SELF-ASSESSMENT REPORT ON THE QUALITY OF EDUCATION IN THE DOCTORAL SCHOOL

Szkoła Doktorska Uniwersytetu Przyrodniczego w Poznaniu

Uniwersytet Przyrodniczy w Poznaniu

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PART A

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VISITING CARD

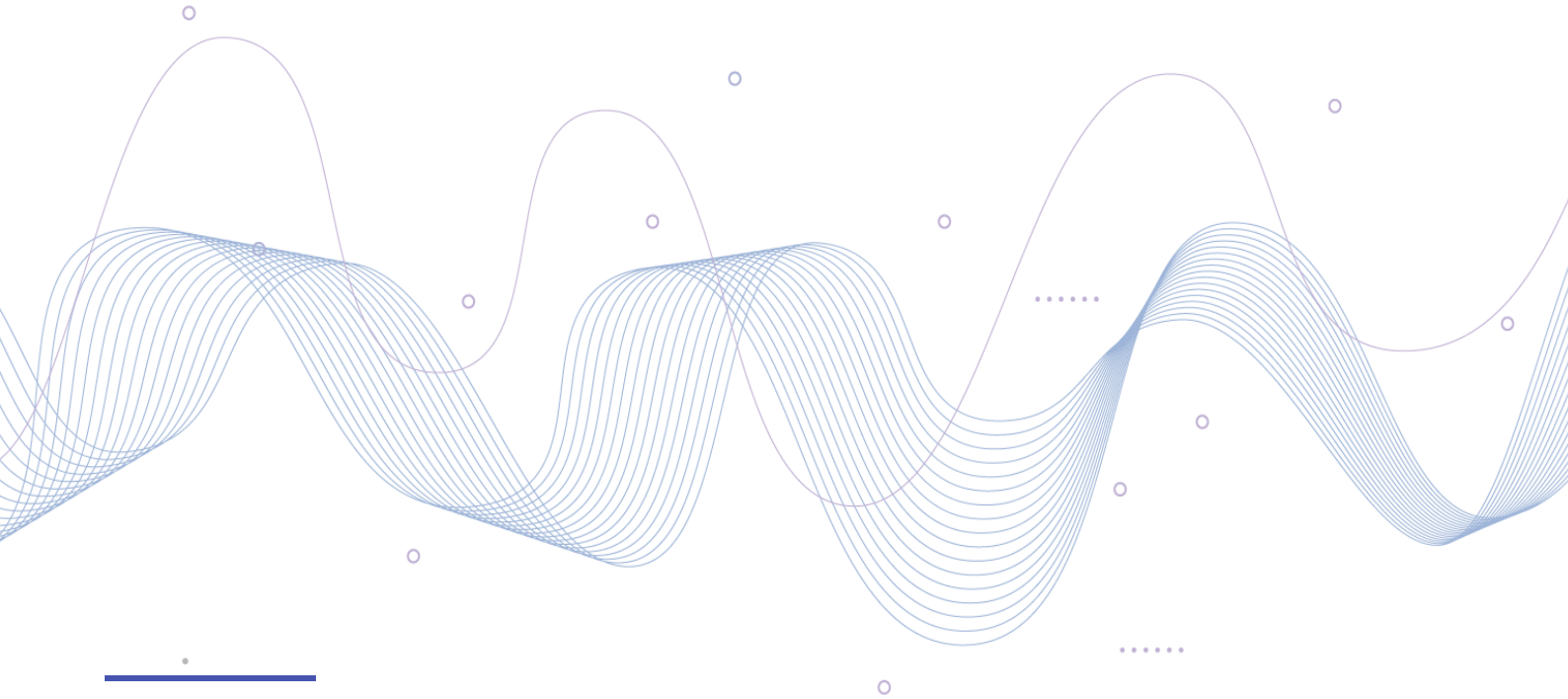
Basic Information about the Doctoral School

Year of Creation

2019

Institution running the doctoral school

Uniwersytet Przyrodniczy w Poznaniu



Field of Education	Education Disciplines
Engineering and technology	mechanical engineering environmental engineering, mining and energy
Veterinary science	veterinary science
Social sciences	economics and finance
Agricultural sciences	agriculture and horticulture food and nutrition technology animal science and fisheries forestry
Natural sciences	biological sciences biotechnology

Name/Scope of the Education Program (PL)	Name/Scope of the Education Program (EN)
Program w Szkole Doktorskiej UPP	PULS Doctoral School Programme
Program kształcenia w Szkole Doktorskiej UPP	PULS Doctoral School Education Programme

Characteristics of the Doctoral School

The Poznań University of Life Sciences Doctoral School (PULS DS) was established on 15 May 2019 by ordinance of the Rector as an organised form of educating PhD students in 9 scientific disciplines: forestry sciences, agriculture and horticulture, food technology and nutrition, veterinary medicine, animal science and aquaculture, mechanical engineering, environmental engineering, mining engineering and power engineering, biological sciences and economics and finance. On 1 October 2024, education at the School was extended to include biotechnology. Research areas are listed in the appendix.

The School's logo represents its mission - a tree, with its extensive root system, branches and leaves, reflects the diversity of scientific research. The tree's roots represent the foundations of knowledge, the branches symbolise development and the diversity of research paths and the leaves the results of scientific work. All together show that gaining knowledge is an organic, complex and continuous process, just like the growth of a tree. Through the education of young researchers, the DS aims to contribute to the growth of this tree, adding new leaves and fruits that will enrich the community of the PULS.

A distinctive feature of the School is the provision of education in English, interdisciplinary seminars for all PhD students in each cohort and a modular teaching system that separates general and disciplinary courses by week or semester. Additionally, candidates and PhD students have access to a website with all information and documents in both language versions and the School Office provides broad support to all PhD students and supervisors, including informational and integration meetings, training organisation and assistance for international PhD students.

The School's administration places strong emphasis on respectful treatment of all participants involved in the educational process. This is reflected not only in the high engagement of the Director in matters concerning both PhD students and their supervisors, but also in the participation of School administrative representatives in doctoral defences and promotion

ceremonies.

When establishing the School, particular emphasis was placed on ensuring a transparent and carefully designed recruitment process, which has been gradually refined over the years based on experience. Recruitment is carried out in the first weeks of July, making it possible to announce a complementary recruitment. This approach has enabled the School to admit 20–30 PhD students annually, of whom 20–25% are international PhD students.

The modular structure of the programme significantly streamlines work on doctoral dissertations without disrupting scientific activities, and it supports PhD students' participation in research visits, internships, and scholarships. An additional advantage of the modular system is that, in the case of justified absence, a PhD student may complete missed classes in the following academic year. As part of the general programme, off-site integration activities are organised after the mid-term evaluation, and — when possible — internationally renowned researchers are invited to participate.

The semester reports submitted by PhD students, containing a description of the implementation of their Individual Research Programmes and the opinions of the supervisor and the Chair of the Committee of Discipline, allow continuous monitoring of progress and enable timely interventions or additional support if needed. Surveys conducted among participants of the School's educational activities also provide important input for optimising the conditions of doctoral education.

Based on the initial years of experience, a document called 'the declaration of rules of cooperation between PhD students and supervisor' was introduced, which has significantly improved the effectiveness of this cooperation.

The mission of the PULS DS is to provide education at the highest level, to build PhD students' soft and analytical skills supported by strong mentors, applying talent-management techniques and offering courses tailored to research needs and individual development. The School strives to be a unit characterised by a high level of academic integrity and interdisciplinarity in its courses and dissertation-related research, positively and effectively contributing to the personal development of PhD students and broadening their scientific and social horizons. At the time of establishing the School, a key objective was that the best graduates would become well-trained PhDs and form a natural academic staff base for PULS. A particular task of the School was to support the implementation doctorate programme so that their results could have a measurable impact on the country's economy.

Strategically, the main development objectives of the School include: ensuring an optimal recruitment process for candidates with strong research potential from both Poland and abroad; fostering the academic and social development of PhD students in all aspects of their training; and maintaining the highest possible quality of doctoral dissertations. Detailed objectives are provided in Appendix 1.
The School's activities to date have yielded many achievements, the most important of which include:
-the vast majority of doctoral dissertations completed at the School are based on collections of scientific publications in peer-reviewed journals,
-a significant number of PhD students can boast very high scores for publications included in their dissertations,
-a high success rate of defended doctoral dissertations relative to the number of admitted candidates,
-a considerable number of grants and scholarships obtained from various sources, including international ones,
-very good cooperation between PhD students, the Self-Government and the School administration.

Active participation of the School's administration in the Polish Association of Doctoral Schools is also an important aspect of its development, based on the exchange of experience.

Further priorities for the continuous development of the School include activities aimed at enhancing the quality of education and steadily improving the quality of research carried out by PhD students across the ten scientific disciplines. We hope to achieve this through the involvement of the most scientifically active supervisors and the University's competent teaching staff engaged in the School. The administration also aims to strengthen the alignment between PhD students' activities and the strategic development goals of individual disciplines by deepening cooperation between the School and the Scientific Discipline Councils. The objective is to ensure that, through comprehensive and interdisciplinary education, future researchers gain the skills and competencies necessary to make meaningful contributions to Polish and global science.

It should be noted that the reporting period includes the years 2020–2022, which coincided with the COVID-19 pandemic.

Additional Information about the Doctoral School

Educating Staff

Numerical data for the evaluation period

Educating Staff	Instructors	Supervisors	Assistant Supervisors
Number of people	96	120	64

Doctoral Students

Number of doctoral students (total): 159

Recruitment during the evaluation period	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2023/ 2024	2024/ 2025	Total
Number of recruited doctoral students	19	34	26	35	29	25	168
Number of doctoral students who completed the doctoral school	12	22	6	0	0	0	40
Number of doctoral students removed from the doctoral student list	5	5	4	6	1	2	23

Mid-term evaluation results	Positive	Negative
Number of Doctoral Students	103	0

Educational Programs	Number of Doctoral Students
PULS Doctoral School Programme	154
PULS Doctoral School Education Programme	7

Additional Numerical Data on Doctoral Students

Number of foreign doctoral students	36
Number of doctoral students with disabilities	6
Number of doctoral students in the Implementation Doctorate program	19
Number of doctoral students in the EU program	2
Number of doctoral students employed by the institution running the doctoral school as academic teachers or research staff	15

Graduates

Numerical data for the evaluation period

Number of graduates who applied for initiation of proceedings for the award of a doctoral degree	38
Number of doctoral students who completed the doctoral school	28

INFORMATION ON THE ENTITY'S COOPERATION WITH THE DOCTORAL STUDENTS' COUNCIL

Cooperation between PULS DS and the Self-Government of PhD Students (S-G) is systemic in nature and arises from the provisions of the Statute, the School Regul. and the Regul. of S-G. The PhD student's representative has right to participate in the Univ. Senate, the Senate Comm. for Acad. Staff and the Univ. Disciplinary Comm. for Acad. Teachers and the Disciplinary Comm. for PhD Students. In addition, PhD students constitute 10% of the SCD.

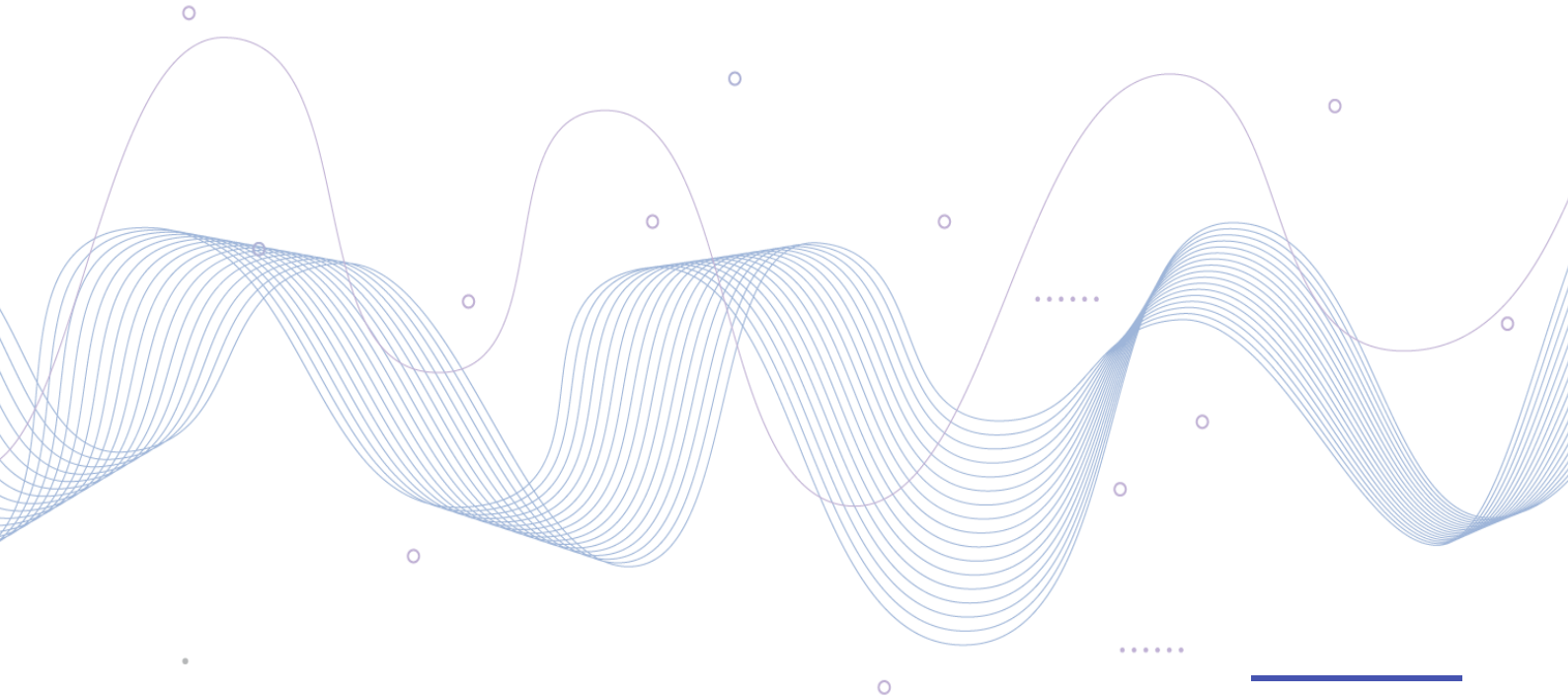
Representatives of S-G participate, with an advisory vote, in the recruitment process, in meetings of the School Council and in the work of the Team for Quality Assurance in the PULS DS.
S-G is effectively involved in key processes: it provides opinions on the DS program, agrees on the School Regul., admission rules and criteria, the mid-term evaluation procedure, which were modified on its initiative. S-G give opinions on draft decisions and resolutions affecting them and express their position on the selection of the Director — which was of particular importance in 2024–25.

Although the Univ. does not operate separate regul. for the allocation of research funding for PhD students from the general subsidy, S-G regularly proposes ideas for supporting research activities, including projects developed in collaboration with the Univ. experimental stations.

Good practices include the ongoing cooperation between S-G and Vice-Rector for Staff and Univ. Develop., the School's Director and administrative staff; regular meetings; as well as recurring integration and scientific events for PhD students, such as the PhD Students' Day or *InterGrill*. Cooperation is conducted in a transparent, partnership-based manner and most matters concerning PhD students are resolved together with their representatives.

Between 2023 and 2025, S-G, working jointly with the School Director and University authorities, negotiated a series of increases in the scholarship. For this activity it was awarded the *ProDok 2025* distinction in the category of *Effective S-G*.

INFORMATION ON THE DOCTORAL SCHOOL GROUPED BY 8 EVALUATION CRITERIA



1. Adequacy of the education program and individual research plans to the learning outcomes for qualifications at PRK level 8 and their implementation

Since the establishment of the School, all classes have been conducted in English — each academic year, the School has admitted a group of English-speaking PhD students.

Conducting the School in English is a considerable challenge for both academic teachers and PhD students, but it is generally assessed positively and perceived as an opportunity to facilitate entry into the international research community, to learn about global scientific achievements, and to present one's own work. For Polish-speaking PhD students, course completions and exams may be conducted in the language chosen by the PhD student.

The programme was designed in accordance with the assumptions of PQF Level 8. In the first year of the School's operation, disciplinary programmes were prepared differently across the disciplines (then seven), and the number of teaching hours was highly varied (from 138 in agriculture and horticulture to 240 in food technology and nutrition). A significant challenge was the construction of programmes in disciplines that had been merged — agriculture and horticulture (formerly agronomy, part of biotechnology, and horticulture) and forestry sciences (formerly forestry and wood technology).

The general programme is delivered in several-day teaching blocks, with two meetings per academic year (November and May). Due to the requirements of PQF Level 8, attendance at both general and disciplinary courses is mandatory, as stated in the Regulations.

The implementation of the programme in weekly blocks for each cohort allows PhD students who miss classes to retake them in the following academic year. The intended structure of the disciplinary programme teaching was similar, which is still in the process of being refined. The disciplinary classes begin in the second semester and, depending on arrangements, may be organised in weekly blocks, spread across the semester, or — in justified cases — arranged directly between lecturers and PhD students

At the end of 2022, a decision was made to unify disciplinary programmes with respect to the number of teaching hours, number of courses, number of exams, and designated weeks for block-based teaching. Due to the large number of disciplines and the extensive scope of their programmes, preparing revised syllabi and aligning the teaching schedules was time-consuming. Currently, disciplinary programmes are more similar in terms of total hours, but due to the diversity of disciplines and thematic scope, certain discrepancies remain (e.g., a higher-than-recommended number of lecturers in some courses or too many seminar hours).

During the reporting period, the general programme underwent minor modifications, and starting from the 2023/2024 academic year, in response to PhD students' needs, the Director changed the order of subjects taught in each year of study. For the purpose of verifying compliance with PQF Level 8, the Chairs of the Committees of Disciplines prepared tables showing the assignment of learning outcomes to each course.

The introduction of Individual Research Programmes (IRPs), subject to mid-term evaluation, raised questions within the University for example, whether modifications are allowed and who bears greater responsibility for programme implementation (PhD student or the supervisor). So far, the principle has remained that no changes are made to the IRP after submission, although the pathway for submitting the document to the Director has been modified.

The IRP was aligned with PQF Level 8 outcomes by designing its structure so that the PhD students plans activities enabling the achievement of those outcomes.
The main components of the IRP include:
-a short description of the doctoral dissertation (research problem, current state of knowledge, originality of the topic, hypothesis and research objective, methodology, and expected outcomes);
-a framework schedule of activities (research tasks presented in a Gantt chart, additional activities with commentary);
-the planned date of dissertation submission (month and year);
-the detailed scope and form of supervisory guidance and expected learning outcomes achieved under supervision;
-the source(s) of funding for research and dissemination of results, and information on provided research infrastructure;
-signatures and opinions.

SUMMARY – SELF-EVALUATION:

The programs (general and disciplinary) were designed in alignment with the assumptions of PQF Level 8, but work is ongoing

to unify the disciplinary programmes. The activities of the Quality Assurance Team in the Doctoral School, including class observations, will support this process.
PhD students and their supervisors differ considerably in their approach to preparing IRPs — some plans are highly detailed, while others are overly general or even superficial.
Disciplinary seminars led by the Chairs of the Committees of Disciplines, who are responsible for the correct construction and implementation of IRPs, are expected to improve this area of the School's functioning.

2. Method of verifying learning outcomes for qualifications at PRK level 8

At the first class of each subject, every academic teacher presents the course syllabus, including the thematic scope, method of verifying knowledge, and the form and criteria of assessment. The teacher also ensures that PhD students understand the approach being applied and have no objections to the stated criteria.

Regarding the general programme, the number of PhD students admitted each year across the disciplines (several per discipline, typically 17–28 in total annually) has made it possible to organise classes effectively, support integration among PhD students, and facilitate interdisciplinary discussions.

In disciplinary classes, working in small groups benefits both sides — it enables a high level of knowledge transfer and allows rapid feedback on the content being delivered. Organising laboratory work or field trips is also significantly more efficient in small groups. In such settings, the teacher can better focus on individual achievements and progress. They can also respond flexibly to circumstances — repeat previously covered content or extend the material when needed.

Syllabuses for all courses in the Doctoral School were initially intended to be uploaded by each lecturer to the University's teaching platform for PhD students. However, an internal survey revealed that this was not always practiced. Therefore, during the attempt to harmonise the programmes, it was decided that all syllabi would be submitted to the School Office and ultimately published on the School's website.

The creation of the general programme posed a considerable challenge due to the wide thematic diversity of the disciplines. The programme is structured into thematic blocks tailored to meet the needs of all PhD students:
-*Research Tools* (38 hours) — consists of three elements: *R package operation* (12 hours, in groups), *Internet of Things* (12 hours, in groups), and *Statistics* (14 hours). This block is taught by three academic teachers, and each subject ends with an individual project.
-*Methodology, Organisation and Financing of Research* (14 hours) — consisting of two elements taught by two academic teachers. Assessment is based on preparing a draft scientific project application.
-*Global Environmental Problems* (26 hours) — includes five elements focusing on: general environmental knowledge, climate change, agricultural production and its environmental impact, extreme phenomena, and philosophy of nature. These subjects are taught by five academic teachers who are experts in the respective fields, and the block ends with a test exam.
-*Interdisciplinary Seminar* (60 hours) — consisting of semester classes during which PhD students present the progress of their doctoral dissertations. This is the most effective way for PhD students from different disciplines to broaden their research horizons, enabling interdisciplinary perspectives on their research problems. It also facilitates discussions that can lead to research collaborations (which has already happened several times).
To further enhance interdisciplinarity, several seminars hosted invited speakers who presented scientific achievements from various fields. Distinguished guests included: Prof. Zbigniew Kundzewicz and Prof. Piotr Tryjanowski — both laureates of the collective Nobel Peace Prize awarded to the IPCC; Prof. Christoph Randler from the University of Tübingen, a world-renowned expert in biological education; and Dr. Sławomir Murawiec from the Medical University of Warsaw — an internationally recognised psychiatrist.
In addition to these blocks, the general programme includes two subjects:
-*Scientific Writing* (6 hours) — taught by a distinguished expert in genetics, a member of the Polish Academy of Sciences, with over 300 scientific publications; completed with a pass.
-*Pedagogy* (12 hours) — taught by an experienced psychologist, educator, and crisis consultant; completed with an exam.
Full completion of the general programme requires passing five exams and obtaining eight ungraded credits over the four-year course of study. Exams are written tests, while ungraded credits typically involve preparing an individual project or a presentation delivered during the interdisciplinary seminar.

The disciplinary programmes were prepared by the Scientific Discipline Councils, each using its own approach. As previously mentioned, the number of teaching hours initially varied significantly (from 138 in agriculture/horticulture to 240 in food technology), and a 2022 School Council resolution aimed to harmonise these programmes in terms of teaching hours, number of subjects, exams, and designated block weeks.

In constructing both the general and disciplinary programmes, traditional methods of assessing acquired skills were adopted — ungraded credit, graded credit, and exams (graded on a scale from 2.0 to 5.0, where 2.0 is a fail and 5.0 is very good). Given that the School offers nearly 150 subjects in total, the methods of verifying PhD students' knowledge are correspondingly diverse.

Verification methods include, in addition to traditional written or oral examinations: preparation of a project or project draft, correctly performing an experiment, evaluating participation in discussions, assessing teamwork, assessing the functioning of a measurement device, analysing data collected through individual work, writing essays, conducting structured interviews,

debates, brainstorming sessions, preparing reports or protocols, and more.
Forms and criteria for passing courses include: active participation in classes, presentation of team project results, oral or written exams, multimedia presentations, preparation of graphic materials, scientific discussions, written tests, oral presentations, final reports, laboratory protocols, and attendance requirements.

The implementation of the Individual Research Programme (IRP) is monitored through semester reports, the mid-term evaluation report, and the final IRP implementation report (signed by the PhD student, supervisor(s), and the Chair of the Committee of Discipline, and approved by the Director).
Based on experience, the pathway for submitting IRPs has evolved:
-2019/2020 — IRPs approved by the Committee of Discipline were then confirmed by the Scientific Discipline Council.
-2020/2021 — IRPs were submitted to the Director and forwarded for approval to the Scientific Discipline Council.
-2021/2022 — IRPs were submitted to the Director and then forwarded to the Committee of Discipline.
-2024/2025 — the Committee of Discipline reviews IRPs and provides comments directly to the PhD student, who may revise the IRP before its final submission to the Director.
These changes have streamlined the IRP submission process. Submission timeliness is excellent.

Verification of PQF Level 8 learning outcomes is possible at the time of PhD student's submission of the final IRP report. This report includes: a comparison of planned versus completed IRP tasks; a description of partially or uncompleted tasks with justification; an explanation of how deviations affect the implementation of the doctoral dissertation; and the planned dissertation submission date. Once accepted by the Director, this report forms the basis of the formal opinion on the PhD student's course of study.

Since the School was established, several surveys have been conducted among PhD students to assess the adequacy of educational methods and programme organisation. Each survey was available in both Polish and English (or only in English). Meetings were also held to gather opinions that could support improvements in programme implementation.
Surveys conducted among PhD students included:
- a general survey on ideas for improving the School,
- a survey evaluating mid-term assessment procedures (sent to PhD students and to members of mid-term evaluation committees),
- a survey on the programme and organisation of the School,
- a survey evaluating disciplinary programmes.

In addition, an anonymous survey on academic teaching quality in the School is available online — covering all subjects and teachers. As in most universities, the number of respondents is modest, but participation is higher than among regular students.

A further annual survey evaluating supervisory cooperation (introduced in 2023) collects feedback from PhD students, while supervisors evaluate their PhD students in semester reports (including research progress, teaching involvement, and overall cooperation).
The introduction of semester reports enables continuous monitoring of progress by both supervisors and the School Director. Since 2023, these reports must also be signed by the Chair of the Committee of Discipline.

SUMMARY – SELF-EVALUATION:

Given the diversity of disciplines, the high number of subjects, and varying numbers of PhD students per field, verifying PQF Level 8 outcomes is a significant organisational challenge. Priority must be given to optimising disciplinary programmes (harmonising teaching hours, number of subjects, etc.) to facilitate systematic verification of learning outcomes. Regular use of survey results, reports from the Quality Assurance Team, and strengthened cooperation between the Committees of Disciplines and the Scientific Discipline Councils will support the unification of procedures for verifying PQF Level 8 outcomes.

3. Qualifications of academic teachers or research staff conducting education at the doctoral school

The selection of highly qualified academic teachers is one of the most important factors determining the quality of education in the Doctoral School, both in the general programme and in disciplinary courses. For the general programme, the first step involved the preparation of the curriculum by the School's administration in cooperation with the School Council, followed by its adoption by a resolution of the Senate of the University.

The process of selecting teachers was conducted effectively — a group of academic teachers with high scientific and didactic qualifications, confirmed by recognised research achievements, was chosen. The process of establishing disciplinary programmes and selecting teachers followed a similar pattern, although in this case the main responsibility rested with the Committees of Disciplines and particularly their Chairs.

Nearly identical criteria were adopted for selecting academic teachers, reflecting the intention to establish a unified system for the qualification of teaching staff in the Doctoral School. Since all classes in the School are conducted in English, the first selection criterion was a good command of the English language and the ability to communicate freely in this language.

For disciplinary programmes, course coordinators were proposed to the Scientific Discipline Councils by the respective Committees of Disciplines. The choice of coordinators was made by the Discipline Councils based on criteria such as: teaching experience in the subject area, independent researcher status in the case of lecture- and seminar-based courses, and documented scientific achievements relevant to the methods taught in laboratory-based classes.

Course coordinators subsequently proposed co-teachers. The primary criterion for assigning teaching responsibilities was teaching experience in the field related to the course content and/or recognition in the scientific community, demonstrated by research achievements, participation in scientific conferences, and preparation of expert reports for external entities.

In the general programme, these criteria made it possible to assemble a group of academic teachers, most of whom have been teaching in the Doctoral School since its establishment. The group includes six professors, three associate professors, and three PhD-level researchers with significant scientific achievements, supported by important publications or outstanding teaching experience highly rated by students.

The disciplinary programmes include a large number of courses taught by over 90 academic teachers. They have not only teaching experience but also extensive laboratory, field, and primary data collection experience.

The selection of teachers supports not only the acquisition of knowledge and skills relevant to PQF Level 8 but also assists PhD students in their research activities and the implementation of their Individual Research Programmes (IRPs). Regular meetings between the Director and supervisors further foster the exchange of experience and the development of supervisors' competencies.

Teachers involved in the Doctoral School have been or currently are principal investigators of numerous research grants funded from national and international sources. They also demonstrate substantial scientific mobility by undertaking domestic and international research stays. They participate in various staff exchange initiatives, scholarship programmes, and apply for external funding to support research and mobility, including NCN, NCBR, NAWA, EU structural funds, Erasmus+ (KA131 and KA171), COST Actions, CEEPUS, the Fulbright Commission, DAAD, the Dekaban Foundation, and other schemes.

Academic staff at the University participate in training and workshops designed to develop soft skills. This is possible due to a number of University-implemented projects aimed at enhancing staff competencies, including:
-High-Quality Education as an Asset of Young Academic Staff at the PULS (2018–2021), POWER
-Best by Nature! Integrated Development Programme of PULS (2020–2023), POWER
-Best by Nature 2.0 – Integrated PULS Programme (2020–2023), POWER
-Integrated PULS Programme for Innovative Greater Poland (2020–2023), POWER
-Training and Organisational Support in the Process of Admitting International Students to PULS (2020–2022), WTP NAWA
-Excellence in University Didactics (2023), POWER
-Best by Nature! Programme for Developing Teaching Staff at PULS (2024–ongoing), FERS
-Best by Nature! Education for the Needs of the Economy (2024–ongoing), FERS
University staff may also access support from the University's Centre for Support and Development, which provides psychological, pedagogical, mentoring, and organisational assistance.

For the general programme, the most effective method of assessing the quality of teaching is the anonymous evaluation surveys completed by PhD students, in which teachers are assessed in several categories, such as: competence, quality of communication in English, relevance of course topics, clarity of instruction, and attractiveness of classes. Scores range from 0 to 10. Several such surveys have been conducted, and the most recent average scores (0–10 scale) were: modular classes 9.2, programme of classes 8.2, interdisciplinary seminar 8.5. Individual teacher scores ranged from 7.14 to 9.90. Since the School's establishment, survey results have influenced the Director's evaluation of teaching quality. If a teacher receives a score below 7, the Director holds a meeting to discuss the quality of teaching. This has occurred twice — one case resulted in significant improvement, the other in replacing the teacher.

A continuous element of teacher evaluation is also an anonymous survey on all subjects and teachers available on the School's website. PhD students may evaluate six aspects of the classes on a 1–5 scale and add comments. Results are analysed by the Director and may lead to conversations with teachers.

SUMMARY – SELF-EVALUATION:

The strengths of teaching in the Doctoral School include the high scientific and teaching competence of academic staff, extensive experience in research grants, and strong engagement in supporting PhD students' IRPs and overall development. Many teachers have completed various specialised courses, such as academic tutoring or scientific communication.
The School's development strategy envisages the continued expansion of its teaching staff base.

4. Quality of the recruitment process

The financial model adopted at the Poznań University of Life Sciences (PULS), based on the decentralisation of funds, has meant that the admission limits announced by the Rector - upon the Director's request - depend primarily on the availability of funding for the scientific research forming part of the future doctoral dissertation and the doctoral award procedure, as well as on the availability of teaching hours for the PhD student in the unit hosting the dissertation. As a consequence, each year only 2–4 places per discipline are announced. This limited number of places significantly influences the number of applicants: the Doctoral School has received feedback indicating that some candidates decide not to apply due to the high level of competition.

At the PULS Doctoral School, it is an established rule that only candidates who have obtained the consent of an academic staff member from the University to supervise their doctoral project—and who can guarantee appropriate working conditions and access to necessary research infrastructure—may participate in the recruitment process. Candidates wishing to establish cooperation with a potential supervisor may contact the Chairs of the Committees of Disciplines. It also happens that applicants reach out directly to PULS academics after reviewing their publication records or public activities.

Recruitment is announced on the University website (in Polish and English, including banners on both versions of the site) under the "Recruitment" tab. Before applying, all prospective candidates may consult the "For Applicants" tab, which contains detailed information about the School and the admission process. Recruitment is open to Polish citizens (Polish-language admission) and international candidates (English-language admission); the rules are identical, and all information and documents are available in both language versions. In the first year, candidates submitted their documents in paper form directly to the School Office. In subsequent years, online registration has been carried out through the University recruitment system (Polish and English versions). Paper documents are now required only from candidates accepted to the School (entered on the PhD students' list).

At the beginning of the recruitment process, once the accuracy of all submitted documents has been verified, the candidate must pass an English-language proficiency evaluation. The examination committee consists of a language instructor appointed by the Director (employed at the PULS Foreign Languages Centre), one member of the School Council, and an administrative representative of the School Office who oversees the procedure. During the oral exam, the following components are assessed: content of the message, linguistic correctness, vocabulary range, pronunciation, and intonation. Candidates speak about their previous achievements and doctoral concept, which enables verification of their command of specialist vocabulary. A standardised evaluation form is used, with a maximum of 20 points and a minimum passing threshold of 15 points. In the years 2019–2022, the score from the English exam contributed to the overall recruitment score. Currently, the principle is that passing the English exam allows the candidate to proceed to the substantive part of the recruitment. Since 2023, for organisational reasons, the English exam and the interview have been held on the same day, which has proved convenient for candidates. Recruitment is generally held on-site at PULS, while online participation is permitted only in well-justified cases (especially for candidates residing outside Poland).
The recruitment rules adopted in 2019 changed in 2020, 2021, and 2023.
Between 2019 and 2022, the evaluated criteria included:
1.The candidate's accomplishments in studies – up to 10 points
2.Scientific activity – up to 20 points
3.Interview – up to 50 points (30 points for the doctoral concept and 20 for disciplinary knowledge)
4.Knowledge of English (2019–2020: modern foreign language) – up to 20 points
Candidates could also receive points for language certificates (B2 – 10 points; C1 –15 points; C2 – 20 points).

Since 2023, passing the English-language exam is a prerequisite for participating in the subsequent stages of recruitment. Points for certificates are no longer awarded, and every candidate must take the oral exam in English.
After this change, the following components are evaluated:
1.The candidate's accomplishments in studies – up to 20 points
2.Documented scientific activity or professional experience (for candidates to the 'implementation doctorate programme') – up to 30 points
3.Interview – up to 50 points (30 for the doctoral concept and 20 for general disciplinary knowledge)

Regarding the recruitment committee, in the years 2019–2022, candidates from all disciplines were assessed by the School Council, composed of representatives from each discipline (including the Director as Chair) and an advisory representative of Self-Government of PhD Students. The interview was moderated by the Director, and each committee member could ask discipline- or concept-related questions. A key role was played by the representative of the relevant discipline, who discussed detailed disciplinary matters with the candidate. After the interview, additional questions could be asked, followed by a discussion. Each committee member then awarded points in the two categories: disciplinary knowledge and the doctoral concept. Averages were calculated, and combined results formed the ranking list for each discipline.

Since 2023, changes have been introduced: the recruitment committee for each discipline includes the Director as Chair, the Chair and two members of the respective Committee of Discipline, and an advisory representative of the Self-Government of PhD Students. The interview is conducted similarly, with each member evaluating the candidate's disciplinary knowledge and doctoral concept, and averages are calculated.

Scientific achievements are assessed based on documented involvement in student research groups, authorship of articles and conference abstracts, participation in courses, internships, and practical placements, as well as other relevant accomplishments. Candidates may present up to three selected achievements; this limit was introduced to avoid excessive, irrelevant documentation previously submitted by candidates.

In total, candidates may receive a maximum of 100 points across four criteria. The first two relate to past achievements (diploma and documented activity), while the remaining two relate to the future: the quality, originality, and feasibility of the proposed doctoral concept, and the candidate's disciplinary knowledge and competencies.
To be admitted, a candidate must obtain at least 60 points. Based on the total score, a ranking list is created for each discipline, and candidates with the highest scores within the Rector's limit are admitted. If the admission limits are not filled, a complementary recruitment is held in September. At that time, also admission to the "implementation doctorate programme' is announced, following the same procedure.
Comlementary recruitment to research projects may take place at any point during the academic year. The schedule is set by the Director in consultation with the project leader, who may participate in the interview with an advisory vote. For organisational reasons, such recruitment is often combined with the regular admission process.
Candidates with a certified disability may request adjustments to the English exam and interview. All necessary support is also provided by the School's administrative staff.

SUMMARY – SELF-EVALUATION:

The PULS Doctoral School educates candidates in as many as ten scientific disciplines, which posed a major challenge in establishing standard evaluation criteria for all fields. However, particular emphasis was placed on maximising the objectivity of the recruitment process. The quality of recruitment is of great importance at the School, and the entire process is conducted in accordance with the principles adopted by the Senate of PULS. Efforts were made to ensure that document submission was as easy as possible and that the procedure took place in a friendly atmosphere. Recruitment information is easily accessible and clearly presented on the School's website. Recognising that the recruitment period is highly stressful for candidates, great care has been taken to ensure openness to questions and concerns. During and outside the recruitment period, the School's administrative staff remain ready to assist candidates by providing guidance and responding to enquiries by phone, email, or in person at the School Office.

5. Quality of scientific or artistic supervision and support for conducting scientific activities

At the PULS DS, a principle has been adopted whereby each candidate wishing to participate in the recruitment process must submit, within the deadline specified in the announcement, a complete set of documents. These include an application for the appointment of a supervisor (SUP) and a statement, confirmed by the head of the organisational unit, guaranteeing financial resources for the implementation of the PhD dissertation. Only candidates who meet this requirement are admitted to the recruitment process. This rule ensures that only applicants who have obtained the consent of an academic teacher from PULS to supervise their doctoral project—together with the assurance of appropriate working conditions and research infrastructure—take part in recruitment. As a result, most candidates applying to the DS are well prepared for the process, having previously consulted the prospective SUP and often being already known to them from earlier collaboration, for example during the preparation of a master's or engineering thesis. Applicants wishing to establish contact with a potential supervisor may approach the Chairs of the Committees of Disciplines (CD).

SUP are appointed at the request of PhD student, submitted to the Director during the recruitment procedure or—on the basis of a new request—no later than one month after the start of education. In justified cases, the CD may appoint an auxiliary supervisor up to the time of submission of the mid-term evaluation report on the implementation of the IRP and at the latest within 24 months from the start of education. In the event of unforeseen circumstances or other important reasons, or in the case of a duly justified resignation of the supervisor, the CD may appoint a new supervisor at PhD student's request.

Statutory criteria for the appointment of SUP (set out in the Regulations) are applied in each case. Where two SUP are appointed, attention is paid to ensuring that they have complementary scientific competences that provide comprehensive substantive supervision of the PhD dissertation. In the case of implementation doctorate programme, additional support for the implementation of research is provided by an advisor from the company.

At the PULS DS, SUP are appointed by resolution of the CD. In the first year of the School's operation, each CD developed its own concept for appointing SUP. Following consultations, common rules were agreed, and a standard SUP questionnaire and SUP declaration form were prepared.

When appointing SUP, the CD verifies whether the supervisor provides funding for the research and ensures optimal conditions for the preparation of the dissertation. Information on the available research infrastructure and the rules for access to it is also included in the IRP.
To date, 170 supervisors and 73 auxiliary supervisors have been appointed at the PULS DS. In justified cases, changes of supervisor have been carried out. The involvement of supervisors employed at foreign universities is described in the section *Internationalisation*.

In order to ensure high-quality cooperation between PhD students and supervisors, several solutions have been implemented:
1.From the very beginning of the School's operation, on the day of the inauguration, meetings are held between the Director, SUP, and first-year PhD students to present the rules governing the School's functioning, including its structure, stages of education (IRP, reports, mid-term evaluation, dissertation submission, etc.). During the meeting, PhD students and SUP can ask questions. The presentation is then sent in PDF format to all participants, including those who were absent. It should be emphasised that, apart from all PhD students (with only a few absences due to unforeseen circumstances), the majority of SUP attend this meeting.
2.At least once a year, the Director organises a meeting with all supervisors to discuss the functioning of the School, supervisory responsibilities, changes, and other relevant issues. This is an opportunity to clarify questions and doubts raised by supervisors.
3.Experiences of conflict situations between PhD students and SUP have shown that problems most often arise from communication errors, which can be avoided. This conclusion was the basis for introducing, in 2023, a so-called declaration of principles of cooperation between the PhD student and SUP. The purpose of this document is to identify key elements of cooperation so that it is effective and leads to the shared goal of submitting and defending the PhD dissertation. The cooperation model is based on the classic mentor–mentee relationship, meaning that the SUP proposes the rules of cooperation and the PhD student negotiates them. It is emphasised that good cooperation requires regular and open communication. The declaration is a document that provides a list of issues which the SUP should discuss with the PhD student at the beginning of their collaboration.
4.In 2023, named questionnaires on the quality of scientific supervision were introduced and are completed once a year by PhD students (the response rate is very high) and ask for responses on a 1–5 scale to seven short items. In addition, PhD students may add comments and the questionnaire is available only to the DS administration. This allows the School to respond in cases where scores of 1 or 2 (very poor, poor) are given: in such situations, the Director requests a meeting with the PhD student or the SUP (these cases have been rare so far). At the same time, a section on the SUP opinion of overall cooperation with the PhD student was introduced into the semester reports.
5.The Director remains available to both PhD students and SUP regarding supervisory issues or any other matters. Contact is possible by email, phone, or in person at the School Office, where the Director is regularly present.
6.The School Office staff provide administrative and organisational support to SUP on a daily basis between 8:00 and 16:00.

The School's website is also a useful tool, presenting information about education at the DS in a comprehensive way. The site is divided into tiles grouped according to the needs of users: "for SUP", "for PhD students" and "for candidates".
7.PULS also operates a Centre for Support and Development, where any employee of the Uni, PhD student, or student may seek psychological, pedagogical, mentoring, or organisational assistance. Centre is prepared to support persons with disabilities.
In the amended Regulations adopted in 2025, a list of the main tasks of supervisors and auxiliary supervisors was set out.

SUMMARY–SELF-EVALUATION:

Supervision at PULS is exercised in very diverse ways. Many supervisors provide comprehensive support to their PhD students, although there are also those who show excessive or, at times, insufficient involvement in supervisory duties. The numerous solutions introduced by the School administration in this area have significantly improved cooperation between supervisors and PhD students.

6. Integrity of the mid-term evaluation process

The aim of the mid-term evaluation is to verify the progress of the implementation of the IRP in order to detect any irregularities that could result in failure to complete the doctoral dissertation. Due to the novelty of this solution, the concept and purpose of the mid-term evaluation are discussed with PhD students and supervisors already at the inaugural meeting.

At the PULS Doctoral School, the mid-term evaluation is carried out at the end of the fourth semester, most often in September. No later than the end of May, the Director sends the Committee of Discipline a list of PhD students and requests proposals for candidates for members of the mid-term evaluation committee. On the basis of the IRP, the Committee of Discipline, together with the Scientific Discipline Council, proposes members of the mid-term evaluation committee (no later than the end of June), taking into account the competence of proposed members in the subject area of the dissertation. A separate committee is appointed for each discipline. The Committee of Discipline may decide, if needed, to appoint more than one mid-term evaluation committee within a discipline. The rules pay particular attention to ensuring that the PhD student and supervisor are informed sufficiently in advance (at least 60 days before the meeting) about the date of the committee's session.

No later than the end of July, the PhD student submits in person to the Committee of Discipline a report on the implementation of the IRP (the report itself is a written document, and its presentation is delivered using, for example, PowerPoint). The Committee of Discipline forwards the report to the mid-term evaluation committee, which, on the agreed date, conducts an interview with the PhD student and with the supervisor(s) regarding the submitted report. The committee decides on the result of the mid-term evaluation (a positive result requires at least 60 points out of 100 possible) and then orally informs the PhD student and the supervisor of the outcome, providing a concise justification of the decision. The committee prepares a protocol of the evaluation, with the mid-term evaluation form attached. The protocol is public in the sense that the PhD student and the supervisor may consult it at the School Office. A copy of the evaluation form, together with the justification, is provided to the PhD students and to the supervisor(s).

From the outset, the mid-term evaluation procedure at the Doctoral School has been based on the preparation of a report by the PhD student, presenting: the state of implementation of the IRP, the development of scientific achievements during education at the School, and the implementation of the educational programme. From 2025 onwards, the report concerns only the state of implementation of the IRP and the development of scientific achievements, as the Self-Government of PhD Students indicated that the description of programme implementation in the report was unnecessary.

In order to improve the mid-term evaluation procedure, its course in a given academic year is discussed in detail at meetings of the School Council. Information meetings are also organised for PhD students, explaining the principles of the evaluation and presenting the relevant documents and how to complete them. Furthermore, the Director discusses the procedure during interdisciplinary seminars. Since the introduction of the rule that the Chair of the Committee of Discipline leads seminars, the Chair also explains the nature and course of the mid-term evaluation to PhD students.

A survey was also carried out among PhD students and members of mid-term evaluation committees. The results indicated that the rules for conducting the mid-term evaluation at PULS are appropriate, and particular emphasis was placed on the positive aspect of the two-stage process: submission of the report and its presentation before the Committee of Discipline, which allows PhD students to prepare better for the key evaluation before the mid-term evaluation committee.

To date, all mid-term evaluations at PULS have been conducted on time and have resulted in a positive outcome. It is also worth noting that, following the mid-term evaluations conducted so far, the number of unfinished doctoral dissertations has remained low—5 removals from the list of PhD students out of 103 mid-term evaluations.

SUMMARY – SELF-EVALUATION:

Taking into account the consistently positive results of the mid-term evaluations, the changes introduced, and the positive feedback from PhD students, it may be concluded that the reliability of the mid-term evaluation process at the PULS Doctoral School is high. To date, the School administration has not received any signals questioning the substantive quality, transparency, or impartiality of the evaluations.

7. Internationalization

A distinguishing feature of the PULS Doctoral School is that all education is conducted entirely in English, and all additional training and events organised within the School are also held in this language. Doctoral dissertations may be defended either in Polish or in English. This reflects the School's openness to PhD students from outside Poland.

PhD students participate in international conferences, for which they may obtain funding, for example under the PREIDUB project implemented at PULS. While implementing their Individual Research Programmes (IRPs), PhD students take part in international projects (NAWA, HORIZON, COST) and publish scientific articles together with researchers from outside Poland. Twenty-five PhD students have taken advantage of the Erasmus+ programme, undertaking 2- or 3-month research stays. PhD students may also attend lectures delivered under Erasmus+, the "Academic and Scientific Poznań" initiative, as well as activities organised by student research groups.

Academic staff of PULS are informed, via announcements from the International Exchange Office (DWM) published in the University Newsletter, about all available forms of mobility, scholarship schemes, and opportunities to apply for external funding to support mobility from domestic and foreign sources (including NAWA, NCN, Erasmus+ KA131 and KA171 actions, COST Actions, CEEPUS, the Fulbright Commission, DAAD, the Dekaban Foundation, EU funds and others). Bilateral staff exchange programmes are also implemented as part of teaching and research cooperation based on agreements or Memoranda of Understanding concluded by PULS, as well as through the University's membership in international organisations. In each case, interested staff may rely on informational and organisational support from the International Exchange Office. Where necessary, the Vice-Rector for International Relations provides consultations on obtaining funding for mobility. Mobility and efforts to develop new contacts are promoted by the University authorities, deans, and heads of departments, who recognise activity in this area, for example during staff appraisal or in bonus systems. At an employee's request, the teaching load may be adjusted and scheduled in such a way that classes can be carried out without difficulty before or after a long-term mobility period. PhD students of the Doctoral School may participate in selected mobility schemes.

Foreign academic staff are invited to deliver open lectures and classes under the PREIDUB programme, Erasmus+, CEEPUS, COST Actions, and the "Academic and Scientific Poznań" initiative. The travel and stay of visiting lecturers in Poland are fully funded from project resources. The PREIDUB programme also finances longer visits of foreign lecturers to Poland in the form of visiting scholar placements. In addition, faculties may offer foreign professors paid teaching at PULS, amounting to at least 60 teaching hours. Visits by lecturers and PhD students are also organised under cooperation agreements or Memoranda of Understanding concluded by PULS, as well as through research projects funded from domestic and foreign sources.

Within disciplinary programmes, lectures have been delivered, among others, by: Prof. Zora Varady DVM, Institute of Animal Physiology, Centre of Biosciences of the Slovak Academy of Sciences, Slovakia; Prof. Juha Kantanen and Prof. Jaana Peippo, Natural Resources Institute (Luke), Finland.

The participation of supervisors or auxiliary supervisors employed at universities outside Poland has not yet been extensive and has involved three PhD students whose supervisors were: Prof. Hieronim Jakubowski (PULS and Rutgers University, USA), Prof. Piotr Tryjanowski (PULS and Technische Universität München (TUM), Germany), and Prof. Magdalena Zielińska-Dawidziak (PULS and Bohai University, China).

The international visibility of the Doctoral School is enhanced through promotional activities carried out during direct visits to partner universities and meetings with existing and potential partners at PULS. In the past academic year, active discussions on developing teaching and research cooperation were conducted, among others, with universities and institutes from India, China, Indonesia, Japan, Turkey, Serbia, Bosnia and Herzegovina, Ukraine, Uzbekistan, and Kazakhstan. In addition, PULS is represented at international education fairs (e.g. in Kazakhstan, Azerbaijan, and Turkey). Representatives of PULS regularly participate in rectors' fora and round-table meetings organised, among others, with universities from Uzbekistan and Turkey, where they present the University's teaching and research offer. Foreign study visits and staff mobilities are further opportunities to promote the University. For example, each staff member participating in Erasmus+ mobility is required to present their home institution at the host university. The Vice-Rector for International Relations participates in and organises online meetings with potential foreign partners, presenting the research and teaching potential of PULS. Promotion of the University is also carried out via its English-language website and social media. Graduates of PULS, who highly rate their studies, contribute effectively to the promotion of the University's offer through word-of-mouth marketing. This results not only from the high quality of educational services and the relevance of degree programmes to the contemporary labour market, but also from the support provided and events organised at PULS.

The participation of PhD students from outside Poland in the Doctoral School is very good and averages 20% of the School's total doctoral population (each cohort includes several foreign PhD students). The Doctoral School also hosts a doctoral project implemented within the MSCA (Marie Skłodowska-Curie "Doctoral Networks 2021") international doctoral network.

Support for international PhD students is provided through clear and transparent information on the School's website, guaranteed accommodation in PULS student dormitories, and information meetings. PhD students are included in integration events organised by PULS, including those specifically dedicated to PhD students (such as Doctoral Student Days and the "Inter-grill").

During the evaluation period, the Doctoral School educated 159 PhD students, including 39 international candidates:
-2019/2020 intake: 3 PhD students (Bangladesh, Rwanda, Turkey)
-2020/2021 intake: 4 PhD students (Nigeria, Slovakia, Kosovo, Indonesia)
-2021/2022 intake: 9 PhD students (Nigeria, Spain, Egypt, India, Turkey, Iran, Indonesia)
-2022/2023 intake: 10 PhD students (Turkey, India, Kosovo, Bangladesh, Pakistan, Iran, Indonesia)
-2023/2024 intake: 8 PhD students (Indonesia, Nigeria, France, Croatia, Egypt, Turkey, Pakistan)
-2024/2025 intake: 5 PhD students (Nigeria, Rwanda, Ethiopia).

SUMMARY – SELF-EVALUATION

International mobility of staff and PhD students is good, and PULS offers a wide range of opportunities for developing international cooperation. The strategy for further internationalisation of the Doctoral School includes: engaging auxiliary supervisors from partner universities outside Poland, seeking to conclude co-tutelle agreements, increasing participation in international doctoral networks, and organising an international conference for PhD students.

8. Effectiveness of doctoral education

Percentage of individuals who obtained a doctoral degree	Doctoral students who applied for initiation of proceedings for the award of a doctoral degree	Doctoral students who were awarded a doctoral degree	Doctoral students who were denied the award of a doctoral degree
in the number of doctoral students who completed their education at the doctoral school during the evaluation period	95 %	70 %	0 %
in the total number of doctoral students who completed their education at the doctoral school	81 %	60 %	0 %

At the PULS DS, the submission of the PhD dissertation—attached to the application for the initiation of the PhD degree conferral procedure—results in the Dean's Office issuing a certificate, the date of which constitutes the official completion date of the DS. To date, all PhD students who have completed their education have had the PhD degree conferral procedure initiated. None has exceeded the statutory extension period, and there have been no cases of refusal to award the PhD degree.

During the reporting period, 40 PhD students submitted their dissertations and initiated PhD degree conferral procedure and 30 of them have already obtained the PhD degree. As many as 11 dissertations received distinctions.

The Director met with graduates from the first intake to discuss the concept of the School. The graduates praised the modular course delivery, the personalised approach to PhD students, the high standard of education and their satisfaction with the skills they acquired during their time at the School. The final seminar of the fourth year is also devoted to discussing issues related to the implementation of education at the School and its assessment by PhD students.

PULS DS plans to monitor graduate careers through surveys, and for this purpose, contact information (email addresses and phone numbers) is being collected.

SUMMARY–SELF-EVALUATION:

Considering the number of submitted PhD dissertations and PhD degrees awarded relative to the number of recruited PhD students, the effectiveness at the PULS DS is good. The awards demonstrate the high recognition the reviewers place on the PhD students' work. There is no doubt that the introduction of doctoral training programs with a specific format encourages PhD students to meet deadlines. It is also worth emphasizing that the number of withdrawals is most often due to health or personal reasons; in only a few cases were removals from the list of PhD students due to the PhD student's failure to fulfill their obligations.

1. veterinary science

Achievement Description

no PhD students have been recruited in the discipline veterinary medicine so far

2. environmental engineering, mining and energy

Achievement Description

Within the discipline of Environmental, Mining and Power Engineering, PhD students conduct advanced scientific research of a high substantive quality in the areas of sustainable environmental management, modern energy technologies, and the safe exploitation of natural resources. The quality of their work is evidenced by the publication of research results in renowned, indexed international scientific journals. Experimental, modelling, and field studies are carried out in cooperation with national and international research institutions as well as with industry partners operating in the environmental, mining, and energy sectors. The research results are presented at national and international scientific conferences.

Moreover, PhD students engage in science-popularisation activities by participating in educational and outreach events addressed to a wide range of audiences.
The most important achievements of PhD students within this discipline include the following publications:

Agaj, T. (2025). *Integrating AHP and MCDA for flood risk assessment in Kosovo: a catchment-based perspective.* Natural Hazards, 121, 10711–10747. https://doi.org/10.1007/s11069-025-07212-4 (70 pts, IF 3.7)
The study presents a flood risk assessment in Kosovo by integrating AHP (Analytic Hierarchy Process) and MCDA (Multi-Criteria Decision Analysis) in a catchment-based framework. A set of hydrological, geomorphological, and anthropogenic factors was standardised and weighted using AHP, and then combined into an integrated risk assessment model. The analysis enabled the identification of areas at the highest risk, highlighting the importance of urbanisation pressure, land-use changes, and topographic conditions. The publication provides an effective tool supporting spatial planning, flood-risk management, and the design of preventive measures. The integration of AHP and MCDA allows for more precise and transparent decision-making in flood protection, especially in regions undergoing dynamic land-use change.

Kocięcka, J.; Stróżecki, M.; Juszczak, R.; Liberacki, D. (2023). *Effect of Subirrigation and Silicon Antitranspirant Application on Biomass Yield and Carbon Dioxide Balance of a Three-Cut Meadow.* Water, 15, 3057. https://doi.org/10.3390/w15173057 (100 pts, IF 3.0)
The study analyses the effects of controlled groundwater table levels and the application of a silicon-based antitranspirant on biomass yield and CO_2 exchange in a three-cut meadow equipped with a subirrigation system. The results show that maintaining a higher groundwater table increased plant productivity and improved the carbon balance. The application of the silicon preparation reduced transpiration, which, under variable water-availability conditions, supported the stability of photosynthetic and growth processes. The findings are valuable for developing agricultural practices that enhance drought resilience and improve the carbon balance of grassland ecosystems.

Antala, M.; Juszczak, R.; van der Tol, Ch.; Rastogi, A. (2022). *Impact of climate change-induced alterations in peatland vegetation phenology and composition on carbon balance.* Science of The Total Environment, 827, 154294. https://doi.org/10.1016/j.scitotenv.2022.154294 (200 pts, IF 8)
This study examines how climate-driven changes in peatland vegetation phenology and composition influence the carbon balance of these ecosystems. It demonstrates that warming and altered hydrological conditions lead to an earlier onset of the growing season, shifts in species dominance, and an increasing share of vascular plants at the expense of Sphagnum mosses. These changes significantly affect CO_2 exchange between peatlands and the atmosphere, potentially weakening their role as long-term carbon sinks. The publication provides essential knowledge for assessing the resilience of peatlands as climate-regulating ecosystems and supports improved prediction of their responses to climate change, as well as the design of conservation and management strategies that protect their carbon-sequestration capacity.

Cakaj, A.; Lisiak-Zielińska, M.; Drzewiecka, K.; Budka, A.; Borowiak, K.; Drapikowska, M.; Cakaj, A.; Qorri, E.; Szkudlarz, P. (2023). *Potential Impact of Urban Land Use on Microplastic Atmospheric Deposition: A Case Study in Pristina City, Kosovo.* Sustainability, 15, 16464. https://doi.org/10.3390/su152316464 (100 pts, IF 3.3)
The study investigates the influence of various types of urban land use on atmospheric microplastic deposition in the city of Pristina (Kosovo). The highest microplastic concentrations were recorded in areas with heavy traffic and dense urban fabric, indicating a strong relationship between anthropogenic pressure and pollution levels. Morphological analysis revealed a dominance of synthetic fibres, suggesting a significant contribution of municipal and transport sources. The findings may support the development of emission-reduction strategies and sustainable urban-planning solutions. The publication also highlights the need for monitoring microplastic air pollution as an emerging environmental threat.

Różańska, M.A.; Harenda, K.M.; Józefczyk, D.; Wojciechowski, T.; Chojnicki, B.H. (2025). *Digital Repeat Photography Application for Flowering Stage Classification of Selected Woody Plants.* Sensors, 25, 2106. https://doi.org/10.3390/s25072106 (100 pts, IF 3.5)
The authors present an innovative method using a single camera (digital repeat photography) to identify flowering stages in 12 tree species based on RGB parameter analysis and machine-learning models. The applied k-nearest neighbours algorithm enabled accurate prediction of the onset of flowering (error 0–5 days) and, for nine species, estimation of the flowering duration. The method proved effective when clear crown-colour changes occurred during the flowering period. The study provides a low-cost and repeatable tool for vegetation monitoring in the context of climate change. The proposed automation of phenological classification enhances measurement precision and supports long-term ecosystem monitoring and conservation planning.

3. food and nutrition technology

Achievement Description

In addition to extensive scientific activity—including applying for research grants, participating in numerous national and international conferences, undertaking research internships at leading centres in Poland and abroad, and publishing research results in prestigious scientific journals—PhD students conducting research in the field of food technology and nutrition have also achieved impressive successes on the international stage. Among the distinctions confirming both the high level of the PhD students' substantive competencies and the innovativeness of their research projects are award-winning competition results, implementation achievements, and externally funded grants.

One of the most significant international accomplishments is the first-place award in the prestigious global *Developing Solutions for Developing Countries (DSDC)* competition organised by the Institute of Food Technologists (IFT) in Chicago (USA) for 2021–2022. The project by Marcellus Arnold, MSc, and Yolanda Rajagukguk, MSc, was recognised as the best product-based solution addressing the needs of developing countries, confirming the global relevance of their applied research. In 2024, Iskandar Harahap, MSc, was awarded a Travel Grant and received the status of Invited Speaker (2024). He was also a finalist for the Young Research Award (2024) and an awardee of the Doctoral Research Grant (DAAD, 2023). In the same year, two PhD students—Marcellus Arnold, MSc, and Yolanda Rajagukguk, MSc—achieved another success, winning first place in the international *"Rose Spiess" Video Competition*, organised by the International Union of Food Science and Technology (IUFoST) during the congress in Rimini, Italy. The awarded video addressed modern solutions in food technology, and the distinction confirms both their science communication abilities and the scientific merit of the presented research.

Moreover, Marcellus Arnold and Yolanda Rajagukguk demonstrated entrepreneurship and the ability to commercialise research findings by winning first place in the *StartUPP! PULS* business model competition (2023), organised by the Innovation and Technology Transfer Centre of the Poznań University of Life Sciences. The success in designing business models confirms the PhD students' versatile competencies in both research and business/implementation aspects related to the development and deployment of innovative food technologies.
A significant area of achievements also includes patents, including four patent applications submitted by Marcin Dziedziński, MSc Eng. (2020–2023), and four applications in Indonesia submitted by Iskandar Harahap, MSc (2019–2023).

In addition to competition achievements, PhD students obtained external funding through competitive research calls, such as NCN *Preludium* grants. Among the beneficiaries were: Iskandar Harahap, MSc – Preludium 20 (2021–2025), Natalia Wawrzyniak, MSc Eng. – Preludium 20 (2022–2026), Agata Daria Jankowska (Zaremba), MSc Eng. – Preludium 22 (2024–2025), Yolanda Rajagukguk, MSc – Preludium 22 (2024–2025), Marcellus Arnold, MSc – Preludium 22 (2024–2025), and Ribi Multisona, MSc – Preludium 23 (2025–2026). Doctoral students also received funding from other sources—for example, Jakub Biegalski, MSc Eng., served as a researcher in the SUP-RIM project in 2024, while Marcin Dziedziński, MSc Eng., received funding under the "Innovation Incubator" programme (2021).

PhD students at the Poznań University of Life Sciences Doctoral School also received numerous awards at conferences. For instance, Mahbuba Islam, MSc, received the *Scientific Commission Award – 1st Place in the Poster Session* at the IXth International Session of Young Scientific Staff in 2022, while Iwona Kawacka, MSc, won first place for the best oral presentation at the 2nd National Conference of Students and Doctoral Candidates in 2021. An important component of the PhD students' scientific achievements is publishing in top-tier journals. An example is the 2023 article by Bukola Adenuga titled *"A systematic review of DNA-based methods in authentication of game and less common meat species"*, published in *Comprehensive Reviews in Food Science and Food Safety*, which has an impact factor of 14.

Awards received in international industry competitions related to the discipline of food technology and nutrition confirm the high level of the technological solutions developed by the PhD students and demonstrate their ability to combine academic knowledge with practical needs of the food sector. The broad spectrum of activities and achievements of the PhD students indicates their significant contribution to the development of the discipline of food technology and nutrition, strengthening both the scientific standing and international visibility of the Poznań University of Life Sciences as an institution conducting research at the highest global level.

The five most important achievements of PhD students in the discipline of Food Technology and Nutrition include:
1.**First place in the Developing Solutions for Developing Countries (DSDC) competition** – Marcellus Arnold and Yolanda Rajagukguk, 2021–2022, Product Development Competition, Institute of Food Technologists (IFT), Chicago, IL, USA. (https://www.ift.org/-/media/feeding-tomorrow/files/feeding-tomorrow-fund-2022-annual-report.pdf)
2.**First place in the "Rose Spiess" Food Technology Video Competition (2024)** – Yolanda Rajagukguk and Marcellus Arnold, International Union of Food Science and Technology (IUFoST), Rimini, Italy. (https://youtu.be/cX86KINJp6w?si=nkAhKj19nLYDNUI_; https://iufost2024-italy.com/wp-content/uploads/2024/09/IUFoST_Press-Release-Sept-10.pdf)
3.**First place in the StartUPP! PULS business model pitching competition (2023)** – Yolanda Rajagukguk and Marcellus Arnold, Innovation and Technology Transfer Centre, Poznań University of Life Sciences, Poznań, Poland. (https://ciitt.up.poznan.pl/aktualnosci/ogloszenia/demoday-final-projektu-startupp-puls)

4.**Six NCN Preludium projects:**
Iskandar Harahap, MSc – Preludium 20 (2021–2025);
Natalia Wawrzyniak, MSc Eng. – Preludium 20 (2022–2026);
Agata Daria Jankowska (Zaremba), MSc Eng. – Preludium 22 (2024–2025);
Yolanda Rajagukguk, MSc – Preludium 22 (2024–2025);
Marcellus Arnold, MSc – Preludium 22 (2024–2025);
Ribi Multisona, MSc – Preludium 23 (2025–2026).
5.**A publication co-authored by Bukola Adenuga, MSc**, in *Comprehensive Reviews in Food Science and Food Safety*, with an impact factor of 14.1 and 200 MNiSW points:
A systematic review of DNA-based methods in authentication of game and less common meat species. Comprehensive Reviews in Food Science and Food Safety, 2023, 22(3). DOI: 10.1111/1541-4337.13142.

4. animal science and fisheries

Achievement Description

PhD students in the discipline of Animal Science and Aquaculture actively participate in the implementation of scientific projects.

Ms **Dagmara Łodyga**, MSc, is involved in the project *mEATquality* (Horizon 2020). As part of the project, she participated in field research and data collection on pig farms in Poland. The project was carried out simultaneously in Italy, Denmark, and Spain. To support the implementation of the project, the PhD student completed the following training:
1. **Animal welfare training – "Training Reports Session 1"**, 28–29 March 2022, Department of Animal Breeding and Raw Materials Evaluation in Złotniki: An international session aimed at practically consolidating the principles of conducting the welfare protocol on individual farms as part of the ongoing research.
2. **Animal welfare training – "Training Reports Session 2"**, 23–24 May 2022, Council for Agricultural Research in Bologna (Italy).
The PhD student collected, organised, processed, and entered data into the system. The results were presented orally at conferences:
1. Łodyga D., Zaworska-Zakrzewska A., Kasprowicz-Potocka M., Sell-Kubiak E. (2023). *How do pig producers in small and medium farms cope? – a case study.* XLIX Scientific Session of the Animal Nutrition Section of the Committee of Animal Sciences, PAS, Lublin.
2. Łodyga, D., Kasprowicz-Potocka, M., Zaworska-Zakrzewska, A., Reyes-Palomo, C., Rodriguez-Estevez, V., Sell-Kubiak, E. (2025). *"QuickScan" – a rapid calculator for assessing the sustainability of pig farms across Europe.* Scientific Seminar within the 17th Winter School of Prof. Marian Różycki, Ustroń, 10–13 February, Poland.
The outcomes of this international collaboration include both the **"QuickScan" calculator** and the publication:
"Economic resilience in intensive and extensive pig farming systems", Giglio, L., Rousing, T., Łodyga, D., Reyes-Palomo, C., Fernández, S.S., Soffiantini, C.S., Ferrari, P., under review in *Sustainability*, 2025, 17(15), 7026 (IF 3; 100 pts MNiSW).
(**example achievement 1**)

PhD students also receive significant distinctions, including Ms **Patrycja Dobrzyńska** (implementation PhD), who was awarded the **Honorary Medal of the Minister of Agriculture and Rural Development "Meritorious for Agriculture"** in 2023 (**example achievement 2**)

An important achievement of the PhD students is obtaining research funding with the support of their supervisors, such as the funding acquired and the role of R&D Manager in the regional project *"Development of an innovative technology for rearing meat geese, considering the bioactive properties of gamma-glutamic acid as a feed additive and a bedding additive improving animal welfare and the quality of compost used for fertilisation"* (6/FELB/2025), secured by Ms Patrycja Dobrzyńska (**example achievement 3**)

Active participation in conferences and scientific symposia is recognised and awarded by organisers. For instance, at the **24th European Symposium on Poultry Nutrition (2025)** in Maastricht, the Netherlands, **Mr Piotr Szymkowiak** received the **Main Award – ESPN Sustainability Award for Early Career Researchers** for the best poster/oral presentation focusing on sustainable poultry nutrition, for the poster:
P. Szymkowiak, M.R. Aslam, Z. Klinger, M. Rawski, M. Hejdysz, S. Kaczmarek, B. Kierończyk, D. Józefiak. *Evaluation of the metabolizable energy regression model for black soldier fly larvae fat in broiler chicken diets.*
The award-winning poster is the result of collaboration between the PhD student, the supervisor, and an interdepartmental research team (**example achievement 4**)

An important achievement of PhD students, resulting from the implementation of their Individual Research Programmes

and the requirements associated with preparing their doctoral dissertations, is the publication of research results in reputable scientific journals. An example is the publication:
Aslam, M.R., Kierończyk, B., Rawski, M., Szymkowiak, P., Stuper-Szablewska, K., Kołodziejski, P., ... & Józefiak, D. (2025). *Insect fat influences broiler performance, meat quality, and the cecal microbiota similarly to plant oils rather than animal fats. Scientific Reports*, 15(1), 1–16. (IF 3.9; 140 pts MNiSW) (**example achievement 5**)

5. biotechnology

Achievement Description

Mr. **Maciej Lenort**, M.Sc. Eng., a second-year PhD student at PULS DS, is involved in research related to plant biotechnology and actively publishes in journals with a high IF index, in which he is the first author (achievement 1: scientific publication: Lenort Maciej, Tomkowiak A, Sobiech A, Bocianowski J, Jarzyniak K, Olejnik P, Jamruszka T, Gawrysiak P.: DArTseq-Based, High-Throughput Identification of Novel Molecular Markers for the Detection of Fusarium Resistance in Maize. INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES Impact Factor: 4.900 MNiSW points:140.000; https://doi.org/10.3390/ijms262110534).

Ms. **Natalia Krówczyńska,** a third-year PhD student at DS in the field of biotechnology, in addition to advanced research, publishes review papers related to plant genetics. In this publication, she serves as the first author and corresponding author (achievement 2: scientific publication: Krówczyńska Natalia., Pietrowska-Borek M. (2025). From signal perception to adaptive responses: A comprehensive review of plant mechanisms under cadmium, lead, and aluminum stress. Environ. Exp. Bot. 238, 106240; https://doi.org/10.1016/j.envexpbot.2025.106240).

Ms. **Krówczyńska** is also active at international conferences (achievement 3: active participation in the conference: Krówczyńska Natalia., Wojdyła-Mamoń A., Pietrowska-Borek M. 2025. Stilbene biosynthesis in grapevine: A new perspective on the role of purine-based signaling molecules. In: Plant Biology Europe 2025 (The Federation of the European Societies of Plant Biology (FESPB) and the Hungarian Society for Plant Biology), Budapest, Hungary. Book of abstract: _P-159, p. A-182, ISBN 978-615-6833-02-0).

Mr. **Adam Jasiok**, a second-year PhD student at PULS DS, is a co-author of publications in journals of very high international standing (achievement 4: Scientific publication: Nikola Musiała-Kierklo, Patrycja Plewka, Adam Jasiok, Ewa Stepniak-Konieczna NAR Breakthrough Article NAR Breakthrough Article Promoter-targeted small RNA duplexes increase MBNL1 transcription and mitigate myotonic dystrophy-associated spliceopathy. Nucleic Acids Research, 2025, 53; https://doi.org/10.1093/nar/gkaf756.) This work has been highlighted by the NAR editors as a breakthrough scientific work (so-called "breakthrough article"). "Breakthrough" articles are those that solve a long-standing problem in their field or provide unique, new insight and understanding in a given area of research, which clearly motivates and defines new research opportunities and directions. These awards recognize only the top 1-2% of articles received by NAR for publication, and are additionally considered and disseminated after publication.

In addition to her research and publication activities, Ms. **Zuzanna Gonera,** a fourth-year PhD student at PULS DS, completed a research internship (achievement 5) at the Institute of Animal Genetics and Biotechnology of the Polish Academy of Sciences in Jastrzębiec (July 2025) in the Department of Experimental Embryology (supervised by Dr. Anna Piliszek and Dr. Silvestre Sampino). The internship covered topics in experimental embryology and developmental biology of laboratory animals (mice and rabbits) and farm animals (sheep).

6. forestry

Achievement Description

Due to the wide range of research topics within the discipline of forestry sciences, scientific collaboration is crucial for its internal integration. The publications presented below are examples of the collaboration of PhD students from different cohorts representing this discipline in the creation of scientific works.

Creative activity in the materials, products, and technologies development, is of great importance for the scientific development of PhD students. These activities result in patent applications.
PhD students in the discipline of forest science actively participate in international and national projects related to the development of modern technologies in forestry and woodworking, which is closely related to the educational profile of the Doctoral School.

We point out as examples of the achievements of our PhD students
• Publication: **Pędzik M.**, Kwidziński Z., Janiszewska-Latterini D., Rogozinski T. (2024) Particle board from the residue of wooden door production as a closed material cycle. Industrial Crops and Products, 222, 119653, https://doi.org/10.1016.j.indcrop.2024.119653 (IF 5.6; MNiSW point 200)
• Publication: **Karol Tomczak**, Ferréol Berendt, Piotr Mederski, Arkadiusz Tomczak, Tobias Cremer, Maciej Piotrowski, **Jennifer Kowalska**, Thomas Purfürst, Felipe de Miguel-Díez, (2025). Accuracy, repeatability, and time consumption of selected digital measurement methods of roundwood stacks. Measurement, 245, 116640, https://doi.org/10.1016/j.measurement.2024.116640. (IF 5.2; MNiSW points – 200)
• Patent application: P.439195 - **Jasińska A.,** Sydor M. (2021) Furniture adapting to changing needs and room dimensions.
• Patent application: P.435052 - **Tokarczyk M.**, Behrendt A. (2023) Method for manufacturing an ultralight cellular board on blocks and an ultralight cellular board on blocks. Scope extensions at the European Patent Office under the number PCT/PL 2023/000029
• Project participation: **K. Tomczak:** contractor in an international project under the Horizon Europe program: European advisory and extension networks on forestry (FORADVISE)

7. agriculture and horticulture

Achievement Description

Within the discipline of Agriculture and Horticulture, PhD students conduct innovative scientific research of a high substantive quality, contributing to the advancement of knowledge in this field. The quality of their work is evidenced by the publication of research results in renowned, highly ranked scientific journals indexed in the Journal Citation Reports (JCR) database, such as *International Journal of Molecular Sciences*, *Genes*, *Journal of Plant Protection Research*, *Journal of Applied Genetics*, *Plants*, *Annals of Animal Science*, and *Energies*.

Experimental research is frequently conducted in cooperation with national and international scientific institutions, including the Poznań University of Life Sciences, Nicolaus Copernicus University in Toruń, Trinity College Dublin, the Plant Breeding and Acclimatization Institute (IHAR), the Institute of Plant Protection – National Research Institute (IOR-PIB), and the Institute of Plant Genetics of the Polish Academy of Sciences (IGR PAS). PhD students also participate in research projects funded by national sources such as the Ministry of Agriculture and Rural Development (MRiRW) and the National Centre for Research and Development (NCBR, LIDER XIV programme), as well as in international projects, including those implemented within the Horizon Europe programme.

The results of their research are presented at numerous national scientific conferences (e.g. the 3rd National Natural Sciences Conference Mater naturae, the 21st Biotechnology Conference at Bydgoszcz University of Science and Technology, the Conference of the Polish Phytopathological Society, the National Conference of Young Scientists) and international ones (e.g. the 26th European Biotechnology Congress, Conference on Cereal Biotechnology and Breeding, Congress of the Soil Science Society of Poland, International Scientific and Technical Seminar *Chemistry for Agriculture*, International Conference on Multi-Disciplinary Excellence). Participation in these events significantly contributes to the internationalisation of research within the discipline.

PhD students are also active members of scientific organisations such as the Polish Society of Soil Science (PTG), the International Union of Soil Sciences (IUSS), and the West Sudeten Naturalists' Society.

Moreover, they engage in science communication and promotion of the discipline of agriculture and horticulture by participating in educational and outreach events such as *Wagary z przyrodą*, *Researchers' Night*, the *Poznań Science and Art Festival*, the *Perspektywy Education Fair*, the AGRO SHOW Agricultural Fair in Bednary, and the National Field Days in Sielinko. They also publish their observations and reflections in popular-science magazines, such as *Top Agrar Polska* and *Agro Profil*, thus helping to build a positive image of the discipline within the academic and socio-economic environment.

The five most important achievements of doctoral students in the discipline of Agriculture and Horticulture include:
• **Publication: Kubiak, A.**; Pilarska, A.A.; Wolna-Maruwka, A.; Niewiadomska, A.; Panasiewicz, K. *The Use of Fungi of the Trichoderma Genus in Anaerobic Digestion: A Review.* Int. J. Mol. Sci. 2023, 24, 17576. https://doi.org/10.3390/ijms242417576; IF = 4.9; MNiSW = 140 pts
• **Publication: Starosta E.**, Jamruszka T., Szwarc J., Bocianowski J., Jędryczka M., Grynia M., Niemann J. *DArTseq-Based, High-Throughput Identification of Novel Molecular Markers for the Detection of Blackleg (Leptosphaeria spp.) Resistance in Rapeseed.* Int. J. Mol. Sci. 2024, 25(15), 8415. doi: 10.3390/ijms25158415; PMID: 39125985; PMCID: PMC11313370; IF = 4.9; MNiSW = 140 pts
• **Publication: Spychała, J.**; **Noweiska, A.**; Tomkowiak, A.; Bobrowska, R.; **Szewczyk, K.**; Kwiatek, M.T. *Unraveling Effects of miRNAs Associated with APR Leaf Rust Resistance Genes in Hybrid Forms of Common Wheat (Triticum aestivum L.).* Int. J.

Mol. Sci. 2025, 26, 665. https://doi.org/10.3390/ijms26020665; IF = 4.9; MNiSW = 140 pts
• **Participation in research projects** funded from national sources such as the National Science Centre (Żukowska A., Spychała J.), the Ministry of Agriculture and Rural Development (**Sobiech A., Szewczyk K., Starosta E., Noweiska A., Spychała J.**), and the National Centre for Research and Development (NCBR) (**Cyplik A.**), as well as in international projects, including those under the Horizon Europe programme (**Oreskovic Matej**).
• **Co-authorship of a patent application** for the invention: *Oligonucleotide primers for detecting the presence of markers associated with resistance to blackleg (Plenodomus spp.) in the genome of winter oilseed rape (Brassica napus L.) and a method for detecting these markers.* Application No. P.452021 (**Starosta E.**).

8. biological sciences

Achievement Description

The most important achievements of doctoral students studying at the UPP Doctoral School in the scientific discipline *of biological sciences* include scientific articles published in high-reputation journals, e.g., the publication: Stachowiak, M., Nowacka-Woszuk , J., Szabelska- Beresewicz , A., Zyprych -Walczak, J., Krzeminska , P., **Sosinski , O.** , ... & Switonski , M. (2024). A massive alteration of gene expression in undescended testicles of dogs and the association of KAT6A variants with cryptorchidism. Proceedings of the National Academy of Sciences, 121(7), e2312724121. (200 pts) (achievement 1) and Publication: Skrzypski , M., Wojciechowicz, T., Rak, A., **Krążek, M** ., **Fiedorowicz, J** ., Strowski , MZ, & Nowak, KW (2025). The levels of adropin and its therapeutic potential in diabetes. Journal of Endocrinology , 265(1). (140 pts) (achievement 2).

PhD students successfully apply for grants to finance their research, for example, Ms. **Martyna Frątczak,** M.Sc., project: The influence of endocrine pollutants on sex and digit ratio in green and brown frogs. No. 2023/49/N/NZ8/01103 (achievement 3).

9. mechanical engineering

Achievement Description

To date, seven PhD students have been trained at the PULS Doctoral School in the field of Mechanical Engineering.

Doctoral students focus their activity on conducting research, which results in the publication of manuscripts in respected journals from the Philadelphia list. An example of an achievement (1) is the publication by Wiktor Bojarski, M.Sc. Eng.: Czekała, W., Łukomska, A., Pulka, J., **Bojarski, W.,** Pochwatka , P., Kowalczyk- Juśko , A., Oniszczuk, A., & Dach, J. (2023). Waste-to-energy: Biogas potential of waste from coffee production and consumption. Energy, 276, 127604. (IF 9; pkt. 200), DOI: 10.1016/j.energy.2023.127604 and achievement 2: p. mgr Staszak Natalia: **Staszak, N.,** Gajewski, T., & Garbowski, T. (2022). Shell-to-beam numerical homogenization of 3D thin-walled perforated beams. Materials, 15(S), 1827. https://doi.org/10.3390/ma15051827 (3.4; 140)

They actively participate in scientific conferences, including international ones, e.g., achievement 3: **M.Sc. Engineer Damian Mrówczyński,** *The role of imperfections in numerical homogenization of multi-layered panels with a corrugated core*, 4th International Conference on Materials: Advanced and Emerging Materials, Barcelona, Spain.
To increase the interdisciplinarity of their research, internationalization and improvement of competences, they go on internships and participate in training, e.g. Mr. **Wiktor Bojarski, M.A.** , completed 3 scientific internships, including: 07.01.2025 - 07.04.2025 Scientific internship at the University degli Studi di Milano - DiSAA titled: " Production of organic fertilizer from bio -waste in line with a closed loop economy using Trichoderma spp . Fungi " carried out in the Agriculture and Environment, Biomass and Agroenergy and Bioeconomy and Green Chemistry laboratories, at Via Celoria , 2 20133 Milan, Italy (achievement 4) and e.g. Mr. **Damian Mrówczyński**: participation in the training: SIMULIA Users' Conference. Poznan, Poland, 13-14 October 2022 (achievement 5).

10. economics and finance

Achievement Description

PhD students preparing dissertations in the discipline of Economics and Finance demonstrate a high level of scientific

activity that extends beyond the preparation of their theses.
First and foremost, they are authors or co-authors of highly ranked publications. The most significant achievement in this category is:
• **Łukasiewicz J.**, Bajan B., Pawlak K. (2025). *Towards greater integration: Prospects for the development of agri-food trade between the EU and RCEP countries.* PLoS One, 20/7, e0328866

In addition, PhD students also publish popular-science articles, including in renowned and influential Polish journals. The most notable achievement in this category is:
• Tryjanowski P., **Anyebe D.** (2025). *Can the market save nature?* Rzeczpospolita
https://www.rp.pl/opinie-ekonomiczne/art42750571-czy-rynek-moze-uratowac-przyrode

PhD students also actively participate in international scientific conferences. The most prestigious include:
• International Conference of Cognitive and Psychological Assessment and Enhancement, 2024, Beijing, China, attended by Ms. **Anshu Rani**
• 5th Sustainability Conference, University of Akureyri, Iceland, attended by Mr. **Cihan Calikoglu**, who delivered the paper *"Multidimensional Assessment of Sustainable Development Index and Human Development Index Using TOPSIS and Bilinear Ordering"*

Mr. **Kacper Mańkowski** also completed an internship at the renowned Wageningen University & Research. It took place from March to July 2025 as part of the Preludium Bis programme organised by NAWA.

ATTACHMENTS

Method of verifying learning outcomes for qualifications at PRK level 8

No.	File type	Filename
1	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_biotechnology.pdf
2	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_economics_and_finance.pdf
3	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_mechanical_engineering.pdf
4	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_environmental_mining_and_power_engineerin
5	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_biological_sciences.pdf
6	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_forestry_sciences.pdf
7	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_agriculture_and_horticulture
8	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_food_technology_and_nutrition.pdf
9	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_veterinary_medicine.pdf
10	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_animal_science_and_aquaculture.pdf
11	The method of assessing the learning outcomes for qualifications at level 8 of the PQF	syllabuses_ENG_-_general_programme.pdf

Qualifications of academic teachers or research staff conducting education at the doctoral school

No.	File type	Filename
1	biotechnology	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
2	economics and finance	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
3	mechanical engineering	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
4	environmental engineering, mining and energy	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
5	biological sciences	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
6	forestry	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
7	agriculture and horticulture	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
8	food and nutrition technology	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
9	veterinary science	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf
10	animal science and fisheries	qualifications_of_academic_teachers_-_PULS_Doctoral_School.pdf

Quality of the recruitment process

No.	File type	Filename
1	The regulations of the doctoral school during the evaluation period	1._Regulations_of_PULS_Doctoral_
2	The regulations of the doctoral school during the evaluation period	2._Regulations_of_PULS_Doctoral_
3	The regulations of the doctoral school during the evaluation period	3._Regulations_of_PULS_Doctoral_
4	The regulations of the doctoral school during the evaluation period	4._Regulations_of_PULS_Doctoral_
5	The regulations of the doctoral school during the evaluation period	5._Regulations_of_PULS_Doctoral_
6	The admissions rules of the doctoral school during the evaluation period	1._rules_for_recruitment_-_PULS_Doctoral_School_2019_202
7	The admissions rules of the doctoral school during the evaluation period	2._rules_for_recruitment_-_PULS_D
8	The admissions rules of the doctoral school during the evaluation period	3._rules_for_recruitment_-_PULS_D
9	The admissions rules of the doctoral school during the evaluation period	4._rules_for_recruitment_-_PULS_D
10	The compositions of the admissions committees during the evaluation period and the rationale for their selection with the aim of maintaining high admission standards	recruitment_committees_-_PULS_D

Quality of scientific or artistic supervision and support for conducting scientific activities

No.	File type	Filename
1	Internal regulations that pertain to the midterm evaluation and that are in force during the evaluation period, such as evaluation rules and criteria	1._rules_for_mid-term_evaluation_+att._-_PULS_DS_2021.pdf
2	Internal regulations that pertain to the midterm evaluation and that are in force during the evaluation period, such as evaluation rules and criteria	2._rules_for_mid-term_evaluation_+att._-_PULS_DS_2022-2024.pdf
3	Internal regulations that pertain to the midterm evaluation and that are in force during the evaluation period, such as evaluation rules and criteria	3._rules_for_mid-term_evaluation_+att._-_PULS_DS_2025.pdf

STATEMENTS

- I hereby declare that the information contained in the self-assessment report is fully consistent with the factual and legal status.
- I hereby declare that the information contained in the self-assessment report in Polish and English is fully identical in substance.
- I hereby declare that the documents attached to the self-assessment report in Polish and English are fully identical in substance.

Signature

AUTHORIZATIONS

Added files

upoważnienie_+_pełnomocnictwo_-_J._Olejnik_Ewaluacja_11.2025.pdf

Attachment
to Resolution no. 303/2019
of the Senate of the Poznań University of Life Sciences
of 29 May 2019

FRAMEWORK STUDY PROGRAMME
of *the Doctoral School at the Poznań University of Life Sciences*

for the academic year of 2019/2020

Classes will be held in 1-, 2- or 3-week modules.

I. 1st year (semesters 1 and 2)

1. General courses (for all PhD students):

1)	*Pedagogics*	2 h x 3 days/2 weeks = 12 h	Examination
2)	*Philosophy of Nature*	2 h x 3 days/2 weeks = 12 h	Examination
3)	Methodology of empirical sciences	2 h x 3 days/2 weeks = 12 h	Examination
4)	*Statistics*	2 h x 5 days/2 weeks = 20 h	Examination
5)	*Interdisciplinary seminar*	2 h x 2 days/2 weeks = 8 h	Course credit
6)	*Occupational health and safety instruction*	4 h x 1 day	Course credit

Total 68 h/year

2. *Teaching placement* — 60 h/year — Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

II. 2nd year (semesters 3 and 4)

1. General courses (for all PhD students):

1) *Scientific Writing* — 2 h x 2 days/2 weeks = 8 h
Course credit

2) *Organisation and financing of research* 2 h x 2 days/2 weeks = 8 h
Course credit

3) *R package operation:* 2 h x 4 days/2 weeks = 16 h
Examination

4) *Global environmental problems* 2 h x 3 days/2 weeks = 12 h
Examination

5) *Internet of Things* 2 h x 3 days/2 weeks = 12 h
Course credit

6) *Interdisciplinary seminar* 2 h x 2 days/2 weeks = 8 h Course credit

Total 64 h/year

2. *Teaching placement* 60 h/year Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

III. III year (semesters 5 and 6)

1. *Teaching placement* 60 h/year Course credit
2. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

IV. IV year (semestery 7 and 8)

1. *Teaching placement* 60 h/year
Course credit
2. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

Attachment
to Resolution no. 392/2020
of the Senate of the Poznań University of Life Sciences
of 29 January 2020

FRAMEWORK STUDY PROGRAMME
of *Poznań University of Life Sciences Doctoral School*
(PULS Doctoral School)

Classes will be held in 1-week modules.

I. 1st year (semesters 1 and 2)

1. General courses:

1)	*Pedagogics*	12 h	Examination
2)	*Global environmental problems*	6 h	Course credit
3)	*Methodology, organisation and financing of research*	14 h	Examination
4)	*Research tools (R package operation)*	12 h	Examination
5)	*Interdisciplinary seminar*	16 h	Course credit
6)	*Occupational health and safety instruction*	4 h	Course credit

Total 64 h/year and:

2.	*Teaching placement*	60 h/year	Course credit
3.	Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students	maximum load of 60 h/year	

II. 2nd year (semesters 3 and 4)

1. General courses:

1)	*Scientific Writing*	6 h	Course credit
2)	*Global environmental problems*	12 h	Course credit
3)	*Research tools (Statistics)*	14 h	Examination
4)	*Research tools (Internet of Things)*	4 h	Course credit
5)	*Interdisciplinary seminar*	12 h	Course credit

Total 48 h/year and:

2.	*Teaching placement*	60 h/year	Course credit

3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

III. 3rd year (semesters 5 and 6)

1. General courses:

1)	*Research tools (Internet of Things)*	8 h	Course credit
2)	*Global environmental problems*	8 h	Examination
3)	*Interdisciplinary seminar*	8 h	Course credit

Total 24 h/year and:

2. *Teaching placement* 60 h/year Course credit

3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

IV. 4th year (semesters 7 and 8)

1. General courses:

1)	*Interdisciplinary seminar*	24 h	Course credit

Total 24 h/year and:

2. *Teaching placement* 60 h/year Course credit

3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

FOUR-YEAR PROGRAMME - POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL - since 2020 (days of the week (xx) will be given in each subsequent semester)

1st YEAR	semester 1	TOTAL	32 h	xx-xx November 202x
	Monday	Tuesday	Wednesday	Thursday
08:15 - 9:45	**OHS instruction** Robert Filas	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke
10:00 - 11:30	**OHS instruction** Robert Filas	**Pedagogics** Dr Olga Grabowska-Chenczke	**Methodology, organisation and financing of research** Prof. Agnieszka Ławniczak-Malińska	**Methodology, organisation and financing of research** Prof. Agnieszka Ławniczak-Malińska
11:30 - 13:00	break	break	break	break
13:00 - 14:30	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**Global environmental problems** Prof. Janusz Olejnik	**Global environmental problems** Prof. Janusz Olejnik	**Methodology, organisation and financing of research** Prof. Agnieszka Ławniczak-Malińska
14:45 - 16:15	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests

1st YEAR	semester 2	TOTAL	32 h	xx-xx April 202x	1st year total 64	
	Monday	Tuesday	Wednesday	Thursday		
08:15 - 9:45	**Global environmental problems** Prof. Janusz Olejnik	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**EXAM**	
10:00 - 11:30	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**EXAM**	
11:30 - 13:00	break	break	break	break	**COURSE CREDIT**	
13:00 - 14:30	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**Research tools (R package operation)** Dr Klaudia Ziemblińska	**EXAM**	**classes within discipline up to 60 hours**
14:45 - 16:15	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**COURSE CREDIT**	**teaching placement 60 hours**

2nd YEAR	semester 3	TOTAL	24 h	xx-xx November 202x
	Monday	Tuesday	Wednesday	
08:15 - 9:45	**Scientific writing** Prof. Marek Świtoński	**Research tools (statistics)** Dr Joanna Zyprych Walczak	**Research tools (statistics)** Dr Joanna Zyprych Walczak	
10:00 - 11:30	**Scientific writing** Prof. Marek Świtoński	**Global environmental problems** Prof. Maciej Skorupski	**Global environmental problems** Prof. Arkadiusz Sadowski	
11:30 - 13:00	break	break	break	
13:00 - 14:30	**Scientific writing** Prof. Marek Świtoński	**Global environmental problems** Prof. Maciej Skorupski	**Global environmental problems** Prof. Arkadiusz Sadowski	
14:45 - 16:15	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	

2nd YEAR	semester 4	TOTAL	24 h	xx-xx April 202x	2nd year total 48	
	Monday	Tuesday	Wednesday			
08:15 - 9:45	**Research tools (statistics)** Dr Joanna Zyprych Walczak	**Research tools (statistics)** Dr Joanna Zyprych Walczak	**Research tools (statistics)** Dr Joanna Zyprych Walczak		**EXAM**	
10:00 - 11:30	**Research tools (statistics)** Dr Joanna Zyprych Walczak	**Research tools (statistics)** Dr Joanna Zyprych Walczak	**Global environmental problems** Dr Damian Michałowski		**COURSE CREDIT**	
11:30 - 13:00	break	break	break			
13:00 - 14:30	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak	**Global environmental problems** Dr Damian Michałowski		**COURSE CREDIT**	**classes within discipline up to 60 hours**
14:45 - 16:15	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests		**COURSE CREDIT**	**teaching placement 60 hours**

3rd YEAR	semester 5	TOTAL	12 h	xx-xx November 202x
	Monday	Tuesday		
08:15 - 9:45	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak		
10:00 - 11:30	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak	**Research tools (Internet of Things)** Dr hab. Marek Urbaniak		
11:30 - 13:00	break	break		
13:00 - 14:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests		

3rd YEAR	semester 6	TOTAL	12 h	xx-xx April 202x	3rd year total 24	
	Monday	Tuesday				
08:15 - 9:45	**Global environmental problems** Dr Klaudia Ziemblińska	**Global environmental problems** Prof. Piotr Tryjanowski			**EXAM**	
10:00 - 11:30	**Global environmental problems** Dr Klaudia Ziemblińska	**Global environmental problems** Prof. Piotr Tryjanowski			**COURSE CREDIT**	**classes within discipline up to 60 hours**
11:30 - 13:00	break	break				
13:00 - 14:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests			**COURSE CREDIT**	**teaching placement 60 hours**

4th YEAR	semester 7	TOTAL	12 h	xx-xx November 202x
	Monday	Tuesday		
08:15 - 9:45	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests		
10:00 - 11:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests		
11:30 - 13:00	break	break		
13:00 - 14:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests		

4th YEAR	semester 8	TOTAL	12 h	xx-xx April 202x	4th year total 24	
	Monday	Tuesday				
08:15 - 9:45	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests				
10:00 - 11:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests			**COURSE CREDIT**	**classes within discipline up to 60 hours**
11:30 - 13:00	break	break				
13:00 - 14:30	**Interdisciplinary seminar** PhD Students and guests	**Interdisciplinary seminar** PhD Students and guests			**COURSE CREDIT**	**teaching placement 60 hours**

1st year of doctoral school (semesters 1 and 2)

1. General courses (64 h):
   1) Pedagogics 12 h ---- Examination
   2) Global environmental problems 1 - 6 h ---- Course credit
   3) Interdisciplinary seminar 16 h ---- Course credit
   4) Methodology, organisation and financing of research 14 h ---- Examination
   5) OHS instruction 4 h ---- Course credit
   6) Research tools (R package operation) - 12 h ---- Examination

2nd year of doctoral school (semesters 3 and 4)

1. General courses (48 h):
   1) Global environmental problems 2 - 12 h ---- Course credit
   2) Scientific writing - 6 h ---- Course credit
   3) Research tools (statistics) - 14 h ---- Examination
   4) Research tools (Internet of Things) - 4 h ---- Course credit
   5) Interdisciplinary seminar 12 h ---- Course credit

3rd year of doctoral school (semesters 5 and 6)

1. General courses (24 h):
   1) Global environmental problems 3 - 8 h ---- Examination
   2) Research tools (Internet of Things) - 8 h ---- Course credit
   3) Interdisciplinary seminar 8 h ---- Course credit

4th year of doctoral school (semesters 7 and 8)

1. General courses (24 h):
   1) Interdisciplinary seminar 24 h ---- Course credit

TOTAL GENERAL **160 h** within discipline **up to 240 h**
teaching placement **60 h/year**

PROGRAMME - POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL - winter semester

NOVEMBER

1st YEAR semester 1 — **TOTAL 32 h**

	Monday	Tuesday	Wednesday	Thursday	Friday	
08:15 - 9:45	**Interdisciplinary seminar** PhD Students and Guests	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**Interdisciplinary seminar** PhD Students and Guests	EXAM
10:00 - 11:30	**Interdisciplinary seminar** PhD Students and Guests	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**Pedagogics** Dr Olga Grabowska-Chenczke	**Interdisciplinary seminar** PhD Students and Guests	COURSE CREDIT
11:30 - 12:30	break	break	break	break	break	
12:30 - 14:00	**Research tools (R package operation) GROUP A+B** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP A** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP B** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP A** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP B** Dr Klaudia Ziemblińska	EXAM
14:15 - 15:45	**Research tools (R package operation) GROUP A+B** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP A** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP B** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP A** Dr Klaudia Ziemblińska	**Research tools (R package operation) GROUP B** Dr Klaudia Ziemblińska	
16:00 - 17:30	**OHS instruction** Robert Filas					COURSE CREDIT
17:45 - 19.15	**OHS instruction** Robert Filas					

NOVEMBER

2nd YEAR semester 3 — **TOTAL 24 h** — **3rd YEAR semester 5** — **TOTAL 12 h**

	Monday	Tuesday	Wednesday	Thursday	Friday	
08:15 - 9:45	**Global environmental problems** Prof. Janusz Olejnik	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Global environmental problems** Prof. Arkadiusz Sadowski	**Global environmental problems** Prof. Maciej Skorupski	COURSE CREDIT
10:00 - 11:30	**Global environmental problems** Prof. Janusz Olejnik	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Global environmental problems** Prof. Arkadiusz Sadowski	**Global environmental problems** Prof. Maciej Skorupski	EXAM
11:30 - 12:30	break	break	break	break		
12:30 - 14:00	**Scientific writing** Prof. Anna Gramza-Michałowska	**Scientific writing** Prof. Anna Gramza-Michałowska	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests		COURSE CREDIT
14:15 - 15:45	**Scientific writing** Prof. Anna Gramza-Michałowska	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests		COURSE CREDIT

4thYEAR semester 7 — **TOTAL 12 h**

16:00 - 17:30	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	
17:45 - 19:15	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	

classes within discipline up to 60 hours/year

teaching placement 60 hours/year

First year of The School (semester 1 and 2)

1. General courses (68 h):
   1) Pedagogics - 12 h ---- Examination
   2) Research tools (Internet of Things) - 12 h ---- Course credit
   3) Interdisciplinary seminar - 16 h ---- Course credit
   4) Methodology, organisation and financing of research - 12 h ---- Course credit
   5) OHS instruction - 4 h ---- Course credit
   6) Research tools (R package operation) - 12 h ---- Examination

Second year of The School (semester 3 and 4)

1. General courses (44 h):
   1) Global environmental problems - 10 h ---- Course credit
   2) Scientific writing - 6 h ---- Course credit
   3) Research tools (Statistics) - 14 h ---- Examination
   4) Methodology, organisation and financing of research - 2 h ---- Examination
   5) Interdisciplinary seminar - 12 h ---- Course credit

Third year of The School (semester 5 and 6)

1. General courses (28 h):
   1) Global environmental problemse - 16 h ---- Examination
   2) Interdisciplinary seminar - 8 h ---- Course credit

Fourth year of The School (semester 7 and 8)

1. General courses (24 h):
   1) Interdisciplinary seminar - 24 h ---- Course credit

TOTAL GENERAL PROGRAMME	**160 h**
2. Classes within discipline	**up to 240 h**
3. Teaching placement	**60 h/year**

PROGRAMME - POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL - summer semester

MAY

1st YEAR semester 2 — **TOTAL 32 h**

	Monday	Tuesday	Wednesday	Thursday	Friday	
08:15 - 9:45	**Interdisciplinary seminar** PhD Students and Guests	**Methodology, organisation and financing of research** Prof. Tomasz Dyszarz	**Methodology, organisation and financing of research** Prof. Tomasz Dyszarz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Interdisciplinary seminar** PhD Students and Guests	COURSE CREDIT
10:00 - 11:30	**Interdisciplinary seminar** PhD Students and Guests	**Methodology, organisation and financing of research** Prof. Tomasz Dyszarz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Methodology, organisation and financing of research** Prof. Krzysztof Szoszkiewicz	**Interdisciplinary seminar** PhD Students and Guests	COURSE CREDIT
11:30 - 12:30	break	break	break	break	break	
13:00 - 14:30	**Research tools (Internet of Things) GROUP A+B** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP A** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP B** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP A** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP B** Prof. Marek Urbaniak	COURSE CREDIT
14:45 - 16:15	**Research tools (Internet of Things) GROUP A+B** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP A** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP B** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP A** Prof. Marek Urbaniak	**Research tools (Internet of Things) GROUP B** Prof. Marek Urbaniak	

MAY — **2 days classes at conference center near Poznań**

2nd YEAR semester 4 — **TOTAL 24 h** — **3rd YEAR semester 6** — **TOTAL 16 h**

	Monday	Tuesday	Wednesday	Thursday	Friday		
08:15 - 9:45	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Global environmental problems** Prof. Dariusz Pieńkowski				EXAM
10:00 - 11:30	**Research tools (statistics)** Dr Joanna Zyprych-Walczak	**Global environmental problems** Prof. Janusz Olejnik	**Global environmental problems** Prof. Dariusz Pieńkowski	**Global environmental problems** Prof. Piotr Tryjanowski	**Global environmental problems** Dr Klaudia Ziemblińska	9:00 - 10:30	COURSE CREDIT
11:30 - 12:30		break	break	**Global environmental problems** Prof. Piotr Tryjanowski	**Global environmental problems** Dr Klaudia Ziemblińska	10:45 - 12:15	EXAM
12:30 - 14:00		**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	break	break	12:15 - 13:15	
14:15 - 15:45		**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	13:30 - 15:00	

4thYEAR semester 8 — **TOTAL 12 h**

16:00 - 17:30	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	
17:45 - 19:15	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	**Interdisciplinary seminar** PhD Students and Guests	

Program dyscyplinowy w SD UPP - biotechnologia/*Disciplinary programme at the PULS Doctoral School - biotechnology*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Metody analizy białek *Proteins analysis methods*	**prof. UPP dr hab. Joanna Perła-Kajan** dr inż. Ewa Bretes	Katedra Biochemii i Biotechnologii	12	4	8		x							E	**28**
2	Biotechnologia i mikrobiologia żywności *Biotechnology and Food Microbiology*	**prof. UPP dr hab. Kamila Myszka** dr Monika Borkowska	Katedra Biotechnologii i Mikrobiologii Żywności	12	3	9		x							E	
3	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii i Mikrobiologii Żywności	4	4	0		x							Z	
4	Zwierzęta laboratoryjne w badaniach biomedycznych *Laboratory Animals in Biomedical Research*	**prof. UPP dr hab. Katarzyna Szkudelska** dr hab. Dawid Szczepankiewicz prof. dr hab. Tomasz Szkudelski	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	4	8			x						z	**30**
5	Edycja genomu *Genome editing*	dr inż. Magdalena Hryhorowicz	Katedra Biochemii i Biotechnologii	12	2	10			x						E	
6	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii i Mikrobiologii Żywności	6	6	0			x						Z	
7	Nowoczesne techniki obrazowania *Modern Imaging Techniques*	**dr inż. Joanna Suszyńska-Zajczyk** dr hab. Zofia Madeja prof. UPP Dr hab. Piotr Pawlak	Katedra Biochemii i Biotechnologii	12	4	8				x					Z	**27**
8	Projekty badawcze – pozyskiwanie środków finansowych *Research projects – funding application*	prof. UPP dr hab. Anna Woźniak	Katedra Biochemii i Biotechnologii	12	2	10				x					Z	
9	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii i Mikrobiologii Żywności	3	3	0				x					Z	
10	Wprowadzenie do epigenetyki *Introduction to epigenetics*	prof. dr hab. Joanna Nowacka-Woszuk	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	4	8					x				Z	**27**
11	Nowe metody analiz komórkowych - cytometria przepływowa i sortowanie komórek *Novel approches in cell analysis – flow cytometry and cell sorting*	**prof. UPP dr hab. Wojciech Juzwa** dr inż. Joanna Suszyńska-Zajczyk	Katedra Biotechnologii Mikrobiologii Żywności	12	4	8					x				E	
12	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii Mikrobiologii Żywności	3	3	0					x				Z	
13	Analiza wyników sekwencjonowania nowej generacji (NGS) *Next Generation Sequencing (NGS) results analysis*	prof. UPP dr hab. Łukasz Wolko	Katedra Biochemii i Biotechnologii	12	2	10						x			Z	**25**
14	Zastosowanie hodowli komórkowych i tkankowych in vitro w przemyśle i medycynie *Applications of cell and tissue culture in industry and medicine*	dr hab. Katarzyna Kowalska	Katedra Biotechnologii i Mikrobiologii Żywności	10	10	0						x			E	
15	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii Mikrobiologii Żywności	3	3	0						x			Z	
16	Nowoczesne technologie w hodowli roślin *Modern Technologies in Plant Breeding*	**prof. UPP dr hab. Janetta Niemann** prof. UPP dr hab. Agnieszka Tomkowiak dr hab. Dorota Weigt	Katedra Genetyki i Hodowli Roślin	12	12	0							x		E	**31**
17	Biotechnologia a zmiana klimatu *Biotechnology and climate change*	dr inż. Kamila M. Harenda	Katedra Ekologii i Ochrony Środowiska, Pracownia Bioklimatologii	12	6	6							x		Z	
18	Mózg bez tajemnic *The brain without secrets*	prof. dr hab. Joanna Śliwowska	Katedra Zoologii	7	7	0							x		Z	
19	Seminarium *Seminar*	prof. dr hab. Daria Szymanowska	Katedra Biotechnologii Mikrobiologii Żywności	6	6	0								x	Z	**6**
			Ogółem: *Total:*	**174**	**89**	**85**										**174**

E - egzamin
E - examination

Z - zaliczenie
Z - pass

ZO - zaliczenie na ocenę
ZO - course credit with a grade

Program dyscyplinowy w SD UPP - ekonomia i finanse/*Disciplinary programme at the PULS Doctoral School - economics and finance*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader** / lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Mikroekonomia zaawansowana *Microeconomics advanced*	dr Joanna Smoluk-Sikorska	Katedra Ekonomii	8	8	0		x							E	**30**
2	Makroekonomia zaawansowana *Advanced macroeconomics*	prof. UPP dr hab. Joanna Wiśniewska-Paluszak	Katedra Ekonomii	8	8	0		x							E	
3	Zastosowanie matematyki w badaniach ekonomicznych *Application of mathematics in economic research*	dr Andrzej Wołoszyn	Katedra Finansów i Rachunkowości	8	4	4		x							Z	
4	Seminarium doktoranckie *PhD seminar*	prof. dr hab. Arkadiusz Sadowski + promotorzy (*supervisors*)	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	6	0	6		x							Z	
5	Statystyka dla ekonomistów *Statistics for economists*	dr Andrzej Wołoszyn	Katedra Finansów i Rachunkowości	8	4	4			x						E	**34**
6	Zastosowanie metod ekonometrycznych w badaniach naukowych *Applied Econometrics in Scientific Studies*	dr Andrzej Wołoszyn	Katedra Finansów i Rachunkowości	8	4	4			x						E	
7	Historia myśli ekonomicznej *History of economic thought*	prof. UPP dr hab. Joanna Wiśniewska-Paluszak	Katedra Ekonomii	8	8	0			x						E	
8	Metodologia badań ekonomicznych *Methodology of economic research*	prof. UPP dr hab. Arkadiusz Sadowski	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	4	4	0			x						Z	
9	Seminarium doktoranckie *PhD seminar*	prof. UPP dr hab. Aleksandra Łuczak dr hab. Jarosław Lira	Katedra Finansów i Rachunkowości	6	0	6			x						Z	
10	Zastosowanie metod taksonomicznych w badaniach naukowych *Application of taxonomic methods in scientific research*	prof. UPP dr hab. Aleksandra Łuczak	Katedra Finansów i Rachunkowości	6	4	2				x					E	**26**
11	Teoria wyboru publicznego *Public choice*	prof. dr hab. Ewa Kiryluk-Dryjska	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	6	6	0				x					E	
12	Ekonomia międzynarodowa *International Economics*	prof. dr hab. Karolina Pawlak	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	8	8	0				x					E	
13	Seminarium doktoranckie *PhD seminar*	prof. dr hab. Arkadiusz Sadowski + promotorzy (*supervisors*)	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	6	0	6				x					Z	
14	Współczesne problemy polityki ekonomicznej *Contemporary problems of economic policy*	prof. UPP dr hab. Aldona Mrówczyńska-Kamińska	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	8	8	0					x				E	**22**
15	Teoria gier *Game theory*	prof. dr hab. Ewa Kiryluk-Dryjska	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	6	6	0					x				E	
16	Seminarium doktoranckie *PhD seminar*	prof. UPP dr hab. Dariusz Pieńkowski prof. UPP dr hab. Lucyna Przezbórska-Skobiej	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	8	0	8					x				Z	
17	Wykład 1 do wyboru: a) Ekonomika i organizacja przedsiębiorstw b) Analiza ekonomiczna przedsiębiorstw *Lecture 1 to choose from a) Economics and organization of enterprises b) Economic analysis of enterprises*	a) dr inż. Dariusz Majchrzycki b) prof. UPP dr hab. Zbigniew Gołaś	a) Katedra Prawa i Organizacji Przedsiębiorstw w Agrobiznesie b) Katedra Finansów i Rachunkowości	6	6	0						x			Z	**24**
18	Wykład 2 do wyboru: a) Współczesne problemy polityki rolnej, b) Ekonomia obszarów wiejskich, c) Agrobiznes w gospodarce narodowej *Lecture 2 to choose from b) Contemporary problems and*	a) prof. UPP dr hab. Wawrzyniec Czubak b) prof. UPP dr hab. Lucyna Przezbórska-Skobiej c) dr Bartłomiej Bajan	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie	6	6	0						x			Z	
19	Seminarium doktoranckie *PhD seminar*	prof. dr hab. Arkadiusz Sadowski + promotorzy (*supervisors*)	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie, Katedra Prawa i Organizacji Przedsiębiorstw w Agrobiznesie	12	0	12						x			Z	
20	Seminarium doktoranckie *PhD seminar*	Promotorzy (*supervisors*)	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie, Katedra Prawa i Organizacji Przedsiębiorstw w Agrobiznesie	12	0	12							x		Z	**12**
21	Seminarium doktoranckie *PhD seminar*	prof. dr hab. Arkadiusz Sadowski + promotorzy (*supervisors*)	Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie, Katedra Prawa i Organizacji Przedsiębiorstw w Agrobiznesie	12	0	12								x	Z	**12**
			Ogółem: *Total:*	**160**	**84**	**76**										**160**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - inżynieria mechaniczna/ *Disciplinary programme at the PULS Doctoral School - mechanical engineering*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** / *lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Podstawy i problemy pomiarów w technice *Basics and problems of measurements in technology*	prof. UPP dr hab. Karol Durczak	Katedra Inżynierii Biosystemów	12	4	8		x							Z	
2	Kierunki rozwoju inżynierii rolniczej w aspekcie inzynierii mechanicznej *Developments in agricultural machinery and equipment in relation to mechanical engineering*	dr inż. Dawid Wojcieszak dr inż. Mirosław Czechlowski	Katedra Inżynierii Biosystemów	12	12	0		x							Z	**30**
3	Wykłady monograficzne seminaria KIB, część I *Monographic lectures and KIB seminars, part I*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	6	6	0		x							Z	
4	Teledetekcja i jej zastosowania *Remote sensing and its applications*	dr inż. Tomasz Wojciechowski	Katedra Inżynierii Biosystemów	12	4	8			x						Z	
5	Zastosowanie spektrometrii w naukach inżynieryjno-technicznych *Applications of spectrometry in engineering sciences*	dr inż. Mirosław Czechlowski	Katedra Inżynierii Biosystemów	12	7	5			x						Z	**27**
6	Wykłady monograficzne seminaria KIB, część II *Monographic lectures and KIB seminars, part II*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0			x						Z	
7	Problemy naukowe związane z produkcją energii z OZE *Scientific problems related to renewable energy production*	prof. dr hab. Jacek Dach prof. dr hab. Wojciech Czekała	Katedra Inżynierii Biosystemów	12	6	6				x					E	
8	Podstawy technologii chemicznej w inżynierii mechanicznej *Fundamentals of chemical technology in mechanical engineering*	prof. UPP dr hab. inż. Krzysztof Pilarski prof. UPP dr hab. inż. Agnieszka Pilarska	Katedra Inżynierii Biosystemów	12	6	6				x					E	**27**
9	Wykłady monograficzne seminaria KIB, część III *Monographic lectures and KIB seminars, part III*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0				x					Z	
10	Problemy logistyki i transportu *Logistics and transportation problems*	dr inż. Dawid Wojcieszak prof. UPP dr hab. inż. Przemysław Niewiadomski	Katedra Inżynierii Biosystemów	12	6	6					x				Z	
11	Metody i techniki sztucznej inteligencji w przetwarzaniu danych *Artificial intelligence methods and techniques in data processing*	prof. UPP dr hab. Krzysztof Koszela	Katedra Inżynierii Biosystemów	12	6	6					x				E	
12	Nowoczesne materiały węglowe i nieorganiczne w inzynierii mechanicznej *Modern carbon and inorganic materials in mechanical engineering*	prof. UPP dr hab. Mariusz Drygaś	Katedra Inżynierii Biosystemów	12	12	0					x				Z	**39**
13	Wykłady monograficzne seminaria KIB, część IV *Monographic lectures and KIB seminars, part IV*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0					x				Z	
14	Modele koncepcyjne w badaniach empirycznych *Conceptual models in empirical studies*	prof. dr hab. Agnieszka Sujak	Katedra Inżynierii Biosystemów	12	8	4						x			Z	
15	Wykłady monograficzne seminaria KIB, część V *Monographic lectures and KIB seminars, part V*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0						x			Z	**15**
16	Wykłady monograficzne seminaria KIB, część VI *Monographic lectures and KIB seminars, part VI*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0							x		Z	**3**
17	Modelowanie neuronowe i uczenie maszynowe w inzynierii mechanicznej *Neural modeling and machine learning in mechanical engineering*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	12	12	0								x	E	
18	Optymalizacja w praktyce inżynierskiej *Optimization in engineering practice*	prof. UPP dr hab. Tomasz Garbowski	Katedra Inżynierii Biosystemów	12	12	0								x	Z	
19	Tutoring indywidalny *Individual tutoring*	prof. UPP dr hab. Tomasz Garbowski prof. dr hab. Maciej Zaborowicz prof. dr hab. Agnieszka Sujak prof. UPP dr hab. Wojciech Czekała prof. UPP dr hab. Krzysztof Koszela prof. dr hab. Inż. Jacek Dach	Katedra Inżynierii Biosystemów	12	12	0								x	Z	**39**
20	Wykłady monograficzne seminaria KIB, część VII *Monographic lectures and KIB seminars, part VII*	prof. UPP dr hab. Maciej Zaborowicz	Katedra Inżynierii Biosystemów	3	3	0								x	Z	
			Ogółem: *Total:*	**180**	**131**	**49**										**180**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - inżynieria środowiska, górnictwo i energetyka/*Disciplinary programme at the PULS Doctoral School - environmental, mining and power engineering*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Staże naukowe *Scientific internships*	prof. dr hab. Klaudia Borowiak	Katedra Ekologii i Ochrony Środowiska	12	6	6		x							ZO	**30**
2	Prezentacja i wizualizacja wyników badań naukowych *Presentation and visualization of research results*	prof. UPP dr hab. Marek Urbaniak	Katedra Budownictwa i Geoinżynierii	12	4	8		x							ZO	
3	Seminarium dyscyplinowe *Seminar of the discipline*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0		x							ZO	
4	Zastosowanie GIS w środowisku przyrodniczym *Application of GIS in the natural environment*	dr Jan Barabach	Katedra Melioracji, Kształtowania Środowiska i Gospodarki Przestrzennej	12	5	7			x						E	**24**
5	Modele koncepcyjne w badaniach empirycznych *Conceptual models in empirical research*	prof. dr hab. Agnieszka Sujak	Katedra Inżynierii Biosystemów	12	8	4			x						ZO	
6	Zastosowania teledetekcji satelitarnej w inżynierii środowiska *Applications of satellite remote sensing in environmental engineering*	dr inż. Joanna Jaskuła	Katedra Melioracji, Kształtowania Środowiska i Gospodarki Przestrzennej	12	5	7				x					ZO	**30**
7	Modelowanie hydrologiczne i hydrodynamiczne *Hydrologic and hydrodynamic modeling*	prof. UPP dr hab. Tomasz Dysarz	Katedra Inżynierii Wodnej i Sanitarnej	12	2	10				x					ZO	
8	Seminarium dyscyplinowe *Seminar of the discipline*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0				x					ZO	
9	Specjalistyczne analizy statystyczne *Specialized statistical analysis*	prof. UPP dr hab. Anna Budka	Katedra Budownictwa i Geoinżynierii	12	0	12					x				ZO	**24**
10	Bioklimatologia *Bioclimatology*	prof. UPP dr hab. Bogdan Chojnicki	Katedra Ekologii i Ochrony Środowiska	12	6	6					x				E	
11	Podstawy i problemy pomiarów wymiany gazowej ekosystemów *Gas exchange measurements: basics and problems*	**prof. UPP dr hab. Marek Urbaniak** dr Klaudia Ziemblińska	Katedra Budownictwa i Geoinżynierii	12	4	8						x			ZO	**30**
12	Metody remediacji gleb *Methods of soil remediation*	dr inż. Katarzyna Wiatrowska	Katedra Gleboznawstwa, Rekultywacji i Geodezji	12	6	6						x			E	
13	Seminarium dyscyplinowe *Seminar of the discipline*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0						x			ZO	
14	Nowoczesne rozwiązania w gospodarce wodnej i sanitarnej *Modern solutions in water and sanitary management*	dr hab. Mateusz Hammerling prof. UPP dr hab. Agnieszka Pilarska	Katedra Inżynierii Wodnej i Sanitarnej	12	6	6							x		ZO	**24**
15	Presja agroekosystemów na środowisko i klimat *Pressure of agrosystems on the environment and climate*	dr hab. Jerzy Kupiec	Katedra Ekologii i Ochrony Środowiska	12	8	4							x		E	
16	Biofizyka w inżynierii środowiska *Biophysics in environmental engineering*	prof. UPP dr hab. Anshu Rastogi	Katedra Ekologii i Ochrony Środowiska	12	7	5								x	E	**18**
17	Seminarium dyscyplinowe *Seminar of the discipline*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0								x	ZO	
			Ogółem: *Total:*	**180**	**91**	**89**										**180**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - nauki biologiczne/ *Disciplinary programme at the PULS Doctoral School - biological sciences*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Organizmy modelowe w badaniach biologicznych *Model organisms in biological sciences*	prof. dr hab. Joanna Śliwowska	Katedra Zoologii	12	12	0		x							E	
2	Kreowanie nowoczesnego warsztatu badawczego – narzędzia i organizacja badań *Creating a modern research workshop - tools and organization of research*	prof. UPP dr hab. Dominik Kmiecik	Katedra Technologii Żywności Pochodzenia Roślinnego	12	6	6		x							E	**30**
3	Seminarium dyscyplinowe *Disciplinary Seminar*	prof. dr hab. Izabela Szczerbal	Katedra Genetyki i Podstaw Hodowli Zwierząt	6	0	6		x							Z	
4	Metodyczne aspekty wykorzystywania zwierząt laboratoryjnych w badaniach naukowych in vivo i in vitro *Methodological aspects of the use of laboratory animals in in vivo and in vitro scientific research*	prof. UPP dr hab. Katarzyna Szkudelska	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	2	10			x						E	
5	Prawo i etyka w badaniach na zwierzętach The Law and Ethics in Animal Research	dr hab. Ewa Pruszyńska-Oszmałek	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	12	0			x						E	**27**
6	Seminarium dyscyplinowe *Disciplinary Seminar*	dr hab. Paweł Kołodziejski	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	3	0	3			x						Z	
7	Metody badania białek *Protein research methods*	dr Tatiana Wojciechowicz	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	2	10				x					E	
8	Techniki mikroskopowe w naukach biologicznych *Microscopic techniques in biological studies*	dr hab. Zofia Madeja	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	5	7				x					E	**27**
9	Seminarium dyscyplinowe *Disciplinary Seminar*	prof. dr hab. Izabela Szczerbal	Katedra Genetyki i Podstaw Hodowli Zwierząt	3	0	3				x					Z	
10	Analiza genomu i epigenomu *Genome and epigenome analysis*	prof. UPP dr hab. Joanna Nowacka-Woszuk	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	4	8					x				E	
11	Metody badań transkryptomicznych *Transcriptomic data analysis*	dr hab. Monika Dragan	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	8	4					x				E	**27**
12	Seminarium dyscyplinowe *Disciplinary Seminar*	prof. UPP dr hab. Joanna Nowacka-Woszuk	Katedra Genetyki i Podstaw Hodowli Zwierząt	3	0	3					x				Z	
13	Wybrane aspekty ekologii *Selected aspects of ecology*	prof. dr hab. Piotr Tryjanowski	Katedra Zoologii	12	6	6						x			E	
14	Wybrane aspekty ochrony środowiska *Selected aspects of environmental conservation*	Prof. UPP dr hab. Janusz Kloskowski	Katedra Zoologii	12	6	6						x			E	**27**
15	Seminarium dyscyplinowe *Disciplinary Seminar*	prof. dr hab. Izabela Szczerbal	Katedra Genetyki i Podstaw Hodowli Zwierząt	3	0	3						x			Z	
16	Biostatystyka i bioinformatyka w analizie danych *Biostatistics and bioinformatics in data analysis*	dr hab. Ewa Sell-Kubiak	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	0	12							x		E	**24**
17	Metody statystyczne w badaniach środowiskowych *Statistical methods in environmental biology*	dr Łukasz Dylewski	Katedra Zoologii	12	0	12							x		E	
18	Finansowanie badań i prowadzenie projektów naukowych *Financing research and conducting scientific projects*	prof. dr hab. Izabela Szczerbal	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	0	12								x	ZO	**18**
19	Seminarium dyscyplinowe *Disciplinary Seminar*	prof. dr hab. Izabela Szczerbal	Katedra Genetyki i Podstaw Hodowli Zwierząt	6	0	6								x	Z	
			Ogółem: *Total:*	**180**	**63**	**117**										**180**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - nauki leśne/*Disciplinary programme at the PULS Doctoral School - forestry sciences*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Globalne znaczenie lasów i leśnictwa *Global importance of forests and forestry*	Prof. dr hab. Piotr Mederski	Katedra Użytkowania Lasu	12	12	0		x							E	**30**
2	Ekonomiczne znaczenie lasów, leśnictwa i drzewnictwa *Economic importance of forests, forestry and timber industry*	Prof. dr hab. Krzysztof Adamowicz	Katedra Ekonomiki Leśnictwa	12	12	0		x							Z	
3	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0		x							Z	
4	Rola lasów w zachowaniu róznożności biologicznej *The role of forests in the preservation of biodiversity*	Prof. dr hab. Paweł Rutkowski	Katedra Botaniki i Siedliskoznawstwa Leśnego	12	12	0			x						Z	**24**
5	Zrównoważona gospodarka zasobami leśnymi *Sustainable forest management*	Prof. UPP dr hab. Cezary Beker	Katedra Urządzania Lasu	12	12	0			x						E	
6	Badania wybranych właściwości produktów leśnych z wykorzystaniem analizy instrumentalnej *Studies on selected properties of forest products using instrumental analysis*	Prof. dr hab. Izabela Ratajczak	Katedra Chemii	12	8	4				x					Z	**30**
7	Ochrona lasu przed szkodliwymi czynnikami biotycznymi i abiotycznymi *The protection of forests against the biotic and abiotic harmful factors*	Prof. dr hab. Paweł Rutkowski	Katedra Botaniki i Siedliskoznawstwa Leśnego	12	12	0				x					E	
8	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0				x					Z	
9	Współczesne meblarstwo *Contemporary furniture industry*	Prof. dr hab. Jerzy Smardzewski	Katedra Meblarstwa	12	12	0					x				Z	**24**
10	Współczesne trendy w przerobie biomasy *Modern trends in biomass conversion*	Prof. dr hab. Magdalena Zborowska	Katedra Chemicznej Technologii Drewna	12	12	0					x				E	
11	Wykorzystanie biomasy leśnej, drzewnej i rolniczej do produkcji nowych materiałów *Utilization of forest, timber, and agricultural biomass in the production of new materials*	Prof. dr hab. Bartłomiej Mazela	Katedrę Mechanicznej Technologii Drewna	12	12	0						x			E	**30**
12	Nanomateriały w drzewnictwie *Nanomaterials in woodworking*	Prof. dr hab. Magdalena Zborowska	Katedra Chemicznej Technologii Drewna	12	12	0						x			Z	
13	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0						x			Z	
14	Nowoczesne technologie inżynieryjne w gospodarce leśnej i ochronie środowiska leśnego *Modern engineering techniques in forest management and forest environment protection*	Dr hab. inż. Bernard Okoński	Katedra Inżynierii Leśnej	12	12	0							x		E	**24**
15	Innowacyjne materiały i technologie w przemyśle drzewnym *Innovative materials and technologies in the woodworking industry*	Dr hab. inż. Tomasz Krystofiak	Katedra Nauki o Drewnie i Techniki Cieplnej	12	12	0							x		E	
16	Substancje naturalne pochodzenia roślinnego *Natural substances of plant origin*	Prof. dr hab. Magdalena Zborowska	Katedra Chemicznej Technologii Drewna	12	12	0								x	Z	**18**
17	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0								x	Z	
			Ogółem: *Total:*	**180**	**176**	**4**										**180**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - rolnictwo i ogrodnictwo/ *Disciplinary programme at the PULS Doctoral School - agriculture and horticulture*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Rolnictwo 2050 - Bezpieczeństwo Żywnościowe *Agriculture 2050 – Food Security*	prof. dr hab. Jean Diatta	Katedra: Agronomii; Chemii Rolnej i Biogeochemii Środowiska; Genetyki i Hodowli Roślin; Gleboznawstwa i Mikrobiologii; Fizjologii Roślin; Fitopatologii i Nasiennictwa	16	16	0		x							Z	**42**
2	Projekty badawcze – pozyskiwanie środków finansowych *Research projects – funding application*	prof. UPP dr hab. Anna Woźniak prof. UPP dr hab. Łukasz Wolko	Katedra Biochemii i Biotechnologii	16	6	10		x							Z	
3	Planowanie doświadczeń i statystyczna analiza danych w badaniach przyrodniczych *Experimental Design and Statistical Data Analysis in Natural Science Research*	dr hab. Agnieszka Łacka	Katedra Metod Matematycznych i Statystycznych	4	4	0		x							Z	
4	Seminarium doktoranckie *Doctoral seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0		x							Z	
5	Rolnicze problemy środowiskowe *Agricultural environmental problems*	prof. dr hab. Monika Jakubus	Katedra: Gleboznawstwa i Mikrobiologii; Chemii Rolnej i Biogeochemii Środowiska; Agronomii	12	12	0				x					Z	**53**
6	Roślina w warunkach stresu *Plant under stress*	prof. UPP dr hab. Tomasz Kleiber	Katedra Fizjologii Roślin	6	6	0				x					Z	
7	Wybrane zagadnienia z ekologicznej i konwencjonalnej ochrony roślin *Selected topics in organic and conventional plant protection*	prof. dr hab. Romuald Górski	Katedra: Entomologii i Ochrony Środowiska; Fitopatologii i Nasiennictwa; Agronomii	15	15	0				x					E	
8	Rolnictwo i ogrodnictwo cyfrowe *Digital agriculture and horticulture*	prof. UPP dr hab. Piotr Rybacki prof. UPP dr hab. Włodzimierz Krzesiński	Katedra: Agronomii; Warzywnictwa	14	6	8				x					Z	
9	Seminarium doktoranckie *Doctoral seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0				x					Z	
10	Nowoczesne technologie uprawy roślin ogrodniczych *Modern technologies for horticulture crops*	prof. UPP dr hab. Tomasz Kleiber prof. UPP dr hab. Włodzimierz Krzesiński	Katedra: Fizjologii Roślin, Warzywnictwa	14	14	0						x			Z	**45**
11	Wybrane aspekty nowoczesnego sadownictwa *Selected aspects of modern fruit production*	prof. UPP dr hab. Grzegorz Łysiak	Katedra: Roślin Ozdobnych, Dendrologii i Sadownictwa	10	10	0						x			Z	
12	Nowe trendy w hodowli roślin i nasiennictwie *New trends in plant breeding and seed production*	prof. dr hab. Roman Hołubowicz	Katedra: Fitopatologii i Nasiennictwa; Genetyki i Hodowli Roślin; Agronomii	15	15	0						x			E	
13	Seminarium doktoranckie *Doctoral seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0						x			Z	
14	Genetyczne podstawy odporności roślin na agrofagi *Genetic basis of plant resistance to pests*	prof. UPP dr hab. Janetta Niemann	Katedra: Genetyki i Hodowli Roślin	10	10	0								x	Z	**26**
15	Znaczenie i ochrona różnorodności biologicznej w produkcji rolniczej i ogrodniczej *Importance and protection of biodiversity in agricultural and horticultural production*	prof. UPP dr hab. Paweł Sienkiewicz	Katedra: Entomologii i Ochrony Środowiska	10	10	0								x	E	
16	Seminarium doktoranckie *Doctoral seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0								x	Z	
			Ogółem: *Total:*	**166**	**148**	**18**										**166**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - technologia żywności i żywienia/*Disciplinary programme at the PULS Doctoral School - food technology and nutrition*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader*** */ lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Biotechnologia i mikrobiologia żywności *Biotechnology and food microbiology*	prof. UPP dr hab. Wojciech Białas	Katedra Biotechnologii i Mikrobiologii Żywnosci	12	2	10		x							E	**30**
2	Zastosowanie narzędzi bioinformatycznych i informatycznych w pracach badawczych *Application of bioinformatics and computer tools in research studies*	prof. dr hab. Magdalena Montowska	Katedra Katedra Technologii Mięsa; Katedra Technologii Żywności Pochodzenia Roślinnego	12	4	8		x							Z	
3	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0		x							Z	
4	Warsztaty chromatograficzne *Chromatography workshops*	prof. dr hab. Henryk Jeleń	Katedra Technologii Żywności Pochodzenia Roślinnego	12	0	12			x						ZO	**24**
5	Wykłady monograficzne z analityki żywności *Monographic lectures on food analytics*	prof. UPP dr hab. Dorota Piasecka-Kwiatkowska	Katedra Chemii	12	12	0			x						E	
6	Technologia gastronomiczna, kuchnia molekularna i żywność funkcjonalna *Catering technology, molecular cuisine and functional food*	prof. dr hab. Anna Gramza-Michałowska	Katedra Technologii Gastronomicznej i Żywności Funkcjonalnej	12	12	0				x					E	**24**
7	Warsztaty poświęcone wybranym metodom analizy żywności (immunochemia i różnicowa kalorymetria skaningowa *Workshops on a selected methods of food analysis (immunochemistry and differential scanning calorimetry)*	prof. UPP dr hab. Dorota Piasecka-Kwiatkowska	Katedra Biochemii i Analizy Żywności	12	0	12				x					ZO	
8	Technologie wytwarzania żywności pochodzenia roślinnego *Technologies for the production of plant-based food*	dr hab. Małgorzata Lasik-Kurdyś	Katedra Technologii Żywności Pochodzenia Roślinnego	12	9	3 (teren)					x				E	**24**
9	Trendy w produkcji żywności roślinnej nowej generacji *Trends in the production of novel plant-based foods*	dr hab. Małgorzata Lasik-Kurdyś	Katedra Technologii Żywności Pochodzenia Roślinnego	12	9	3 (teren)					x				ZO	
10	Nowoczesna technologia mięsa, standardy i systemy jakości żywności *Modern meat technology, standards and systems for food quality*	prof. UPP dr hab. Jolanta Tomaszewska-Gras	Katedra Technologii Mięsa; Katedra Zarzadzania Jakością i Bezpieczeństwem Żywności; Katedra Technologii Żywności Pochodzenia Roślinnego	12	12	0						x			ZO	**30**
11	Technologia mleczarska, wartość odżywcza i trendy *Dairy technology, nutritional value and trends*	prof. UPP dr hab. Dorota Cais-Sokolińska	Katedra Mleczarstwa i Inżynierii Procesowej	12	6	6						x			E	
12	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0						x			Z	
13	Wykłady monograficzne z zakresu Żywienia człowieka i dietetyki *Monographic lectures on human nutrition and dietetics*	prof. dr hab. Agata Chmurzyńska	Katedra Żywienia Człowieka i Dietetyki	12	12	0							x		E	**42**
14	Wykłady monograficzne: Chemia i technologia tłuszczów *Monographic lectures: Chemistry and technology of lipids*	prof. dr hab. Magdalena Rudzińska	Katedra Technologii Żywności Pochodzenia Roślinnego	12	12	0							x		ZO	
15	Zajęcia terenowe i wizyty studyjne *External activities and study visits*	prof. dr hab. Magdalena Rudzińska	Katedra Technologii Żywności Pochodzenia Roślinnego; Katedra Żywienia Człowieka i Dietetyki	12	2	10 (teren)							x		Z	
16	Seminarium *Seminar*	Przewodniczący Komisji Dysycpliny	Komisja Dyscypliny	6	6	0							x		Z	
			Ogółem: *Total:*	**174**	**110**	**48**										**174**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Program dyscyplinowy w SD UPP - weterynaria/*Disciplinary programme at the PULS Doctoral School - veterinary medicine*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader** / lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Metodologia badań w medycynie weterynaryjnej *Research methodology in veterinary medicine*	**prof. dr hab. Małgorzata Pomorska-Mól** dr Ewelina Czyżewska-Dors	Katedra Chorób Wewnętrznych i Diagnostyki	14	14	0		x							E	
	Metodologia badań w medycynie weterynaryjnej: Obsługa naukowych medycznych baz danych (seminarium) *Research methodology in veterinary medicine (seminar)*	**dr Ewelina Czyżewska-Dors** dr Michał Majewski	Katedra Chorób Wewnętrznych i Diagnostyki	3	3	0		x							Z	
2	Statystyka w analizie danych badawczych *The Statistical Analysis of Research Data*	dr Arkadiusz Dors	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	4	4	0		x							E	**30**
	Statystyka w analizie danych badawczych (seminarium) *The Statistical Analysis of Research Data (seminar)*	dr Arkadiusz Dors	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	3	3	0		x							Z	
3	Seminarium dyscyplinowe *Disciplinary seminar*	prof. UPP dr hab. Agnieszka Pękala-Safińska	Komisja Dyscypliny	6	6	0		x							Z	
4	Zwierzęta w badaniach naukowych *Animals in scientific research*	**prof. UPP dr hab. Lidia Radko** dr Arkadiusz Dors	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	12	12	0			x						E	
5	Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych *Diagnostic methods in veterinary medicine and scientific research*	**prof. dr hab. Małgorzata Pomorska-Mól** prof. UPP dr hab. Lidia Radko dr Mirosław Różycki	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	12	12	0			x						Z	**27**
	Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych (seminarium) *Diagnostic methods in veterinary medicine and scientific research (seminar)*	**prof. dr hab. Małgorzata Pomorska-Mól** prof. UPP dr hab. Lidia Radko dr Mirosław Różycki	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	3	3	0			x						Z	
6	Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych *Diagnostic methods in veterinary medicine and scientific research*	**prof. UPP dr hab. Agnieszka Pękala-Safińska** lek. wet. Anna Łukomska dr Marta Rybska prof. dr hab. Marek Świtoński	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	18	18	0				x					E	
	Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych (seminarium) Diagnostic methods in veterinary medicine and scientific research (seminar)	**prof. UPP dr hab. Agnieszka Pękala-Safińska** lek. wet. Anna Łukomska dr Marta Rybska	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	3	3	0				x					Z	**27**
7	Seminarium dyscyplinowe *Disciplinary seminar*	prof. UPP dr hab. Agnieszka Pękala-Safińska	Komisja Dyscypliny	6	6	0				x					Z	
8	Systemy zapewnienia bezpieczeństwa żywności *Food Safety Management Systems*	**dr Przemysław Racewicz** **dr Mirosław Różycki** dr Michał Majewski	Katedra Hodowli Zwierząt i Oceny Surowców; Katedra Nauk Przedklinicznych i Chorób Zakaźnych	43	43	0					x				E	**43**
9	Seminarium wynikowe *Resulting seminar*	**prof. dr hab. Małgorzata Pomorska-Mól** prof. dr hab. Marek Świtoński prof. dr hab. Hanna Jackowiak prof. UPP dr hab. Lidia Radko prof. UPP dr hab. Agnieszka Pękala-Safińska	Komisja Dyscypliny	5	5	0						x			Z	**11**
10	Seminarium dyscyplinowe *Disciplinary seminar*	prof. UPP dr hab. Agnieszka Pękala-Safińska	Komisja Dyscypliny	6	6	0						x			Z	
11	Koncepcja „One Health” *The "One Health" concept*	**dr Arkadiusz Dors** prof. UPP dr hab. Agnieszka Pękala-Safińska prof. UPP dr hab. Lidia Radko dr Mirosław Różycki prof. dr hab. Małgorzata Pomorska-Mól	Katedra Nauk Przedklinicznych i Chorób Zakaźnych	36	36	0							x		E	**36**
12	Seminarium dyscyplinowe *Disciplinary seminar*	**prof. UPP dr hab. Agnieszka Pękala-Safińska** prof. dr hab. Małgorzata Pomorska-Mól	Komisja Dyscypliny	6	6	0								x	Z	**6**
		Ogółem: *Total:*		**180**	**180**	**0**										**180**

E - egzamin
E - examination

Z - zaliczenie
Z - pass

ZO - zaliczenie na ocenę
ZO - course credit with a grade

Program dyscyplinowy w SD UPP - zootechnika i rybactwo/ *Disciplinary programme at the PULS Doctoral School - animal science and aquaculture*

Lp. *No.*	Przedmiot *Course*	**Kierownik przedmiotu** / Prowadzący ***Course leader** / lecturer*	Jednostka *Department*	Liczba godzin *Number of hours*			Semestr *Semester*								Sposób zaliczenia *Form of assessment*	Łącznie godzin na semestr *Total hours per semester*
				Ogółem *Total*	Wykłady *Lectures*	Ćwiczenia *Classes*	1	2	3	4	5	6	7	8		
1	Produkcja zwierzęca część 1 *Animal production part 1*	**prof. dr hab. Adam Cieślak** dr hab. Marcin Pszczoła dr Joanna Składanowska-Baryza	Katedra Żywienia Zwierząt	12	5	7		x							Z	**30**
2	Doświadczenia i analiza danych w naukach o zwierzętach *Experiments and data analysis in Animal Sciences*	dr hab. Ewa Sell-Kubiak	Katedra Genetyki i Hodowli Zwierząt	12	6	6		x							E	
3	Seminarium *Seminar*	prof. dr hab. Dorota Cieślak	Komisja Dyscypliny	6	6	0		x							Z	
4	Produkcja zwierzęca część 2 *Animal production part 2*	**prof. dr hab. Dorota Cieślak** prof. UPP dr hab. E. Warzych-Plejer dr hab. Marcin Pszczoła	Katedra Genetyki i Podstaw Hodowli Zwierząt	12	6	6			x						Z	**24**
5	Modele zwierzęce w eksperymentach naukowych *Animal models in scientific experiments*	prof. UPP dr hab. Katarzyna Szkudelska dr Dawid Szczepankiewicz	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	7	5			x						E	
6	Produkcja zwierzęca część 3 *Animal production part 3*	**prof. dr hab. Włodzimierz Nowak** prof. UPP dr hab. M.Kasprowicz-Potocka	Katedra Żywienia Zwierząt	12	8	4				x					Z	**30**
7	Metody doświadczalne w zootechnice i rybactwie część 1 *Experimental methods in zootechnics and fisheries part 1*	**prof. UPP dr hab. Małgorzata Kasprowicz-Potocka** prof. dr hab. Adam Cieślak dr hab. prof. UPP Sebastian Kaczmarek	Katedra Żywienia Zwierząt	12	12	0				x					E	
8	Seminarium *Seminar*	prof. UPP dr hab. Małgorzata Kasprowicz-Potocka	Komisja Dyscypliny	6	6	0				x					Z	
9	Produkcja zwierzęca część 4 *Animal production part 4*	**prof. UPP dr hab. Jan Mazurkiewicz** dr hab. Marcin Hejdysz prof. UPP dr hab. Sebastian Kaczmarek	Katedra Zoologii, Pracownia Rybactwa Śródlądowego i Akwakultury; Katedra Żywienia Zwierząt; Katedra Hodowli Zwierząt i Oceny Jakości Surowców	12	6	6					x				Z	**24**
10	Metody eksperymentalne w zootechnice i rybactwie część 2 *Experimental methods in zootechnics and fisheries part 2*	**dr hab. Zofia Madeja** dr Tatiana Wojciechowicz prof. UPP dr hab. Marek Skrzypski	Katedra Fizjologii Biochemii i Biostruktury Zwierząt	12	4	8					x				E	
11	Produkty spożywcze pochodzenia zwierzęcego *Food products of animal origin*	**prof. dr hab. Piotr Ślósarz** dr hab. Agnieszka Ludwiczak dr Joanna Składanowska- Baryza	Katedra Hodowli Zwierząt i Oceny Jakości Surowców	12	6	6						x			E	**30**
12	Metody eksperymentalne w zootechnice i rybactwie część 3 *Experimental methods in zootechnics and fisheries part 3*	dr hab. Kinga Skieresz-Szewczyk	Katedra Fizjologii, Biochemii i Biostruktury Zwierząt	12	5	7						x			E	
13	Seminarium *Seminar*	prof. UPP dr hab. Małgorzata Kasprowicz-Potocka	Komisja Dyscypliny	6	6	0						x			Z	
14	Funkcjonalna żywność *Functional food*	**prof. dr hab. Adam Cieślak** prof. dr hab. Małgorzata Szumacher dr hab. Agnieszka Ludwiczak	Katedra Żywienia Zwierząt	12	5	7							x		E	**24**
15	Biostatystyka i bioinformatyka w analizie danych *Biostatistics and bioinformatics in data analysis*	**dr Alicja Szabelska-Beręsewicz** dr Joanna Zyprych-Walczak	Katedra Metod Matematycznych i Statystycznych	12	5	7							x		Z	
16	Odnawialne źródła energii w sektorze produkcji zwierzęcej *Renewable energy sources in the animal production sector*	**prof. dr hab. Jacek Dach** prof. dr hab. Wojciech Czekała	Katedra Inżynierii Biosystemów	12	6	6								x	Z	**18**
17	Seminarium *Seminar*	prof. UPP dr hab. Małgorzata Kasprowicz-Potocka	Komisja Dyscypliny	6	6	0								x	Z	
			Ogółem: *Total:*	**180**	**105**	**75**										**180**

E - egzamin *E - examination* | **Z - zaliczenie** *Z - pass* | **ZO - zaliczenie na ocenę** *ZO - course credit with a grade*

Strategic research areas for 10 scientific disciplines at the Poznań University of Life Sciences

1. **Forestry Sciences** - research on scientific problems in forestry, wood science and environmental chemistry;
2. **Agriculture and Horticulture** - research on the use of modern techniques in precise fertilisation and crop protection, the use of genetic and breeding techniques in developing new varieties and the use of microorganisms to regulate the fermentation process;
3. **Food Technology and Nutrition** - research on innovative technologies for food production and storage in terms of its quality and safety, as well as nutritional epidemiology;
4. **Veterinary Medicine** - research in preclinical and clinical veterinary sciences;
5. **Animal Science and Aquaculture** - innovative feeding methods and the analysis of genetic and environmental factors affecting animal health and productivity;
6. **Mechanical Engineering** - research on modern mechanical engineering methods and techniques applied to biosystems engineering, exact sciences and natural sciences;
7. **Environmental, Mining and Power Engineering** – research on the rational management of environmental resources, particularly in the areas of water, air and landscape protection, waste management, and the revitalisation of degraded areas;
8. **Biological Sciences** – research on animal and plant biology, animal disease models, biotechnology and food microbiology;
9. **Economics and Finance** – research on the interconnections between the economic, social and environmental aspects of agriculture, agribusiness and rural areas on a national, European and global scale;
10. **Biotechnology** – research on innovative solutions in medical biotechnology, animal and plant biotechnology and industrial biotechnology.

Detailed development goals of PULS Doctoral School:

- Development of scientific research at the highest possible level, including research within the framework of implementation doctorates, as part of research projects funded by the Polish and foreign agencies;
- Individual support in research and skill development for PhD students through their involvement in various research programs, such as ERASMUS+, COST, PreIDUB etc.;
- Improving PhD students' skills in developing technological solutions that are attractive to the economic environment, including through industrial and technological internships in enterprises and project management training;
- Individual development of supervisors and mentors, with no limits for PhD students funded by external projects and the involvement of supervisors from leading research departments at the PULS and beyond;
- Increasing the number of PhD students to ensure annual enrollment of 50-70;
- Maintaining the proportion of PhD students from outside Poland at 25%, including increasing the number of doctoral students from EU countries;
- Matching doctoral thesis topics to the development strategy of a given discipline at the PULS;
- activities aimed at engaging the best PhD students as PULS employees;
- continuous improvement of DS functioning and effective cooperation with the PULS authorities;
- continuous improvement of the quality of doctoral education;
- supporting doctoral students to improve the quality of their doctoral dissertations;
- supporting PhD students with financial, psychological and social support;
- extensive promotional campaigns for the PULS DS;
- securing operational funds for the operation of the PULD DS.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Biotechnology and Food Microbiology**	
Name of the course in Polish: **Biotechnologia i mikrobiologia żywności**	
Unit providing the course (Department): **Department of Biotechnology and Food Microbiology**	
Course leader: **Prof. UPP dr hab. Kamila Myszka**	
Discipline: **Biotechnology**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
- Practical classes	**9**
- exam	**1**
- Self-study	**2**
Total numer of hours:	**15**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce doctoral students to practical aspects and new trends/techniques in food microbial diagnostics and industrial biotechnology. The basics of the organization of work in a genetics laboratory and the organization of work with microorganisms on a laboratory scale are also presented.

TEACHING METHODS:

Lectures with multimedia presentation, conducting laboratory experiments.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The graduate knows and understands the current principles and latest trends in microbiological analysis of food and industrial biotechnology, which enables the creation of original research concepts and their scientific interpretation in the field of food biotechnology. - - -	P8U_W
In the area of skills (PhD students know how to): - the graduate is able to use the knowledge of food biotechnology and microbiology to formulate their own research problems - the graduate can independently plan and implement research in the field of biotechnology and food microbiology	P8U_U
In the area of social competences (PhD students are capable to): - The graduate is ready to independently plan research in the field of food biotechnology and microbiology and independently enrich the existing scientific output.	P8U_K

Methods of evaluation of outcomes achievement:

exam and protocol
Performance of experiments in the microbiology and genetics laboratory

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Lectures:
1. practical aspects and new trends in food microbiology diagnostics
2. practical aspects and new trends in diagnostics of food infections.

Workshops:
1. organization of work in the microbiology laboratory. Microbiological analysis of selected food products
2. organization of work in the genetics laboratory. Use of high-resolution melting analysis in detection of adulteration of selected fermented products**.**

The course completion criteria and methods:	Percent of a final grade:
The prerequisite for passing the exercises is active participation in laboratory classes and receiving a positive evaluation of the protocols of the performed experiments.	40%
The exam will be held in written form (test). A positive grade will be given with at least 60% correct answers	60%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Wheelis M. Principles of modern microbiology
2. Norma PN-EN ISO/EIC 17025
3. Borkowska M., Celińska E. 2023. Multiple region high resolution melting-based method for accurate differentiation of food-derived yeast at species level resolution. Food Microbiology, 109, 104120
4. Druml B., Cichna-Markl M. 2014. High resolution melting (HRM) analysis of DNA – its role and potential in food analysis. Food Chemistry, 158, 245-254
5. A Guide to high resolution melting (HRM) analysis – Applied Biosystem protocols

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Seminar	**4**
- Self-study	**10**
Total numer of hours:	**14**

OBJECTIVE OF THE COURSE:
Study of literature within the discipline and subject of the doctoral thesis.

TEACHING METHODS:
Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): The world scientific achievements concerning specific issues related to a given scientific discipline and the resulting implications for practice	P8U_W_1
In the area of skills (graduates know how to): Use knowledge to creatively formulate your own research problems	P8U_U_1
In the area of social competences (graduates are capable to): Has competence in evaluating literature Is ready to critically evaluate his/her contribution to the development of science.	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:

Analysis of literature related to the discipline and topic of the doctoral thesis.

The course completion criteria and methods:	Percent of a final grade:
Credit for a course ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Laboratory Animals in Biomedical Research**	
Name of the course in Polish: **Zwierzęta laboratoryjne w badaniach biomedycznych**	
Unit providing the course (Department): **Department of Animal Physiology, Biochemistry and Biostructure**	
Course leader: **Prof. dr hab. Katarzyna Szkudelska**	
Discipline: **Biotechnology**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:
enriching knowledge of laboratory animal models; achievement of skills in planning experiments with animals, legal regulations; Local Ethics Committee

TEACHING METHODS:
lectures, practical workshops, journal club – multimedia presentation with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning the animal models and ethical approach of the use of animals in scientific experiments and implications for practice; - the ethical rules as well as new methods and trends in research involving animals, thus facilitating the creation of original approaches, new concepts, and their scientific interpretation.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems; - innovatively solve research tasks using independently gained knowledge concerning ethical and methodological aspects of the use of laboratory animals in scientific research.	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): - independently plan research - promote appropriate models of teamwork.	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Attending lectures

Activity during workshop and discussions

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TEACHING CONTENT:

- rules regulating the use of animals in research;
- conditions of keeping and rules for handling animals;
- purposes, types of studies, and principles of planning experiments using animals;
- research models of animals;
- *in vitro* methods developed based on lab animals' cells and tissues (examples of experiments);
- work with scientific literature related to the subject - presentation of a selected article and discussion;
- workshop – examples of the use of animals in scientific research.

The course completion criteria and methods:	Percent of a final grade:
Passing test ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Hubrecht R., Kirkwood J.: "*The UFAW Handbook of the Care and Management of Laboratory and other Research Animals"*. eight edition, Wiley-Blackwell, 2010

"*Best practice methodology in the use of animals for scientific purposes*." National Health and Medical Research Council (NHMRC) 2017, Australian Government

„*Fundamentals of Laboratory Animal Science*" Enqi Liu, Jianglin Fan**,** 2017, VetBooks, Taylor&Francis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Genome editing**	
Name of the course in Polish: **Edycja genomu**	
Unit providing the course (Department): **Department of Biochemistry and Biotechnology**	
Course leader: **dr inż. Magdalena Hryhorowicz**	
Discipline: **Biotechnology**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**2**
- Practical classes	**10**
- Others with teacher	**3**
- Self-study	**15**
Total number of hours:	**30**

OBJECTIVE OF THE COURSE:

Learning about the latest genome editing methods.
Learning about the applications and development prospects of new genome editing technologies.

TEACHING METHODS:

Lectures based on multimedia presentation, discussion with students.
Practical classes: individual/group projects.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): O1 Students will discover the latest technologies in the scope of genome editing (CRISPR/Cas, TALEN, ZFN). O2 Students will have basic knowledge of genetic engineering methods. O3 Students will know methods of introducing CRISPR/Cas system elements into cells. O4 Students will know examples of applications of CRISPR/Cas mediated genome editing.	P8U_K1, P8U_K2
In the area of skills (PhD students know how to): O5 Students will have skills to design sgRNAs for genome editing. O6 Students will be able to perform DNA cloning, bacterial transformation, and clone selection. O7 Students will be able to prepare genetic construct using CRISPR/Cas9 system. O8 Students will have skills to interpret results, derive conclusions, express and justify opinions.	P8U_S1, P8U_S2
In the area of social competences (PhD students are capable to): O9 Students will be able to cooperate and work in a team as well as work individually to analyze a problem, design and conduct research. O10 Students can determine the priorities in the implementation of a specific task. O11 Students will be aware of the possibility of occurrence of hazards and necessity to ensure workplace safety.	P8U_So1, P8U_ So2, P8U_ So4

Methods of evaluation of outcomes achievement:

Written exam.

TEACHING CONTENT:

Genome editing (CRISPR/Cas, TALEN, ZFN), DNA cloning, genetic engineering enzymes, ligation of vector and insert DNA, competent cells, *E.coli* transformation and transformants screening, methods of introducing elements of the CRISPR/Cas system into cells, applications of CRISPR/Cas mediated genome editing, biosafety guidelines.

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The course completion criteria and methods:	Percent of a final grade:
Participation in the exercises and performing planned experiments allows students to take the exam. Written exam. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Targeted Genome Editing Using Site-Specific Nucleases ZFNs, TALENs, and the CRISPR/Cas9 System. Editors: Yamamoto Takashi, SPRINGER, 2015, ISBN: 978-4- 431-55226- 0

An introduction to molecular biotechnology. Fundamentals, methods and applications. Second, updated edition. Red. M. Wink, Wiley-Blackwell, 2011, 1-601, ISBN 978-3-527-32637-2

Techniques in genetic engineering. Isil Aksan Kurnaz, CRC Press, 2015,1-322, ISBN 978-1-4822-6089-2

Evolution of CRISPR/Cas Systems for Precise Genome Editing.
Hryhorowicz M, Lipiński D, Zeyland J. Int J Mol Sci. 2023 Sep 18;24(18):14233. doi: 10.3390/ijms241814233.

CRISPR/Cas9 Immune System as a Tool for Genome Engineering.
Hryhorowicz M, Lipiński D, Zeyland J, Słomski R. Arch Immunol Ther Exp (Warsz). 2017 Jun;65(3):233-240. doi: 10.1007/s00005-016-0427-5. Epub 2016 Oct 3.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **III**

TYPE OF CLASSES: (course load)	
- Seminar	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:
Literature studies in the field of doctoral thesis methodology, preparation and implementation of a research workshop.

TEACHING METHODS:
Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): Knows and understands the research methodology within the scope of the doctoral thesis topic	P8U_W_3
In the area of skills (graduates know how to): Is able to critically conduct literature studies in the field of methodology and determine their contribution to the development of science Is able to formulate a research problem, goal, hypothesis and select appropriate methods to solve the research problem posed	P8U_U_1 P8U_U_4
In the area of social competences (graduates are capable to): Possesses competence in evaluating literature Is ready to critically assess their contribution to the development of science Is ready to conduct research in an ethical and independent manner	P8U_K_1 P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:
Analysis of literature related to the topic of the doctoral dissertation. Development of a research workshop necessary to verify the hypotheses of the doctoral dissertation.

The course completion criteria and methods:	Percent of a final grade:
Credit for a course ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern Imaging Techniques**	
Name of the course in Polish: **Nowoczesne techniki obrazowania**	
Unit providing the course (Department): **Department of Biochemistry and Biotechnology, Department of Genetics and Animal Breeding**	
Course leader: **Dr Joanna Suszyńska-Zajczyk,** Department of Biochemistry and Biotechnology Tutors (collaborators): **dr hab. Zofia E. Madeja, dr hab. Piotr Pawlak,** Department of Genetics and Animal Breeding	
Discipline: **Biotechnology**	Semester: **IV**

TYPE OF CLASSES: (course load)	
- Lectures	**4**
- Practical classes	**8**
- Self-study	**4**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

Gaining knowledge and developing practical skills related to the application of chosen microscopic imaging techniques in life sciences**.** The course will introduce (A) the basics of optics and light/fluorescent image detection, (B) laser scanning based microscopy (LSM - confocal and STED), and (C) the basic course of electron microscopy. The course will provide the background information about the methods used to prepare biological samples for various types of imaging.

TEACHING METHODS:

Multimedia presentations (theory), laboratory work dedicated to microscopic slide preparation, image acquisition and analysis, microscopic work and data analysis.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - how to find literature related to microscopic imaging, - what sort of information or data may be gathered from microscopic observations - understand the principles of modern microscopy – including bright-field and fluorescent microscopy, LSM, super-resolution imaging (SR) and electron microscopy, - the latest trends in microscopy that would allow to create original research concepts and implement interpretation of scientific data.	**P8U_W_1** **P8U_W_2**
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of the research problem, that include preparing of biological specimens for microscopic observations and basic knowledge related to the practical use of presented microscopes - apply different staining methods depending on the biological material - follow a laboratory protocol, - proficiently conduct a biochemical experiment, perform necessary observations and measurements, and describe the obtained results - plan an experiment (solving research tasks)	**P8U_U_1** **P8U_U_2** **P8U_U_4**

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In the area of social competences (PhD students are capable to): - collaborate within a team, take on diverse roles – including some leadership responsibilities - properly interpret the data (including critical thinking) - independently plan the research and broaden the existing knowledge (that includes reading scientific literature) - creatively solve the challenges in professional and public life, considering their ethical aspect	**P8U_K 1** **P8U_K 4**

Methods of evaluation of outcomes achievement:

Evaluation will be assessed based on student's knowledge, student's activity/work during classes, and a small project.

TEACHING CONTENT:

Short lecture will precede the experimental classes.
The content will be divided into 3 main subjects
1: Light/fluorescent microscopy in biology;
2: Principles of confocal microscopy: introduction to optics (properties of light, reflection, refraction, beam splitting, optical resolution, principles of fluorescence (excitation and emission spectra), image resolution and limitations of each method.
3: Electron microscopy – overview of the preparation steps of biological material for SEM and TEM microscopy.

Practical classes will include:
1: making of microscopic slides dedicated to conventional and LSM/SR based fluorescent microscopy,
2: image acquisition (LSM confocal microscope), principles of image acquisition, data interpretation, and analytical methods (software for image analysis)
3. practical preparation of tissue samples for SEM and TEM, image acquisition, and microscopic analysis.

The course completion criteria and methods:	Percent of a final grade:
Activities during class	60%
Project related to data analysis	40%
☒**pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Ibidi Academy: https://ibidi.com/content/category/28-webinars
2. Mahbubul H. Shihan, Samuel G. Novo, Sylvain J. Le Marchand, Yan Wang, Melinda K. Duncan. A simple method for quantitating confocal fluorescent images. Biochemistry and Biophysics Reports, Volume 25, 2021,100916. doi.org/10.1016/j.bbrep.2021.100916.
3. Elliott AD. Confocal Microscopy: Principles and Modern Practices. Curr Protoc Cytom. 2020, 92(1):e68. doi: 10.1002/cpcy.68.
4. Hayat, M.A. Eric. Basic techniques for transmission electron microscopy. Elsevier, 2012.
5. Goldstein, J. I., Newbury, D. E., Michael, J. R., Ritchie, N. W., Scott, J. H. J., & Joy, D. C. Scanning electron microscopy and X-ray microanalysis. Springer, 2017.
6. Pubmed and Google Schoolar

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Research projects – funding application

Name of the course in Polish:
Projekty badawcze – pozyskiwanie środków finansowych

Unit providing the course (Department):
Biochemistry and Biotechnology

Course leader:
Prof. UPP, dr hab. n. med. Anna Woźniak

Discipline:	Semester:
Biotechnology	**IV**

TYPE OF CLASSES:
(course load)

- Lectures	**2**
- Practical classes	**10**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize doctoral students with the specifics of applying for funding for scientific activities in grant dedicated to doctoral students.

TEACHING METHODS:

Lectures in the form of multimedia presentations. Working on an online platform for grant applications on the example of OSF (Support for Financing Streams).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): E1 The PhD student knows and understands the principles of planning and financing scientific research and project evaluation.	P8U_W_1
In the area of skills (PhD students know how to): E2 The PhD student is able to independently plan and implement his own scientific development and inspire and/or organize the development of other people.	P8U_U_1
In the area of social competences (PhD students are capable to): E3 The PhD student is prepared to independently plan research and independently expand existing scientific achievements.	P8U_K_1

Methods of evaluation of outcomes achievement:

The PhD student activity. Preparation of a project application in a grant dedicated to doctoral students.

TEACHING CONTENT:

1. The offer for research projects based on the example of national centers financing scientific activities.
2. Strategies for selecting optimal types of grants for PhD students, assessment of the applicant's chances and capabilities.
3. Application regulations.
4. Applications platform.
5. Application proposal analysis based on the example of the National Science Center Preludium competition.
6. Individual scientific plans.
7. Individual project proposals.

The course completion criteria and methods:
Preparation of a project proposal in a grant competition dedicated to PhD students.

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

Percent of a final grade:
100%

RECOMMENDED LITERATURE:

No universal manual.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Seminar	**3**
- Self-study	**10**
Total numer of hours:	**13**

OBJECTIVE OF THE COURSE:
The verification of the implemented research workshop. Evaluation of the obtained research results.

TEACHING METHODS:
Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): Knows and understands the research methodology within the scope of the doctoral thesis topic Knows the methods of interpreting the obtained research results	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (graduates know how to): Is able to critically evaluate the applied research methodology Is able to modify the research methodology Is able to interpret and present research results	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competences (graduates are capable to): Has competences in evaluating literature Is ready to critically determine his/her contribution to the development of science Is ready to conduct research in an ethical and independent manner	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:
Analysis of the implemented research workshop. Interpretation of the obtained research results.

The course completion criteria and methods:	Percent of a final grade:
Credit for a seminar ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Introduction to epigenetics**	
Name of the course in Polish: **Wprowadzenie do epigenetyki**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **prof. dr hab. Joanna Nowacka-Woszuk**	
Discipline: **Biotechnology**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize doctoral students with epigenetic mechanisms regulating tissue-specific gene expression: DNA methylation, histone modifications, architecture of the interphase nucleus and the role of non-coding RNA molecules.

TEACHING METHODS:

Theoretical lectures and practical laboratory classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice - the latest theories and trends in the field of scientific disciplines in which education is provided at the doctoral school, which allow the creation of original research concepts and their scientific interpretation - - -	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - solve research tasks innovatively, using independently acquired knowledge of the latest research methods and tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - promote appropriate models of team work	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of activity during laboratory classes. Assessment of discussion skills at seminars. Assessment of the presentation.

TEACHING CONTENT:

Knowledge concerning the basic methods of examining epigenetic mechanisms: WGBS, RRBS, ChIP-seq, ATAC-seq, qPCR, 3D microscopic imaging methods.
Practical part: DNA methylation analysis by pyrosequencing of converted DNA (laboratory exercises)

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The course completion criteria and methods: Final score based on attendance, completion of laboratory exercises and presentation of a scientific article in the field of epigenetics ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Lucchesi John C. Epigenetics, Nuclear Organization & Gene Function, Oxford (2019)
Ralph Rapley. The Nucleic Acid Protocols Handbook. Springer Protocols Handbooks (2000).

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Novel approaches in cell analysis – flow cytometry and cell sorting**	
Name of the course in Polish: **Nowe metody analiz komórkowych - cytometria przepływowa i sortowanie komórek**	
Unit providing the course (Department): **Department of Biotechnology and Food Microbiology**	
Course leader: **Assoc. Prof. Wojciech Juzwa, PhD**	
Discipline: **Biotechnology**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
- Self-study	**4**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

The aim of the classes is to familiarize students with single-cell analysis procedures based on flow cytometry and the use of a cell sorter. Students will learn about the prospects for development and applications of modern single-cell analysis methods in natural sciences. Students will be introduced to the structure and operation of flow cytometers and will learn how to design experiments using them.

TEACHING METHODS:

Multimedia presentations, handling laboratory equipment, practical preparation of research protocols. Classes are conducted by staff with documented achievements and competencies appropriate to the presented content and learning outcomes for the subject.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): − how to find literature related to flow cytometry, − what kind of information/data can be obtained in cytometric analysis and what are the goals of cell sorting − the principle of operation of a flow cytometer, cell sorter, and imaging flow cytometer, − the latest trends in flow cytometry that will allow for the creation of original research concepts, implementation of scientific data interpretation, and use in human disease therapy.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): − prepare samples for cytometric analysis − prepare the instrument (flow cytometer) for analysis and perform cytometric data acquisition − conduct interpretation of results using software (including machine learning (ML) modules)	P8U_U 2 P8U_U 4
In the area of social competences (PhD students are capable to): − working in a group, taking on various roles, including the role of a leader. − creatively solves challenges in professional life, considering ethical aspects.	P8U_K1 P8U_K4

Methods of evaluation of outcomes achievement:

Written exam – a test and questions concerning the understanding of flow cytometry concepts and the application potential of instruments.

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TEACHING CONTENT:

The course completion criteria and methods: Lectures: 1. Fluorescence in biological research - flow cytometry 2. Imaging flow cytometry and cell sorting	Percent of a final grade: 80%
Exercises: 1. Assessment of physiological and morphological parameters of mammalian cells using conventional flow cytometry and imaging cytometry 2. Directions for interpreting cytometric analysis results with elements of machine learning (Machine Learning – ML)	20%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Practical Flow Cytometry (2003) – H. M. Shapiro
2. Gołąbek-Grenda A.; Kaczmarek M.; Juzwa W.; Olejnik A. Natural resveratrol analogs differentially target endometriotic cells into apoptosis pathways. Scientific Reports, 13:1146, 2023
3. Nowak-Terpiłowska A., Lipiński D., Hryhorowicz M., Juzwa W., Jura J., Korcz A., Słomski R., Mazurkiewicz N., Gawrońska B., Zeyland J. Production of ULBP1-KO pigs with human CD55 expression using CRISPR technology. Journal of Applied Animal Research, 48(1): 93-101, 2020
4. Olszewska M, Malcher A, Stokowy T, Pollock N, Berman AJ, Budkiewicz S, Kamieniczna M, Jackowiak H, Suszynska-Zajczyk J, Jedrzejczak P, Yatsenko AN, Kurpisz M. Effects of Tcte1 knockout on energy chain transportation and spermatogenesis: implications for male infertility.Hum Reprod Open. 2024

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Seminar	**3**
- Self-study	**10**
Total numer of hours:	**13**

OBJECTIVE OF THE COURSE:
The evaluation and presentation of the obtained research results.

TEACHING METHODS:
Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): Knows and understands the research methodology within the scope of the doctoral thesis topic Knows the methods of interpreting the obtained research results	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): Is able to critically evaluate the applied research methodology Is able to modify the research methodology Is able to interpret and present research results	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competences (PhD students are capable to): Has competences in evaluating literature Is ready to critically determine his/her contribution to the development of science Is ready to conduct research in an ethical and independent manner	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:
Interpretation and presentation of obtained research results

The course completion criteria and methods:	Percent of a final grade:
Credit for a seminar ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Next Generation Sequencing (NGS) results analysis**	
Name of the course in Polish: **Analiza wyników sekwencjonowania nowej generacji (NGS)**	
Unit providing the course (Department): **Biochemistry and Biotechnology**	
Course leader: **Prof. UPP dr hab. Łukasz Wolko**	
Discipline: **Biotechnology**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**2**
- Practical classes	**10**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
The course aims to demonstrate Ph.D. students methods of bioinformatic processing of various types of data obtained from next-generation sequencing (NGS).

TEACHING METHODS:
Lectures in the form of multimedia presentations. Practical classes using computers and specialized software.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The PhD student knows the applications of modern NGS DNA sequencing methods - The PhD student knows the basic principles and stages of processing sequential data	P8U_W
In the area of skills (PhD students know how to): - The PhD student is able to independently plan experiments using modern NGS mass sequencing methods - The PhD student is able to use bioinformatics software to process data	P8U_U
In the area of social competences (PhD students are capable to): -The PhD student is prepared to independently plan research using NGS methods - The PhD student is ready to implement projects in the discussed field	P8U_K

Methods of evaluation of outcomes achievement:

Active participation in practical exercises.

TEACHING CONTENT:

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
1. Pre-processing of sequencing reads 2. Mapping and de novo assembly of reads 3. The lecture will discuss the basic principles of NGS data processing. 4. Processing RNAseq data using R programs 5. Processing RNAseq data using the QIAGEN CLC Genomics Workbench program 6. Processing of metagenomic 16S rRNA amplicons 7. Functional interpretation - KEEG, GO, EC ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

There is no manual

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Applications of cell and tissue culture in industry and medicine**	
Name of the course in Polish: **Zastosowanie hodowli komórkowych i tkankowych w przemyśle i medycynie**	
Unit providing the course (Department): **Department of Biotechnology and Food Microbiology**	
Course leader: **Dr hab. Katarzyna Kowalska**	
Discipline: **Biotechnology**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**10**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:
This course aims to show recent advances in cell and tissue cultures and their applications and importance in the development of modern medicine, pharmacy and industrial biotechnology.

TEACHING METHODS:

Lecture with a multimedia presentation.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - knows the global scientific achievements and trends in methods currently used in animal cell cultures in biotechnology, pharmacy and medicine - knows the applications of animal cell cultures in the production of biopharmaceuticals and biotechnological processes - knows the latest trends in in vitro research, such as in vitro meat production and 3D bio-printers	P8U_WG
In the area of skills (PhD students know how to): - use knowledge to formulate their own research problems - perform own research projects using the latest knowledge regarding methods and tools in animal cell cultures -	P8U_UW P8U_UO
In the area of social competences (PhD students are capable to): - can independently plan research for future research projects - assess the risks and results of future research projects	P8U_KK P8U_KO

Methods of evaluation of outcomes achievement:

Written exam

TEACHING CONTENT:
The teaching content is dediated to the recent advances in animal cell and tissue cultures, and covers the following topics: (1) Analyzes of the safety and biological activity of food ingredients (2) Meat production using in vitro methods (3) The importance of animal cell cultures in the development of modern pharmacy, medicine and biotechnology (4) 3D tissue models (5) Use of in vitro cells in biomedical research (research on the mechanisms of drug action, research on drug transport through the intestines, respiratory barrier, respiratory epithelium or blood-brain barrier) (6) Bioprinting of 3D tissue models (7) Industrial production of biopreparations using animal cell cultures (production of vaccines, monoclonal antibodies, enzymes).

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The course completion criteria and methods:	Percent of a final grade:
Written exam □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

1.The latest scientific publications on the subject recommended by the teacher https://www.ncbi.nlm.nih.gov/pubmed/
2. Recent Advances on Cell Culture Platforms for In Vitro Drug Screening and Cell Therapies: From Conventional to Microfluidic Strategies, Adv. Healthcare Mater. 2023, 12, 2202936 DOI: 10.1002/adhm.202202936
3.Pharmaceutical Applications of Cell and Tissue Culture to Drug Transport pp 367–374 Editors: Glynn Wilson, S. S. Davis, L. Illum, Alain Zweibaum,Part of the book series: NATO Science Series A: (NSSA, volume 218)
4. In-vitro meat: a promising solution for sustainability of meat sector. J Anim Sci Technol. 2021 Jul;63(4):693-724. doi: 10.5187/jast.2021.e85.
5. Current Developments in 3D Bioprinting for Tissue and Organ Regeneration–A Review Front. Mech. Eng., 30 October 2020 Sec. Digital Manufacturing, Volume 6 - 2020 | https://doi.org/10.3389/fmech.2020.589171

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Seminar	**3**
- Self-study	**10**
Total numer of hours:	**13**

OBJECTIVE OF THE COURSE:
The evaluation and presentation of obtained research results. Preparation of a doctoral dissertation.

TEACHING METHODS:
Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): Knows methods of interpreting obtained research results Knows and understands the main development trends in the scope of the implemented doctoral thesis	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): Is able to critically evaluate obtained research results and compare them to literature data Is able to interpret and present research results	P8U_U_1 P8U_U_4
In the area of social competences (PhD students are capable to): Is ready to critically define his/her contribution to the development of science Is ready to evaluate obtained research results in an ethical and independent manner Is ready to fulfill the social function of a researcher	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:
Discussion of the obtained experimental results with the results of other authors of scientific works.

The course completion criteria and methods:	Percent of a final grade:
Credit for a seminar ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern Technologies in Plant Breeding**	
Name of the course in Polish: **Nowoczesne technologie w hodowli roślin**	
Unit providing the course (Department): **Department of Genetics and Plant Breeding**	
Course leader: **Prof. UPP dr hab. Janetta Niemann**	
Discipline: **Biotechnology**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce doctoral students to practical aspects and new trends/techniques in plant breeding.

TEACHING METHODS:

Lectures with multimedia presentation.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The PhD student knows and understands the current principles and latest trends in plant breeding - -	P8U_W
In the area of skills (PhD students know how to): - The PhD student is able to use the knowledge of plant biotechnology to formulate their own research problems	P8U_U
In the area of social competences (PhD students are capable to): - The PhD student is ready to independently plan research in the field of plant breeding with modern biotechnological techniques.	P8U_K

Methods of evaluation of outcomes achievement:

exam

TEACHING CONTENT:

Processes optimalization for obtaining DH plants; new sources of genes for resistance to biotic and abiotic stresses; marker-assisted selection; enriching the gene pool through distant crossbreeding; modern biotechnological methods used in plant breeding, i.e. new genome editing techniques.

The course completion criteria and methods:	Percent of a final grade:
The exam will be held in written form (test). A positive grade will be given with at least 60% correct answers.	60%

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

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RECOMMENDED LITERATURE:

1. Kamaluddin, Usha Kiran, M. Z. Abdin. 2023. Technologies in Plant Biotechnology and Breeding of Field Crops. Springer ed.
2. Bharadwaj D.N. 2018. Advanced Molecular Plant Breeding: Meeting the Challenge of Food Security. Apple Academic Press.
3. Singh, D. P., Singh, A. 2021. Plant Breeding and Cultivar Development. Elsevier Science Publishing Co.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Biotechnology and climate change**	
Name of the course in Polish: **Biotechnologia a zmiana klimatu**	
Unit providing the course (Department): **Department of Ecology and Environmental Protection, Laboratory of Bioclimatology**	
Course leader: **dr inż. Kamila M. Harenda**	
Discipline: **Environmental Engineering, Mining and Energy**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**6**
Total numer of hours:	**18**

OBJECTIVE OF THE COURSE:

Gaining knowledge and developing skills in the field of the biotechnology impact on the climate and estimating the carbon and water footprint of production.

TEACHING METHODS:

Multimedia presentations; discussion panel.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The student knows and understands basic knowledge about the processes causing carbon emissions and water consumption in the economy sector - The student has the knowledge necessary to predict the impact of actions taken on carbon and water footprints	P8U_W_1
In the area of skills (PhD students know how to): - The student is able to estimate the size of the carbon and water footprint of a specific biotechnology production - The student is able to use the carbon and water footprint to assess a specific production and interpret the obtained results	P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): - The student is ready to form questions, opinions and statements as well as cooperate in a group. - The student is ready to analyze and understand reports and data regarding the size of carbon and water footprints.	P8U_K_4 P8U_K_1

Methods of evaluation of outcomes achievement:

project; exam

TEACHING CONTENT:

Lectures: This course aims to familiarizing students with the processes leading to carbon dioxide emissions and water resource consumption. It covers environmental life cycle assessment (LCA) including the evaluation of the natural environment's impact throughout the entire process. This involves identifying and quantitatively assessing the environmental burdens, evaluating the potential impacts of these burdens, and examining available strategies for burden reduction. The course will also introduce the methodology for calculating carbon and water footprints, and discuss biotechnological production processes in terms of their carbon footprint.

Exercises: Students will be tasked with preparing a project focused on carbon and water footprints.

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The course completion criteria and methods:	Percent of a final grade:
A positive evaluation of the project, which involves estimating one's own carbon and water footprint for practical applications, is required by the end of the semester. The condition for taking the final exam is the successful completion of the exercises. The final course grade is composed of 60% from the exam, 30% from participation during lectures, and 10% from the exercises grade. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	60% exam 30% lectures participation 10% exercise grade

RECOMMENDED LITERATURE:

Olivier Jolliet, Myriam Saade-Sbeih, Shanna Shaked, Alexandre Jolliet, i Pierre Crettaz, Environmental Life Cycle Assessment. Taylor&Francis Inc. 2015
Emissions Gap Report 2021, United Nations Environment Programme, ISBN: 978-92-807-3890-2
Walter Klöpffer & Birgit Grahl, Life Cycle Assessment (LCA): A Guide to Best Practice. Wiley 2014

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **The brain without secrets**	
Name of the course in Polish: **Mózg bez tajemnic**	
Unit providing the course (Department): **Department of Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Joanna Śliwowska**	
Discipline: **Biotechnology**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Lectures	**7**
- Self-study	**3**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:
To provide the latest knowledge in neuroscience related to developmental and behavioral neuroscience.

TEACHING METHODS:
Lectures. Power Point presentation and discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) the world output on specific issues related to a particular scientific discipline and the resulting implantations for practices, 2) the latest theories and trends in the range of scientific disciplines in which the training in the doctoral school was implemented. It will allow the creation of original research concepts and their scientific interpretations	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 1) use knowledge to creatively formulate their own research problems, 2) innovatively solve research tasks using independently acquired knowledge of the latest research methods and tools, 3) independently plan and implement their own scientific development and inspire and/or organize the development of others	P8U_U_1 P8U_W_3
In the area of social competences (PhD students are capable to): 1) independent planning of research and independent augmentation of the existing scientific knowledge 2) creatively address challenges in the professional and public sphere, taking into account their ethical dimension,	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Active and critical discussion of the topics covered in the lectures; answers to questions raised

TEACHING CONTENT:
Brain development, genetic and environmental determinants of behaviour, neurobiological basis of the stress response
and ways to cope with stress, sleep and wakefulness regulation, the brain and drugs, neurobiological basis of aggression
and empathy, brain vs. artificial intelligence

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The course completion criteria and methods:	Percent of a final grade:
Answering questions during lectures and active participation in the critical scientific discussion	100%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Kolb B., Whishaw I.Q. (2019) Brain and Behaviour, Worth Publisher, New York, USA.
2. Kandel ER., Schwartz JH., Jessell TM. Principles of neural science. MCGraw-Hill, USA 2000.
3. Kalat JW. (2020) Biological Psychology. Argosy Publishing, Inc.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Departament Biotechnology and Food Microbiology**	
Course leader: **Prof. dr hab. Daria Szymanowska**	
Discipline: **Biotechnology**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Seminar	**6**
- Self-study	**10**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

The evaluation and presentation of obtained research results. Preparation of a doctoral dissertation. Preparation of a multimedia presentation for the defense of the doctoral dissertation.

TEACHING METHODS:

Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): Knows the latest scientific literature in the field of the doctoral thesis being carried out Knows and understands the main development trends in the field of the doctoral thesis being carried out	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): Is able to critically evaluate the obtained research results and compare them to literature data Is able to interpret and present research results	P8U_U_1 P8U_U_5
In the area of social competences (PhD students are capable to): Is ready to critically define his/her contribution to the development of science Is ready to discuss the obtained research results Is ready to fulfill the social function of a researcher	P8U_K_1 P8U_K_2 P8U_K_5

Methods of evaluation of outcomes achievement:

Preparation of multimedia presentations, participation in discussions, attendance at seminars

TEACHING CONTENT:

Zasady wyboru wyników badań i prawidłowej ich prezentacji.

The course completion criteria and methods:	Percent of a final grade:
Credit for a seminar ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

RECOMMENDED LITERATURE:

Specialist literature related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Proteins analysis methods**	
Name of the course in Polish: **Metody analizy białek**	
Unit providing the course (Department): **Department of Biochemistry and Biotechnology**	
Course leader: **Prof. UPP. dr hab. Joanna Perła-Kaján**	
Discipline: **Biotechnology**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
- Self-study	**10**
Total numer of hours:	**22**

OBJECTIVE OF THE COURSE:
Acquiring proficiency in protein analysis techniques, including dynamic light scattering, zeta potential analysis, and Western blotting. Mastering the execution of protein analyses utilizing these methods

TEACHING METHODS:
Seminars followed by practical lab sessions

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): The latest trends and theories in the field of protein analysis using dynamic light scattering (DLS) and Western blotting, enabling independent planning and conducting of research	
In the area of skills (PhD students know how to): E7: Capable of operating the Zetasizer instrument and equipment for protein electrophoresis, protein transfer to membranes, as well as gel and membrane imaging apparatus. E8: Based on a laboratory protocol, proficient in conducting a biochemical experiment, performing necessary observations and measurements, and describing the obtained results	
In the area of social competences (PhD students are capable to): - Collaborating within a team, taking on diverse roles, including leadership responsibilities	

Methods of evaluation of outcomes achievement:

Written exam

TEACHING CONTENT:

Theoretical principles of particle size analysis, zeta potential, polyacrylamide gel electrophoresis, electrotransfer, and protein immunodetection. Optical configuration of the Zetasizer apparatus. Sample preparation methods. ZS EXPLORER software. Measurement methods in DLS. Analysis and interpretation of results.

The course completion criteria and methods:	Percent of a final grade:
Written exam □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Hames B. D., Hooper N.M., Krótkie wykłady z Biochemii, PWN Warszawa 2021 (and previous editions).
Stryer L., Biochemia, PWN 2023 (and previous editions).

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Microeconomics advanced**	
Name of the course in Polish: **Mikroekonomia zaawansowana**	
Unit providing the course (Department): **Department of Economics**	
Course leader: **Dr. Joanna Smoluk-Sikorska**	
Discipline: **Economics and Finance**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

Deepening the knowledge of microeconomic analysis methods and improving their application skills in more complex market situations. Extending the neoclassical model of market behaviour to problems arising from uncertainty and risk

TEACHING METHODS:

Interactive lecture, discussion, case studies

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature on microeconomics in a deepened degree, its place and relations in the science system, and its implications for practice - the latest theories and trends in microeconomics, useful in facilitating the creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use the knowledge of microeconomics for creative formulation of their own research problems - innovatively solve research tasks by performing an analysis of economic problems on a microeconomic scale using gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_1 P8U_K_5

Methods of evaluation of outcomes achievement:

Written exam,
Essay,
Participation in the discussion

TEACHING CONTENT:

The market and its elements. The theory of consumer choice. Producer theory. The equilibrium of an enterprise in various market structures (perfect competition, monopoly, monopolistic competition, oligopolies). The problem of uncertainty and risk. Game theory and its application in microeconomics.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Written exam	70%
Essay	30%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Varian H. (2019): Microeconomic Analysis, 3rd edition. Viva Books.
2. Begg D., Dornbusch R., Fischer S., (2014): Economics. MacGraw Hill.
3. Marks Stephen G., Samuelson William F. (2014): Managerial economics. 8th edition, JOHN WILEY & SONS LTD.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Advanced macroeconomics**	
Name of the course in Polish: **Makroekonomia zaawansowana**	
Unit providing the course (Department): **Department of Economics**	
Course leader: **Assoc. Prof. DSc PhD Joanna Wiśniewska-Paluszak**	
Discipline: **Economics and Finance**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
Total number of hours:	**8**

OBJECTIVE OF THE COURSE:
Using formal models to present and analyse theories of macroeconomics

TEACHING METHODS:
Lecture with the multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know and understand the methodology of formal macroeconomic modelling - graduates know and understand theories of macroeconomics	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - graduates know how macroeconomic theories can be applied and tested - graduates know how to generate additional macroeconomic predictions - graduates know how to apply theory to macroeconomic practice	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competencies (PhD students are capable to): - graduates are capable of extending the ideas of macroeconomics - graduates are capable of using rigorous ways to solve macroeconomic problems	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:
Test

TEACHING CONTENT:
Elements of dynamic new Keynesian models. Dynamic Stochastic General Equilibrium (DSEG) models of fluctuations. Model of the perfect financial market. Financial crises. Diamond-Dybving model. The The Solow growth model. Endogenous growth models. Models of knowledge accumulation. Real-business cycle model.

The course completion criteria and methods:	Percent of a final grade:
Test □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Blanchard O., Macroeconomics. Global Edition. Pearson, London, 2017.
Froyen R.T., Macroeconomics. Theories and Policies. 10th ed, Global Edition, Pearson, London, 2013.
Mankiw N.G., Macroeconomics. 7th ed, Worth Publishers, New York, 2009.
Romer D., Advanced Macroeconomics. McGraw Hill Education, New York, NY, USA, 2018.
Snowdon B., Vane H.D., Modern Macroeconomics. Its Origins, Development and Current State, Edward Elgar, Cheltenham, UK, Northampton, MA, USA, 2005.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Application of mathematics in economic research**	
Name of the course in Polish: **Zastosowanie matematyki w badaniach ekonomicznych**	
Unit providing the course (Department): **Finance and Accounting**	
Course leader: **dr Andrzej Wołoszyn**	
Discipline: **Economics and Finance**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**4**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

Providing PhD students with knowledge and skills in the application of mathematical analysis, including differential and integral calculus, to the solutions of economic problems.

TEACHING METHODS:

Online presentations and problem solving practice classes

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - calculus applications in economics, including finding optimal values of variables by using derivatives and integrals, - marginal calculus applications that examine how a small change in one variable affects another,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - understand, apply, and analyze calculus-based economic models, such as functions, derivatives, integrals, and optimization problems, - translate mathematical principles of related rates, elasticity, and equilibrium to the investigation of a range of economic problems, such as market prices, production, or consumption,	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - express their ideas clearly and persuasively, - receive feedback from the teacher and provide it for colleagues, - identify possible errors of their initial problem solving approach and correct it, possibly with the help of classmates,	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Active participation in class and discussion

TEACHING CONTENT:

1. Application of derivatives in economics, marginal calculus (marginal cost, marginal product), elasticity of production and demand functions. Monotonicity and convexity of functions,
2. Application of integral calculus in economics. Indeterminate integrals. Application of definite integrals (market equilibrium price, producer surplus, consumer surplus).

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Test for practice classes ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Matłoka M. (2003). Matematyka dla ekonomistów, Wydawnictwo Akademii Ekonomicznej w Poznaniu
2. McAfee P., Lewis T.R., & Dale D.J. (2009): Introduction to Economic Analysis, Saylor Foundation

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **PhD seminar**	
Name of the course in Polish: **Seminarium doktoranckie**	
Unit providing the course (Department): **Departments**	
Course leader: **prof. dr hab. Arkadiusz Sadowski**	
Discipline: **Economics and finance**	Semester: **2, 3, 4, 5, 6, 7, 8**

TYPE OF CLASSES:
(course load)

- Practical classes	**6/6/6/8/12/12/12**
Total numer of hours:	**62**

OBJECTIVE OF THE COURSE:

Specifying research areas and methodological workshop in the field of the PhD thesis.
Developing the ability to organise research work and to solve research problems.
Developing the ability to present research results and to take part in a scientific discussion.

TEACHING METHODS:

Seminar, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know the scientific output in the economics and finance discipline to an extent that allows them to formulate original research problems and scientifically interpret the obtained research results	P8U_W_1 P8U_W_2 P8U_W_3 P8U_W_4
In the area of skills (PhD students know how to):: - graduates know how to formulate an original research problem, select research methods appropriate for its solution, and plan and conduct research proceedings	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): - graduates are capable to plan and carry out research, and prepare scientific publications disseminating the obtained research results - graduates are capable to present the obtained research results and discuss them in the academia and socio-economic environment	P8U_K_1 P8U_K_2 P8U_K_3 P8U_K_4 P8U_K_1 P8U_K_2 P8U_K_5

Methods of evaluation of outcomes achievement:

Presentations related to the PhD thesis
Discussion

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Requirements for the preparation of a PhD thesis in the field of social sciences, in the economics and finance scientific discipline. Stages in the research process. Criteria for selecting research methods. Preparing an individual research programme. Presentation of the concept of a PhD thesis, as well as partial and final research results.

The course completion criteria and methods:	Percent of a final grade:
Presentations related to the PhD thesis	80%
Discussion	20%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- Pozycje zwarte oraz czasopisma naukowe właściwe dla problematyki rozprawy doktorskiej
- Kuciński K., red. (2015): Elementy metodyki rozprawy doktorskiej. Difin, Warszawa.
- Stępień B. (2016): Zasady pisania tekstów naukowych. Prace doktorskie i artykuły. Wydawnictwo Naukowe PWN, Warszawa.
- Wymagania dotyczące przygotowania rozprawy doktorskiej w dziedzinie nauk społecznych, w dyscyplinie ekonomia i finanse na Uniwersytecie Przyrodniczym w Poznaniu, dostęp**:** https://wes.up.poznan.pl/sites/default/files/STUDIA_DOKTORANCKIE/Wymagania%20dotyczące%20przygotowania%20rozprawy%20doktorskiej_13.07.2020.pdf

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Statistics for economists**	
Name of the course in Polish: **Statystyka dla ekonomistów**	
Unit providing the course (Department): **Finance and Accounting**	
Course leader: **dr Andrzej Wołoszyn**	
Discipline: **Economics and Finance**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**4**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

To introduce students to the concepts of inferential statistics. Students gain knowledge and skills in estimation and verification of statistical hypotheses related to the mean of a distribution.

TEACHING METHODS:

Presentations and problem solving practice classes with MS Excel

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - core statistical concepts economics, such as probability, inference, estimation, and hypotheses testing - applications that examine how to test economic arguments using statistical methods,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use empirical evidence to evaluate an economic argument, interpret statistical results, conduct appropriate statistical analysis of data, and explain the statistical problems involved, - ability to use standard software packages, such as Excel, to perform statistical data analysis, - communicate statistical findings effectively	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - express their ideas clearly and persuasively, - receive feedback from the teacher and provide it for colleagues, - identify possible errors of their initial problem solving approach and correct it, possibly with the help of classmates,	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Active participation in class and discussion

TEACHING CONTENT:

Economic applications in statistical distribution of random variables, estimation of parameters, and hypothesis testing

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Project □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

1. Diez D.M., Barr C.D., Cetinkaya-Rundel, M. (2012). OpenIntro statistics.
2. Gravetter F.J., Wallnau, L.B. (2017). Statistics for The Behavioral Sciences.
3. StatQuest with Josh Starmer (YT podcast)
4. zedstatistics (YT podcast)

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Applied Econometrics in Scientific Studies**	
Name of the course in Polish: **Zastosowanie metod ekonometrycznych w badaniach naukowych**	
Unit providing the course (Department): **Finance and Accounting**	
Course leader: **dr Andrzej Wołoszyn**	
Discipline: **Economics and Finance**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**4**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

Provide students with knowledge and skills on concepts and methods related to estimation, verification, interpretation, and prediction of econometric models.

TEACHING METHODS:

Presentations and problem solving practice classes with R

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - know the concepts and methods related to estimation, verification, interpretation, and prediction of econometric models, - understand applicability of econometric models in real-world economic problems,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply studied concepts to estimate, verify, and interpret a model and make predictions for linear and selected non-linear models, - assess suitability of the models for real economic problems	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - express their ideas clearly and persuasively, - receive feedback from teacher and provide it for colleagues, - identify and correct possible errors of the initial problem solving approach, possibly with the help of classmates,	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Active participation in class and discussion

TEACHING CONTENT:

Econometric models, their classification and construction. Linear models with one and multiple regressors. Modifying variables. Selected nonlinear models.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Project □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

1. Hanck C., Arnold M., Gerber A. and Schmelzer M. (2019). Introduction to Econometrics with R (econometrics-with-r.org).
2. A full course in econometrics, by Ben Lambert (YT podcast)

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **History of economic thought**	
Name of the course in Polish: **Historia myśli ekonomicznej**	
Unit providing the course (Department): **Department of Economics**	
Course leader: **Assoc. Prof. DSc PhD Joanna Wiśniewska-Paluszak**	
Discipline: **Economics and finance**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:
Using of critical thinking to understand alternative economic theories

TEACHING METHODS:
Lecture with the multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know and understand the evolution of economic thought - graduates know and understand theories of economic schools	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - graduates know how to classify economic thoughts - graduates know how to generalise economic ideas - graduates know how to interpret changes in economic thought	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): - graduates are capable of extending the ideas of economics - graduates are capable of discussing the economic ideas	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:
Essay

TEACHING CONTENT:
Economics as an sientific discipline. Classification of economic streams and schools. The dispute over economic methodology. Neoclassical economics. Keynesian economics. Institutional economics. Complexity economics. Behavioural economics. Economic evolutionism.

The course completion criteria and methods:	Percent of a final grade:
Essay □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Colander D. (2000): The death of neoclassical economics, Journal of the History of Economic Thought 22/2.

Durate P.G., Giraud Y. (2016): The place of the history of economic thought in mainstream economics, 1991-2011, viewed thorough a bibliographic survey, Journal of the History of Economic Thought 38/4.

Hunt E.K., Lautzenheiser M. (2011): History of Economic Thought. A Critical Perspective, 3rd ed., M.E. Sharpe, Inc., New York.

Schliesser E. (2008): Philosophy and a scientific future of the history of economics, Journal of the History of Economic Thought 30/1.

Zweynert J. (2007): How can the history of economic thought contribute to an understanding of institutional change?, Journal of the History of Economic Thought 30/1.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Methodology of economic research**	
Name of the course in Polish: **Metodologia badań ekonomicznych**	
Unit providing the course (Department): **Department of Economics and Economic Policy in Agribusiness**	
Course leader: **Prof. UPP dr hab. Karolina Pawlak, prof. UPP dr hab. Arkadiusz Sadowski**	
Discipline: **Economics and finance**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
Total numer of hours:	**4**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarise the PhD students with the concept of science, as well as the functions, types and methods of scientific research, with particular emphasis on methods in economic research. In addition, the course aims to present good practices in the field of writing scientific papers in the economics and finance discipline.

TEACHING METHODS:

Lecture with multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know the principles of planning of research and research methods in the economics and finance scientific discipline - graduates know the principles and good practices for writing research papers in the discipline of economics and finance	P8U_W_3 P8U_W_2
In the area of skills (PhD students know how to): - graduates know how to select research methods appropriate for solving the research problem stated - graduates know how to prepare the concept of a scientific article disseminating the results of research conducted and assess whether the publication meets the criteria for scientific articles in the economics and finance discipline	P8U_U_2 P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - graduates are capable to plan research and prepare scientific articles in the economics and finance discipline	P8U_K_1

Methods of evaluation of outcomes achievement:

Written work on a given topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

- Concept of science and scientific method
- Characteristics of science
- Classification of sciences
- Functions and types of scientific research
- Research methods
- Research hypotheses
- Subject and scope of economic research
- Specificity and nature of economic laws, the ceteris paribus principle
- The concept of an economic model
- Application of the economic model
- Rules and good practices in writing papers in the economics and finance scientific discipline

The course completion criteria and methods:	Percent of a final grade:
Graded written assignment	100%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- A Guide to Writing in Economics. Thompson Writing Program, Duke University. Dostęp: https://econ.duke.edu/masters-programs/current-students/resources/writing-resources
- Adamkiewicz-Drwiłło H.G. (2008): Współczesna metodologia nauk ekonomicznych, Dom Organizatora TNOiK, Toruń.
- Apanowicz J. (2005): Metodologiczne uwarunkowania pracy naukowej. Difin, Warszawa.
- Boumans M., Davis J.B. (2015): Economic methodology. Understanding economics as a science. 2nd edition. Red Globe Press.
- Burnewicz J. (2007): Metodologia badań ekonomicznych. Uniwersytet Gdański, Gdańsk.
- Einstein A. (2001): Pisma filozoficzne. DeAgostini, Warszawa.
- Filipenko A.S. (2017): Methodology in economics: An overview. International Journal of Development and Sustainability, 6(10), 1448-1460.
- Flejterski S., Urchs M. (2015): Elementy filozofii i metodologii nauk ekonomicznych. Perspektywa kryzysowa. Edu-libri, Kraków.
- Kartezjusz (2019): Rozprawa o metodzie. Vis-a-Vis Etiuda, Kraków.
- Pejić Bach M. (2015): How to Write and Publish A Scientific Paper: A Closer Look to Eastern European Economics, Business and Management Journals. Business Systems Research, 6(1), 93-103, DOI: 10.1515/bsrj-2015-0006.
- Ratajczak M. (2010): Metodologia badań ekonomicznych. UE w Poznaniu, Katedra Teorii i Historii Ekonomii, Poznań.
- Sedláček T. (2015): Ekonomia dobra i zła. W poszukiwaniu istoty ekonomii od Gilgamesza do Wall Street. Studio Emka, Warszawa.
- Stachak S. (2003): Podstawy metodologii nauk ekonomicznych, Książka i Wiedza, Warszawa.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Application of taxonomic methods in scientific research**	
Name of the course in Polish: **Zastosowanie metod taksonomicznych w badaniach naukowych**	
Unit providing the course (Department): **Department of Finance and Accounting**	
Course leader: **prof. UPP dr hab. Aleksandra Łuczak**	
Discipline: **Economics and finance**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**2**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

The course aims to present issues related to taxonomic methods in scientific research and their applications, especially typological classification and linear ordering methods to analyze economic phenomena.

TEACHING METHODS:

Lecture with a multimedia presentation, discussion, and analysis of empirical examples in the field of economics and finance

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
- graduates know world scientific literature concerning taxonomic methods	P8U_W_1
- graduates understand the role and place of taxonomic methods and their applications in economic analysis and research	P8U_W_1
- graduates know different types of taxonomic methods and understand the possibilities of using these methods	P8U_W_2
- graduates know the basic procedures for using classification and linear ordering methods	P8U_W_2
- graduates know the properties of selected taxonomic methods, their limitations, advantages, and disadvantages	P8U_W_2
In the area of skills (PhD students know how to):	
- graduates know how to collect, analyze ,and interpret the necessary statistical data	P8U_U_2
- graduates know how to apply appropriate taxonomic methods to study selected phenomena in the field of economics and finance	P8U_U_2
In the area of social competences (PhD students are capable to):	
- graduates are capable of independently planning research in the area of economics and finance using taxonomic methods	P8U_K_1

Methods of evaluation of outcomes achievement:

Scientific discussion
Evaluation of the commitment to practical classes
Written exam

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

1. Basic concepts of taxonomy
1.1. History of taxonomic methods
1.2. The concept of taxonomy
1.3. Two basic directions of taxonomic analyzes
1.4. Taxonomic methods and examples of their use in economic analyzes
2. Typology of taxonomic methods and types of taxonomic analyzes
2.1. Typology of classification methods
2.2. The essence of hierarchical and division classification methods
2.3. Fuzzy classification - fuzzy k-means method
2.4. Classification quality indicators
2.5. The stages of the procedure in the classification process
2.6. Examples of discrete and fuzzy classification
3. Linear ordering methods (ranking classification)
3.1. The stages of constructing a synthetic measure
3.2. Methods of constructing a synthetic measure
3.3. An example of the construction of a synthetic measure

The course completion criteria and methods:	Percent of a final grade:
Scientific discussion	10%
Written exam	90%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Basic literature:

Łuczak A. (2016), Wielokryterialne metody ilościowe w diagnozowaniu i modelowaniu rozwoju lokalnego. Wydawnictwo Uniwersytetu Przyrodniczego, Poznań.

Łuczak A., Wysocki F. (2005): Wykorzystanie metod taksonometrycznych i analitycznego procesu hierarchicznego do programowania rozwoju obszarów wiejskich. Wydawnictwo Akademii Rolniczej, Poznań.

Wysocki F. (2010): Metody taksonomiczne w rozpoznawaniu typów ekonomicznych rolnictwa i obszarów wiejskich. Wydawnictwo Uniwersytetu Przyrodniczego, Poznań.

Doumpos M., Zopounidis C. (2002): Multicriteria Decision Aid Classification Methods. Applied Optimization, vol 73. Springer, Boston, MA.

Andreopoulou Z., Koliouska C., Zopounidis C. (2017): Multicriteria and Clustering. Cooperative Management. Springer, Cham.

Additional literature:

Taksonomia, Klasyfikacja i analiza danych. Teoria i zastosowania. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław.

Studies in Classification, Data Analysis, and Knowledge Organization. Springer.

Guerrero H. (2019) Presentation of Quantitative Data: Data Visualization. In: Excel Data Analysis. Springer, Cham.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Public choice**	
Name of the course in Polish: **Teoria wyboru publicznego**	
Unit providing the course (Department): **Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie**	
Course leader: **Prof. UPP dr hab. Ewa Kiryluk-Dryjska**	
Discipline: **Economics and finance**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

The aim of the course is to present the role of the public sector in the national economy, explain the mechanisms of its functioning and present its potential shortcomings. It also to familiarizes PhD students with the possibilities of modeling public choice decision problems.

TEACHING METHODS:

Lecture - multimedia presentation with discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The PhD student is familiar with the assumptions of rational choice theory. - The PhD student has a basic understanding of game theory as a methodological tool in public choice theory. - -	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - The PhD student can identify the specifics of the functioning of the public sphere. - The PhD student can construct a simple model of public choice using elementary game theory.	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - The PhD student is aware of the basic tasks of the public sphere and the threats arising from its vulnerability. The PhD student can advocate for the necessity of modeling in economic sciences.	P8U_K_3 P8U_K_1

Methods of evaluation of outcomes achievement:

Discussions, students prepare and present a review of a scientific paper on public choice.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Fundamentals of public choice theory (research scope, methodology, genesis, theory against other trends). The logic of collective action. Cardinal and ordinal utility. Barriers to economic growth. Outside of GDP. Functions of social welfare. Fair distribution of goods in society (examples of methods' application).

The course completion criteria and methods:	Percent of a final grade:
Projects' preparation	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Rational Choice, A. Hindmoor, Palgrave Macmillan, 2016
2. The Economics of Collective Choice, J.B. Stevens, Westview Press, 1999
3. Mathematics and Democracy. Designining Better Voting and Fair- Division Procedures, S. Brams, Princeton University Press, 2008
4. Fair Division. From cake-cuting to dispute resolutions, S. Brams, A. Taylor, Cambridge University Press 1999.
5. Game theory. A very short introduction, K. Binmore, Oxford University Press, 2007
6. An Introduction to Game Theory, M. Osborne, Oxford University Press, 2004
7. Game Theory and Humanities, S. Brams, MIT Press 2011

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* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **International Economics**	
Name of the course in Polish: **Ekonomia międzynarodowa**	
Unit providing the course (Department): **Department of Economics and Economic Policy in Agribusiness**	
Course leader: **Prof. UPP dr hab. Karolina Pawlak**	
Discipline: **Economics and finance**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with the most important principles and mechanisms of the modern world economy.

TEACHING METHODS:

Lecture with multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know and understand classical, neoclassical and modern theories of international trade, foreign direct investment and international competitiveness	P8U_W_1
- graduates know and understand the mechanisms of functioning of the international market and the world economy	P8U_W_1
- graduates know the directions of research in the area of international trade and international competitiveness in the agri-food sector Translated with DeepL.com (free version)	P8U_W_2
In the area of skills (PhD students know how to): - graduates know how to formulate a new research problem in the area of international trade, foreign direct investment and international competitiveness and select research methods adequate to solve it	P8U_U_1 P8U_U_2
- graduates know how to perform cause-and effect analyses of international trade and international competitiveness and popularize their results	P8U_U_3
- graduates know how to give classes and lectures on the theory of international trade, foreign direct investment and international competitiveness Translated with DeepL.com (free version)	P8U_U_5

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In the area of social competences (PhD students are capable to): - graduates are capable to engage in scientific discussion on the functioning of the international market and the world economy	P8U_K_5
- graduates are capable to individually and collectively solve research problems in the field of international economic relations	P8U_K_1 P8U_K_2 P8U_K_4
- graduates are capable to prepare scientific and popular science publications on the functioning of the international market and the world economy, with particular emphasis on the international agricultural market Translated with DeepL.com (free version)	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Written exam (an essay)

TEACHING CONTENT:

- Classical, neoclassical and modern theories of international trade
- Theories of foreign direct investment
- Competition and international competitiveness
- Role of foreign trade and investment in economic growth
- Regionalism in the modern world economy

The course completion criteria and methods:	Percent of a final grade:
Written exam (an essay)	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

- Dunn R.M. Jr, Mutti J.H. (2004): International Economics. 6th edition. Routledge, London, New York.
- Krugman P.R., Obstfeld M., Melitz M.J. (2018): Ekonomia międzynarodowa. Teoria i polityka. Tom 1 i 2. Wydawnictwo Naukowe PWN, Warszawa.
- Krugman P.R., Obstfeld M., Melitz M.J. (2018): International Economics: Theory and Policy. 11th edition. Pearson Education.
- Misala J. (2005): Wymiana międzynarodowa i gospodarka światowa. Teoria i mechanizmy funkcjonowania. Oficyna Wydawnicza SGH, Warszawa.
- Salvatore D. (2013): International economics. 11th edition. Wiley, Hoboken, NJ (online).
- Sawyer W.Ch., Sprinkle R.L. (2020): Applied International Economics. 5th edition. Routledge, Taylor & Francis Group, London, New York.

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załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Contemporary problems of economic policy**	
Name of the course in Polish: **Współczesne problemy polityki ekonomicznej**	
Unit providing the course (Department): **Department of Economics and Economic Policy in Agribusiness**	
Course leader: **Prof. UPP dr hab. Aldona Mrówczyńska-Kamińska**	
Discipline: **Economics and Finance**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:

The aim of the course is to present the most important assumptions regarding the theoretical premises of the existence of economic policy and tools used by supporters of both demand and supply approaches

TEACHING METHODS:

Lecture with multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
- the relationship between the state and the market in modern economies	P8U_W_1
- tools and instruments of state economic policy and in understanding the importance of public interventions in the case of market failure	P8U_W_2
- arguments for and against demand and supply approaches in economic policy	P8U_W_2
In the area of skills (PhD students know how to):	
- critically assess the socio-economic situation, in terms of the applied tools of economic policy in the country and internationally	P8U_U_1
- critically analyze the budget law and assumptions of state monetary policy and their implementation	P8U_U_2
- analyze state aid against the background of other economic policy instruments	P8U_U_2
In the area of social competences (PhD students are capable to):	
- understand economic policy and the tools used and the resulting rationale for the activities of economic entities and the functioning of households	P8U_K_1
- assess the macroeconomic situation of Poland against the background of the international economic situation	P8U_K_2
- independently search for and interpret information on current instruments used to shape the state's economic policy, is able to independently transfer knowledge on the subject	P8U_K_2

Methods of evaluation of outcomes achievement:

Presentations and written works on a given topic.

TEACHING CONTENT:

1. Objectives and tools of economic policy.
2. The role of the state in economic life - various economic schools.
3. Keynesian, neoclassical and institutional approach to public activities.
4. Arguments for and against the demand and supply approach in economic policy.

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The course completion criteria and methods: Written exam □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

1. Friedman, M., Friedman, R. D., & Adams, J. (1980). Free to choose: A personal statement (Vol. 249). New York: Harcourt Brace Jovanovich.
2. Piketty, T. (2018). *Capital in the twenty-first century*. Harvard University Press.
3. Hartz, L. (2013). *Economic policy and democratic thought*. Harvard University Press.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Game theory**	
Name of the course in Polish: **Teoria gier**	
Unit providing the course (Department): **Katedra Ekonomii i Polityki Gospodarczej w Agrobiznesie**	
Course leader: **Prof. UPP dr hab. Ewa Kiryluk-Dryjska**	
Discipline: **Economics and Finance**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

The aim of the course is to present the basic issues of cooperative and non-cooperative game theory together with elements of fair division algorithms based on games.

TEACHING METHODS:

Lecture - multimedia presentation with discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The PhD student is familiar with the principles of modeling using game theory. - The PhD student knows the basic criteria and methods of fair division. - -	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - The PhD student can apply models of game theory in practice. - The PhD student understands the principles of applying fair division algorithms to decision-making problems. - -	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - The PhD student is aware of the purpose of economic modeling using game theory. - The PhD student can advocate for the necessity of modeling in economic sciences.	P8U_K_3 P8U_K_1

Methods of evaluation of outcomes achievement:

Discussion, questions

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TEACHING CONTENT:

Noncooperative games (basic rules of static / dynamic games with complete and incomplete information, examples and their potential application), cooperative games (auction, stable coalitions, core, Shapley's value), fair-division algorithms and their application (divide-the dollar, bankruptcy rules).

The course completion criteria and methods:	Percent of a final grade:
Exam □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

1. Teoria gier, P. Straffin, Scholar, 1993
2. An Introduction to Game Theory, M. Osborne, Oxford University Press, 2004
3. Game theory. A very short introduction, K. Binmore, Oxford University Press, 2007
4. Konkurencja i kooperacja. Teoria gier w ekonomii i naukach społecznych, PWN 2004
5. Public choice III, D.C. Mueller, Cambridge University Press
6. Fair Division. From cake-cuting to dispute resolutions, S. Brams, A. Taylor, Cambridge University Press 1999
7. Game Theory and Humanities, S. Brams, MIT Press 2011
8. Sprawiedliwy podział. Kryteria, metody, aplikacje, E. Kiryluk-Dryjska , PWN 2019

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Economics and organization of enterprises**	
Name of the course in Polish: **Ekonomika i organizacja przedsiębiorstw**	
Unit providing the course (Department): **Department of Law and Enterprise Management in Agribusiness**	
Course leader: **Dr. Dariusz Majchrzycki**	
Discipline: **Economics and Finance**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

To familiarize students with the principles of the enterprise as a whole and the functioning of its individual areas.
Explaining the impact of external and internal conditions on the functioning of enterprises.
Developing independent and creative thinking skills.
Motivating to formulate their own assessments and views, shaping the ability to use literature on the subject and its critical evaluation.

TEACHING METHODS:

Methods of direct communication - a lecture with the use of a multimedia presentation.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
1) PhD student knows the scientific literature on economics and organization of enterprises.	P8U_W_1
2) PhD student obtains in-depth knowledge of the organizational and economic principles in which enterprises operate.	P8U_W_1
3) PhD student acquires knowledge about the latest trends in running a business and managing human capital.	P8U_W_2
In the area of skills (PhD students know how to):	
1) PhD student is able to use theoretical knowledge to analyze, diagnose and evaluate organizational problems of enterprises.	P8U_U_1
2) PhD student has skills in assessing the economic effects of enterprises.	P8U_U_1
3) PhD student is able to use and transfer the results of economic analyzes to run an enterprise.	P8U_U_3
In the area of social competences (PhD students are capable to):	
1) PhD student is able to formulate questions, opinions and statements and cooperate in a group in order to solve a specific substantive problem.	P8U_K_1
2) PhD student is convinced of the importance of economics and enterprise organization issues in order to creatively take up challenges related to enterprise management.	P8U_K_2

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Methods of evaluation of outcomes achievement:

Final test - single-choice test.

TEACHING CONTENT:

1/ Introduction. Place and role of economics and organization of enterprises. Definitions.
2/ Conditions and determinants of external and internal functioning of enterprises.
3/ Running a business - the importance and functions of enterprises.
4/ The role of stakeholders in the company's operations.
5/ Human, intellectual and social capital in the enterprise.
6/ CSR concept (socially responsible business).
7/ Enterprise on the global market - cooperation and economic cooperation of enterprises vs. competition.
8/ A company in a knowledge-based economy.

The course completion criteria and methods:

Written completion of the classes

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

Percent of a final grade:

100%

RECOMMENDED LITERATURE:

Basic literature:
Mierzejewska-Majcherek J.: Ekonomika przedsiębiorstw, Difin, Warszawa, 2008.
Lichtarski J. (red.): Podstawy nauki o przedsiębiorstwie. Wyd. AE we Wrocławiu, Wrocław, 2007.
Krupski R.: Podstawy organizacji i zarzadzania. Prace naukowe Wałbrzyskiej Wyższej Szkoły Zarządzania I Przedsiębiorczości. I-BiS Wydawnictwo, Wrocław 2004.

Supplementary literature:
Buglewicz K.: Społeczna odpowiedzialność biznesu. Nowa wartość konkurencyjna, PWE, Warszawa 2017
Godlewska-Majkowska H., Skrzypek E., Płonka M.: Przewaga konkurencyjna w przedsiębiorstwie. Sektor-wiedza-przestrzeń. Seria profesorska TEXTER Warszawa (e-book).
Dębski D.: Ekonomika i organizacja przedsiębiorstw, WSIP, Warszawa, 2012.
Ekonomika przedsiębiorstw, red. J. Engelhardt, CeDeWu, Warszawa 2011.
Guzera K.: Ekonomika przedsiębiorstw, Difin, Warszawa 2006.
Duraj J.: Podstawy ekonomiki przedsiębiorstwa. PWE, Warszawa 2004.

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załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Economic analysis of enterprises

Name of the course in Polish:
Analiza ekonomiczna przedsiębiorstw

Unit providing the course (Department):
Department of Finance and Accounting

Course leader:
prof. UPP dr hab. Zbigniew Gołaś

Discipline:	Semester:
Economics and Finance	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

Acquisition of skills and competences in the field of understanding and applying analytical methods and techniques in the activities of business entities and the functioning of markets, linking the results of economic analysis with the decision-making systems of enterprises and organizations

TEACHING METHODS:

Lecture with multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - graduates know the scientific literature on economic analysis of enterprises - graduates understand the role and place of economic analysis methods in economic research - graduates know the types and methods of economic analysis - graduates know the characteristics of selected methods of economic analysis, their limitations, advantages and disadvantages	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - graduates are able to collect, analyze and interpret the necessary statistical data - graduates are able to apply appropriate methods of economic analysis to the study of selected phenomena in economics and finance	P8U_U_2
In the area of social competences (PhD students are capable to): - graduates have the ability to independently plan research in the field of economics and finance using methods of economic analysis	P8U_K_1

Methods of evaluation of outcomes achievement:

Scientific discussion,
Oral examination

TEACHING CONTENT:

Methodological foundations of economic analysis. Conditions and rules for interpreting and presenting the results of economic analysis, rules and databases for comparisons. Information sources used in economic analysis. Economic analysis stages. Types of analyzes. Environmental analysis, legal and social conditions, balance sheet analysis, profit and loss account analysis, cash flow analysis, ratio analysis of financial liquidity, debt, efficiency, profitability, bankruptcy risk.

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The course completion criteria and methods:	Percent of a final grade:
Scientific discussion, Oral examination	30% 70%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1.Bednarski L. i inni (2003): Analiza ekonomiczna w przedsiębiorstwie. AE Wrocław.
2.Jarzemowska M. (2013): Analiza ekonomiczna w przedsiębiorstwie, PWE, Warszawa.
3.Mruk H. (2007): Analiza rynku. PWE, Warszawa.
4.Sierpińska M., Jachna T. (2017): Ocena przedsiębiorstwa według standardów światowych. PWN, Warszawa.
5.Wędzki D. (2009): Analiza wskaźnikowa sprawozdania finansowego. Tom 1 i 2. Oficyna Ekonomiczna, Warszawa.
7.Koźmiński A.K., Piotrowski W. (2013): Zarządzanie. Teoria i praktyka. PWN, Warszawa.
8.Prusak B. (2005): Nowoczesne metody prognozowania zagrożenia finansowego. Difin, Warszawa.
9. Wędzki D.(2024): Analiza wskaźnikowa sprawozdania finansowego według polskiego prawa bilansowego Wydawnictwo Nieoczywiste,Warszawa
10. Internet sources of statistical economic and financial data:
NBP, GUS, EUROSTAT, Amadeus database, Emerging Markets Information Service, Bach database - Bank for the Accounts of Companies Harmonised, World Bank database, FAOSTAT, POINTINFO, OECD database, FADN, KRS.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Contemporary problems and challenges of agricultural policy

Name of the course in Polish:
Współczesne problemy polityki rolnej

Unit providing the course (Department):
Department of Economics and Economic Policy in Agribusiness

Course leader:
Prof. UPP dr hab. Wawrzyniec Czubak

Discipline:	Semester:
Economics and Finance	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

The goal of the course is to achieve the ability to recognize and prioritize contemporary problems of agricultural sector development (micro- and mesoeconomic approach) - barriers, weaknesses and threats facing the national, EU and international agricultural sector. On this background, the conditions for the design of the agricultural policy - directed at the development of farms and the food economy as an integral part of the economic development strategy - will be defined. Issues related to both the theoretical elements of the system of state intervention in agriculture and the assessment/evaluation of the mechanisms of state influence in the food economy will be presented.

TEACHING METHODS:

Lecture; utilisation of the online information sources; discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - international scientific achievements on issues related to contemporary problems of agricultural policy and the resulting economic consequences for farms and agribusinesses - he up-to-date theories and solutions in the field of agricultural policy to define research problems, create original concepts for solving problems and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use knowledge to formulate their own research problems creatively - create innovative scientific solutions by applying independently acquired knowledge with the use of research methods and tools in defining the challenges of agricultural policy, developing possible solutions and their evaluation	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - to initiate activities in the public interest - to develope the role of creative communities in social life	P8U_K_3 P8U_K_5

Methods of evaluation of outcomes achievement:

Active participation in class and discussion

TEACHING CONTENT:

The concept, scope and objectives of agricultural (agrarian) policy
Formulating, development and evolution of policy mechanisms
Macroeconomic determinants of agricultural policy
Problems of sustainable agriculture
The role of agricultural policy in the context of agricultural public goods
The European Green Deal as an example of contemporary challenges for European agricultural policy

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The course completion criteria and methods:	Percent of a final grade:
exam for credit ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Czyżewski A. (2007): Uniwersalia polityki rolnej w gospodarce rynkowej, ujęcie makro i mikroekonomiczne, Wyd. AE w Poznaniu, Poznań.
Czyżewski A., Poczta-Wajda A. (2011): Polityka rolna w warunkach globalizacji, PWE, Warszawa.
Czubak W. (2013): Rozwój rolnictwa w Polsce z wykorzystaniem wybranych mechanizmów Wspólnej Polityki Rolnej Unii Europejskiej, Wyd. UP w Poznaniu, Poznań.
Poczta W., Rowiński J. (2019)(red.): Struktura polskiego rolnictwa na tle Unii Europejskiej, Wyd. CeDeWu, Warszawa.
CAP Strategic Plans - Agriculture and rural development (2023)
Supplementary literature:
Selected articles: Problems of Agricultural Economics (Institute of Agricultural and Food Economics National Research Institute), „Wieś i Rolnictwo" (“Village and Agriculture”)(Institute of Rural and Agricultural Development, Polish Academy of Sciences), Journal of Agribusiness and Rural Development, Annals of the Polish Association of Agricultural and Agribusiness Economists.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Economics of Rural Areas

Name of the course in Polish:
Ekonomia obszarów wiejskich

Unit providing the course (Department):
Department of Economics and Economic Policy in Agribusiness

Course leader:
Prof. UPP dr hab. Lucyna Przezbórska-Skobiej

Discipline:	Semester:
Economics and Finance	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total number of hours:	**6**

OBJECTIVE OF THE COURSE:
Getting to know the basic concepts and issues in the field of rural economics.

TEACHING METHODS:
Lecture with multimedia presentation. Use of online information sources. Questions/issues to be discussed by students.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to rural areas with the resulting implications for practice - the latest theories and trends connected with rural development in Poland and in the world	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge of rural development in the process of creative formulation of their research problems - transfer research results to the economic sphere in rural areas	P8U_U_1 P8U_U_3
In the area of social competencies (PhD students are capable to): - plan research and broaden the existing body of scientific publications - actively and creatively solve challenges in the professional life - active participation and promote appropriate models of teamwork	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:
Questions/problems for discussion for students.

TEACHING CONTENT:
Economics of rural areas in economic sciences. The scope and goals of the rural economy. Problems of the economics of rural areas. Rural/urban areas - definitions. Rural-urban relations. Socio-economic structure of rural areas. Functions of rural areas. Contemporary processes and phenomena in rural areas. Problems of rural areas. Rural development factors. Directions of activation of rural areas. Rural policies.

The course completion criteria and methods:
Active participation in the discussion - pass.

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

Percent of a final grade:
100%

RECOMMENDED LITERATURE:

Bański Jerzy (2017): Rozwój obszarów wiejskich. Polskie Wydawnictwo Ekonomiczne, Warszawa.
McAreavey Ruth (2009): Rural Development. Theory and Practice. Rural. Routledge, Taylor & Francis Group, London and New York.
Obszary wiejskie w Polsce w 2020 roku (2022): Analizy statystyczne, GUS, Warszawa, Olsztyn.
Raport „Polska wieś 2022. Raport o stanie wsi". FDPA, Wydawnictwo Naukowe Scholar, Warszawa.
Woods M. (2010): Rural. Routledge, Taylor& Francis Group, London and New York.

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załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

Name of the course (as specified in the approved programme):
Agribusiness in the national economy

Name of the course in Polish:
Agrobiznes w gospodarce narodowej

Unit providing the course (Department):
Department of Economics and Economic Policy in Agribusiness

Course leader:
dr Bartłomiej Bajan

Discipline:	Semester:
Economics and Finance	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total number of hours:	**6**

OBJECTIVE OF THE COURSE:

The main aim of the course is to present the development processes of agribusiness and to indicate the determinants of its participation in national economies in selected countries of the world. The environmental aspect of production will also be taken into account. Moreover, the application of the method of input-output analysis, based on input-output tables and environmental accounts, for the study of agribusiness will be presented.

TEACHING METHODS:

Lecture with multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the functioning of agribusiness as a sub-system of the national economy, - the formation of worldwide development paths of agribusiness, - the regularities of the development of the agri-food sector and the factors shaping the development of agribusiness.	P8U_W_1 P8U_W_2 P8U_W_2
In the area of skills (PhD students know how to): - understand and can evaluate the development paths of agribusiness in the country and the world, - can use input-output methods to calculate agribusiness and the sector's connection to the environment - can analyze the factors affecting the development of agribusiness	P8U_U_1 P8U_U_2 P8U_U_2
In the area of social competences (PhD students are capable to): - express their own opinions and work in a group, - independently search and interpret information on current activities in the formation of modern agribusiness	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:
Presentations and written works on a given topic.

TEACHING CONTENT:

1. Agribusiness - theoretical aspects of development
2. Agribusiness in the national economy - research methods
3. Characteristics of agriculture and food industry and their macroeconomic environment in the studied countries; Production and income results in agribusiness; Sectoral interdependencies in agribusiness
4. Determinants of the share of agribusiness in the national economy
5. Greenhouse gas emissions in agribusiness

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: Written exam ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

1. Davis, J., & Goldberg, R. (1957). *A concept of agribusiness*. Boston: Division of Research, Graduate School of Business Administration. Harvard University.
2. Barrett, C. B. (Ed.). (2012). *Agricultural Development: Critical Concepts in Development Studies*. Routledge.
3. Mrówczyńska-Kamińska, A., Bajan, B., Pawłowski, K. P., Genstwa, N., & Zmyślona, J. (2021). Greenhouse gas emissions intensity of food production systems and its determinants. *Plos one*, *16*(4), e0250995.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Basics and problems of measurements in technology**	
Name of the course in Polish: **Podstawy i problemy pomiarów w technice**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. UPP dr hab. inż. Karol Durczak**	
Discipline: **Mechanical engineering**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:

Statistical processing of measurement results and their interpretation. Methods and techniques of measurement in technology.

TEACHING METHODS:

Measurement demonstrations, demonstrations with explanations, independent performance of measurement tasks, discussions during exercises and consultations, self-education.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - knows and controls changes in the SI system - knows basic measurement methods and techniques - knows the calculation of measurement errors - knows methods for determining measurement uncertainty	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - is able to apply acquired knowledge in practice - is able to solve measurement problems on their own - is able to use measuring instruments	P8U_U_2 P8U_U_1 P8U_U_4
In the area of social competences (PhD students are capable to): - is ready for independent learning - is ready for creative activity - is ready for teamwork - understands the public interest	P8U_K_1 P8U_K_2 P8U_K_4 P8U_K_3

Methods of evaluation of outcomes achievement:

text analysis, problem solving

TEACHING CONTENT:

1. Origin, philosophy and purpose of measurements.
2. SI system.
3. Calculating measurement errors
3.1. Examples of calculating and estimating measurement uncertainty
3.2. Examples of calculating systematic errors
3.3. Tasks

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: verification of exam materials **☒ pass (Z)** **□ course credit with a grade** **□ examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Alder K. (1999): Engineering revolution. Princeton University Press. ISBN: 9780691009698.
Alder K. (2002): The Measure of All Things: The Seven-Year Odyssey and Hidden Error That Transformed the World. Free Press, NY, ISBN: 0-7432-1675X.
Art. 6 ust. 3 ustawy z dnia 11 maja 2001 r. – Prawo o miarach (Dz. U. z 2013 r. poz. 1069, z późn. zm.
Chmielewski H. (1971): Międzynarodowy układ jednostek miar SI. Państwowe Wydawnictwa Szkolnictwa Zawodowego, Warszawa.
Durczak K. (2012). Pomiary wielkości geometrycznych w technice. Wyd. UPP.
Durczak, K. (2023). *Sztuka pomiarów, czyli od metra do mikrometra.* Poznań: Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu. https://doi.org/10.17306/978-83-67112-61-1
Dz. U. 1966 Nr 25 poz. 154 Rozporządzenie Rady Ministrów z dnia 23 czerwca 1966 r. w sprawie ustalenia legalnych jednostek miar.
Dz. U. 2001 Nr 63 poz. 636 Ustawa z dnia 11 maja 2001 r. Prawo o miarach.
Dz. U. 2006 Nr 225 poz. 1638 Rozporządzenie Rady Ministrów z dnia 30 listopada 2006 r. w sprawie legalnych jednostek miar.
Dz. U. 2010 Nr 9 poz. 61 Rozporządzenie Rady Ministrów z dnia 12 stycznia 2010 r. zmieniające rozporządzenie w sprawie legalnych jednostek miar.
EA-4/02. Wyrażanie niepewności pomiaru przy wzorcowaniu. 2001. GUM, Warszawa.
ISO R31. Basic Quantites and Units of the SI.
JCGM 100:2008 (GUM 1995 wersja poprawiona 2010) Ewaluacja danych pomiarowych – przewodnik wyrażania niepewności pomiaru. przewodnik_jcgm_100_ver__fin_27_08_2019_popr_.pdf (dostęp 25.11.2019 *https://www.gum.gov.pl/pl/aktualnosci/3285,Polska-wersja-przewodnika-wyrazania-niepewnosci-pomiaru-juz-dostepna.html*)

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Developments in agricultural machinery and equipment in relation to mechanical engineering**	
Name of the course in Polish: **Kierunki rozwoju inżynierii rolniczej w aspekcie inżynierii mechanicznej**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **dr inż. Mirosław Czechlowski**	
Discipline: **Mechanical engineering**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce students to the development of agricultural engineering and to present the most recent technical and technological trends used in agricultural machinery, machine control systems and the acquisition and exchange of data on field work.

TEACHING METHODS:

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - modern techniques and technologies used in agriculture and implemented in agricultural machinery and vehicles,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - critically examine technical solutions present on the market for agricultural machinery and equipment, - propose innovative solutions for techniques and technologies used in agricultural machinery and equipment,	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - to seek innovative solutions for techniques and technologies used in machinery and equipment, while respecting intellectual property rights, - to disseminate techniques and technologies used in sustainable agriculture,	P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

The verification of the learning outcomes takes place through a structured interview (exchange of questions and answers).

TEACHING CONTENT:

The educational content of the course covers issues related to modern cultivation technologies and machine developments, from cultivation, sowing and plant protection to crop harvesting.

In addition, the latest solutions involving the use of electric drives and electric transmissions in tractors and agricultural machines will be presented.

The last thematic block will be devoted to machine control systems: variable application of inputs, autonomous machines and systems for the acquisition and exchange of data on field operations.

The course completion criteria and methods:	Percent of a final grade:
Structured interview (exchange of questions and answers)	100%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Mandatory literature:

1. Recent Developments in Agriculture. Winkler Adriana, Syrawood Pub House, ISBN 9781682867167
2. Agricultural Engineering: Emerging Trends, Hamilton Nathan, Syrawood Pub House, ISBN 9781647400514

Additional literature:

1. Michałek R. (2008) Przyszłość inżynierii rolniczej jako nauki I kierunku kształcenia. Inżynieria Rolnicza 1(99)/2008
2. Kosmicki Z. (2008) Kierunki rozwoju techniki rolniczej. Technika Rolnicza Ogrodnicza Leśna 1/2008

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part I**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część I**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	**Semester:** **II**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
Total numer of hours:	**6**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

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TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Remote sensing and its applications**	
Name of the course in Polish: **Teledetekcja i jej zastosowania**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **Dr eng. Tomasz Wojciechowski**	
Discipline: **Mechanical Engineering**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The purpose of the course is to familiarize course attendees with the most recent technical solutions and research problems in the application of satellite technology in agricultural engineering. The course covers the issues of active and passive methods of observation of agricultural production space and operation of agricultural machinery, components of observation systems, components of EO data processing and use in ERP/SAP/FMIS systems in accordance with the principles of precision and digital agriculture.

TEACHING METHODS:

Lecture using audiovisual techniques and MS Teams and UPP Moodle platform
Laboratory exercises using EO data processing applications and platforms and MS Teams and UPP Moodle platform.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) know and understands world scientific literature concerning specific problems related to earth observations along with the resulting implications for practice	(P8U_W_1)
In the area of skills (PhD students know how to): 2) know how to apply knowledge of EO in the process of creative formulation of their research problems	(P8U_U_1)
In the area of social competences (PhD students are capable to): 3) creatively solve challenges using EO data in the professional life, considering their ethical aspects	(P8U_K_2)

Methods of evaluation of outcomes achievement:

The debate, individual projects

TEACHING CONTENT:

- Active and passive methods of earth observation, and components of earth observation systems.
- Sources, types and types of EO data used in agricultural engineering.
- Methods and tools for processing and acquiring EO data.
- Trends in satellite-based earth observation systems.

The course completion criteria and methods:	Percent of a final grade:
Student engagement	100%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Hejmanowska B., Wężyk P. 2020. Dane satelitarne dla administracji publicznej. Polska Agencja Kosmiczna
2. Viacheslav I. Adamchuk v.i. 2018. Tutorial on Application of QGIS Software for Precision Agriculture (McGill University, 2018). https://adamchukpa.mcgill.ca/

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Applications of spectrometry in engineering sciences

Name of the course in Polish:
Zastosowanie spektrometrii w naukach inżynieryjno-technicznych

Unit providing the course (Department):
Department of Biosystems Engineering

Course leader:
dr inż. Mirosław Czechlowski

Discipline:	Semester:
Mechanical Engineering	**3**

TYPE OF CLASSES:
(course load)

- Lectures	**7**
- Practical classes	**5**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is for the student to become familiar with selected spectral analytical methods used in qualitative and quantitative analysis of materials used in agricultural production and crops. During the course, the student is introduced to the theoretical foundations of phenomena used in spectral analytical methods, apparatus and practical application of measurement methods.

TEACHING METHODS:

Lecture with multimedia presentation, laboratory exercises

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -- theoretical basis of near-infrared spectroscopy, - methods of construction and validation of calibration models, - methods of transformation of spectral data,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - acquire spectra by transmission and diffuse reflectance methods, - build and validate calibration models, - apply spectral transformations to improve the quality of the data obtained,	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - to search for new practical applications of spectroscopic methods in agricultural technology, - to promote the practical application of spectroscopic methods in agricultural technology,	P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Structured interview (exchange of questions and answers), evaluation of the execution of the experiment and elaboration of the results.

TEACHING CONTENT:

Lectures: Introduction: basics of spectroscopy, division of spectral techniques. Infrared (IR) spectroscopy - theoretical basis. Near infrared (NIR) spectroscopy - apparatus, measurement techniques and their applications. Methods for construction and validation of calibration models. Application of spectral data transformations to improve prediction accuracy using calibration models. Examples of application of spectroscopy in agricultural engineering.
Laboratory exercises: Acquisition of spectral spectra by transmission and diffuse reflectance methods. Construction and validation of calibration models. Application of spectral data transformations to improve prediction accuracy using calibration models.

The course completion criteria and methods:	Percent of a final grade:
Laboratory exercises: Evaluation of the execution of the experiment and elaboration of the results.	100%
Lecture: Structured interview (exchange of questions and answers).	100%

☒ pass (Z) **□ course credit with a grade** **□ examination**

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Mandatory literature:

1. Patrycja Wrosz (2012) Zastosowanie spektroskopii bliskiej podczerwieni i klasycznej podczerwieni w analizie jakościowej i ilościowej surowców w przemyśle farmaceutycznym i kosmetycznym
2. Swarbrick, Brad. (2012). Multivariate Analysis for Dummies.
3. Baeten, V. & Dardenne, Pierre. (2005). Applications of nearinfrared imaging for monitoring agricultural food and feed products. Spectrochemical Analysis Using Infrared Multichannel Detectors. 283-302.
4. I. Stanimirova, M. Daszykowski, B. Walczak (2008) Metody uczenia z nadzorem – kalibracja, dyskryminacja i klasyfikacja, w D. Zuba, A. Parczewski, Chemometria w analityce, IES, Kraków,

Complementary literature:

5. Camo Software AS (2012) Glossary of Multivariate Statistical Methods
6. Camo Software AS (2012)The Unscrambler® X v10.3 User Manual

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part II**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część II**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Scientific problems related to renewable energy production**	
Name of the course in Polish: **Problemy naukowe związane z produkcją energii z OZE**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **Prof. Jacek Dach**	
Discipline: **Mechanical Engineering**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**8**
Total numer of hours:	**20**

OBJECTIVE OF THE COURSE:

To increase the theoretical and practical knowledge about renewable energy sources implementation in Poland. To show the practical solutions about energy production and reduction of environmental impact (study cases in the experimental farms of PULS). New technologies for generating renewable energy and fuels, e.g., demand-driven biogas plants as installations stabilizing energy systems.

TEACHING METHODS:

- Lectures
- Study tour
- Discussion about study cases

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating the creation of original research concepts and their scientific interpretation - principles of planning and financing of research and evaluation of projects	(P8U_W_1) (P8U_W_2) (P8U_W_3)
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - independently plan and realize their scientific development, as well as inspire and/or organize the development of others	(P8U_U_2) (P8U_U_4)
In the area of social competencies (PhD students are capable to): - creatively solve challenges in professional and public life, considering their ethical aspects - initiate actions for the public good	(P8U_K_2) (P8U_K_3)

Methods of evaluation of outcomes achievement:

Oral presentations and discussion.

TEACHING CONTENT:

Renewable energy installations (biogas plants, biomethane plants, PV, windmills, hybrid systems) – Prof. Jacek Dach
Waste management systems – Prof. Jacek Dach
Properties and management of biomass and waste – Prof. Wojciech Czekała

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Oral presentations	30%
Discussion	70%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Biological Treatment of Waste and By-Products from Food Industry. Wojciech Czekała.

2. Biogas Plants - Waste Management, Energy Production and Carbon Footprint Reduction. Wojciech Czekała. John Wiley & Sons. Springer Nature

3. Renewable Energy Systems - A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions. Henrik Lund. Academic Press.

4. Gadirli G, Pilarska AA, Dach J, Pilarski K, Kolasa-Więcek A, Borowiak K. Fundamentals, Operation and Global Prospects for the Development of Biogas Plants — A Review. Energies. 2024; 17(3):568. https://doi.org/10.3390/en17030568

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Fundamentals of chemical technology in mechanical engineering**	
Name of the course in Polish: **Podstawy technologii chemicznej w inżynierii mechanicznej**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. UPP dr hab. inż. Krzysztof Pilarski**	
Discipline: **Mechanical engineering**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**12**
Total numer of hours:	**24**

OBJECTIVE OF THE COURSE:

TEACHING METHODS:

1. Exercises
2. Discussion during classes
3. Multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): global scientific achievements concerning specific issues related to a given scientific discipline and the resulting implications for practice, the latest theories and trends in the scientific disciplines in which education was carried out at the doctoral school, which will allow for the creation of original research concepts and their scientific interpretation, principles of planning and financing scientific research and project evaluation, conditions concerning intellectual property and confidentiality principles related to scientific and teaching activities.	P8U_W_1 P8U_W_2 P8U_W_3 P8U_W_4 P8U_W_4
In the area of skills (PhD students know how to): use knowledge to creatively formulate their own research problems, innovatively solve research tasks using independently acquired knowledge of the latest research methods and tools, transfer research results to the economic sphere, independently plan and implement their own scientific development and inspire and/or organize the development of others, conduct didactic classes and verify the content provided.	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_4 P8U_U_5

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

In the area of social competences (PhD students are capable to): independent research planning and independent expansion of existing scientific achievements, creative undertaking of challenges in the professional and public sphere, taking into account their ethical dimension, initiating activities for the public interest, shaping models of proper conduct in teamwork, maintaining and developing the significance and role of creative environments in social life	P8U_K_1 P8U_K_2 P8U_K_3 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Written or oral stage tests

TEACHING CONTENT:

Lecture topics

1. Introduction to the nomenclature of chemical technology
2. Chemical technology and production and environmental protection considerations
3. Problems of locating chemical industry installations - ecological and ethical issues.

Exercise topics

1. Tasks concerning mass flow
2. Tasks concerning energy balance
3. Stresses in systems resulting from interatomic interactions

The course completion criteria and methods:	Percent of a final grade:
Written or oral stage tests □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

1. J. Kępiński, Wstęp do technologii chemicznej, Wyd. Uczeln PS, Szczecin, 1978
2. J. Zieńko, Problemy lokalizowania inwestycji. Metody ocen oddziaływania na środowisko, Wyd. Uceln. PS, Szczecin, 1994
3. E. Skrzypczak, Z. Szefliński: Wstęp do fizyki jądra atomowego i cząstek elementarnych. PWN, 1995.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part III**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część III**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Logistics and transportation problems**	
Name of the course in Polish: **Problemy logistyki i transportu**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. UPP dr hab. inż. Przemysław Niewiadomski, dr inż. Dawid Wojcieszak**	
Discipline: **Mechanical engineering**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Case study	**6**
- Essey	**12**
- Self-study	**10**
Total numer of hours:	**40**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize doctoral students with contemporary conditions of logistics and transport from the perspective of manufacturing enterprises and agricultural producers (broad context).

TEACHING METHODS:

Lecture with multimedia presentation and analysis of specific cases occurring in the practice of functioning of industrial and agricultural enterprises, practical exercises, modelling and simulation of supplier evaluation methods, literature search (PhD student's own work).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) Global scientific achievements on specific issues related to logistics and transport from the perspective of the scientific disciplines of management and quality science (logistics) and civil engineering, geodesy and transport (transport) and the resulting implications for practice. 2) The latest theories and trends in logistics and transport, in which education was carried out at the doctoral school, which will allow for the creation of original research concepts and their scientific interpretation. 3) Principles of planning and financing scientific research and evaluation of projects in the field of logistics and transport and agrologistics. 4) Conditions regarding intellectual property and confidentiality rules related to scientific and teaching activities.	P8U_W_1) (P8U_W_2) (P8U_W_3) (P8U_W_4)

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

In the area of skills (PhD students know how to): 1) Use knowledge to creatively formulate own research problems in the area of logistics and transport (the perspective of engineering and technical sciences). 2) Innovatively solve research tasks using independently acquired knowledge regarding the latest research methods and tools and apply it in the context of problems in the area of logistics and transport and agrologistics. 3) Transfer the results of research and development work to the economic sphere (implementation of solutions in the agro-industrial sector). 4) Independently plan and implement own scientific development and implement research and development work and create the development of other people. 5) Conduct didactic classes and verify the content provided regarding logistics and transport.	(P8U_U_1) (P8U_U_2) (P8U_U_3) (P8U_U_4) (P8U_U_5)
In the area of social competences (PhD students are capable to): 1) Independent research planning and independent expansion of existing scientific achievements in the area of logistics and transport (the perspective of engineering and technical sciences). 2) Creatively addressing challenges in the area of logistics and transport in the professional and public sphere, taking into account their ethical dimension. 3) Initiating activities related to logistics and transport for the public interest. 4) Shaping models of proper conduct in teamwork, including project teams conducting research in the area of logistics and transport. 5) Maintaining, developing the importance and role of logistics and transport researchers in social life.	(P8U_K_1) (P8U_K_2) (P8U_K_3) (P8U_K_4) (P8U_K_5)

Methods of evaluation of outcomes achievement:

1.Oral exam
2.Essay
3.Case study

TEACHING CONTENT:

Lecture content: Conditions of functioning of modern industrial enterprises, Definitions, concepts and development of logistics in industry 5.0. The concept of logistics with explanation of individual components of the definition. Logistics chain (supply, production, transport and storage, after-sales and reverse logistics context). Sustainable logistics on a macro and micro scale. Logistics process and its components. Logistics system. Transformations performed on cargo and information flows - criteria for these transformations. Subject division of logistics with commentary. Logistics centers and their equipment - definition; infrastructure; scope of services. Logistics task - for a manufacturing enterprise (diagram and description). Organization of the logistics structure in an enterprise - the essence and tasks of the logistics system. Means of transport in agriculture. Expenditures and costs in logistics. Modern concepts of logistics. Problems of logistics and transport in the practice of enterprises.

Exercise content: Modeling the supply system, Defining the determinants of supplier selection and supply sources, designing a supplier competence model, assessing the importance of requirements, modeling the manufacturing process of parts and components of agricultural transport means, analysis of the market of producers of agricultural transport means (technological trailers, manure spreaders, slurry tankers, etc.), criteria for selecting a means of transport on a farm (customer perspective).

The course completion criteria and methods:	Percent of a final grade:
Rozmowa (egzamin ustny)	40%
Esej dotyczący problemów logistyki i transportu	40%
Obecność na zajęciach	20%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Abt S.: Zarządzanie logistyczne w przedsiębiorstwie. PWE, Warszawa 1998.
2. Abt S., Woźniak H.: Podstawy logistyki. Wyd. Stella Maris, Gdańsk 1993.
3. Adamczewski P.: Informatyczne wspomaganie łańcucha logistycznego. Wyd. AE, Poznań 2001.
4. Blaik P.: Logistyka. PWE, Warszawa 2004.
5. Brzeziński M.: Logistyka w przedsiębiorstwie. Wyd. Bellona, Warszawa 2006.
6. Krawczyk S.,: Podstawy Logistyki, CwDeWu, Warszawa 2020.
7. Szymonik A, Nowak I.: Współczesna logistyka, Difin, Warszawa 2017.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Artificial intelligence methods and techniques in data processing**	
Name of the course in Polish: **Metody i techniki sztucznej inteligencji w przetwarzaniu danych**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **Prof. UPP dr hab. inż. Krzysztof Koszela**	
Discipline: **Mechanical engineering**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The purpose of the course is to introduce students to the possibilities of using computational intelligence methods (mainly artificial neural networks)
in data analysis and scrambling. As part of the course, doctoral students should develop a practical skill in using selected methods of computational intelligence for data analysis.

TEACHING METHODS:

1.Lectures - presentation of theoretical knowledge in the form of original content in the form of original presentations.
2.Exercises in the computer classroom: solving AI problems independently using the software at hand.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice, - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation,	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems, - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools, - give classes and lectures and verify taught content,.	(P8U_U_1) (P8U_U_2) (P8U_U_5)
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature, - creatively solve challenges in the professional and public life, considering their ethical aspects, - initiate actions for the public good,	(P8U_K_1) (P8U_K_2) (P8U_K_3)

Methods of evaluation of outcomes achievement:

- Supervision of projects implemented in exercises.
- Computer-assisted colloquium to test practical skills in AI methods.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The course topics include selected issues in artificial neural networks, evolutionary methods and other areas of computational intelligence in the context of their applications to data analysis / prediction / optimization / approximation in technical issues. Introduction to artificial neural networks and evolutionary methods. Use of artificial neural networks in data analysis and prediction. Classification of data using artificial neural networks.

The course completion criteria and methods:	Percent of a final grade:
Workshop	50%
- evaluation from the colloquium	50%
- evaluation from the project	
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

WYKAZ LITERATURY:

Flasiński M., 2011. Wstęp do metod sztucznej inteligencji. PWN, W-wa.
Baczyński D. i inni., 2008. Sztuczna inteligencja w praktyce. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa. Kwiatkowska A.M., 2007.
Systemy wspomagania decyzji. PWN, W-wa.
Cichosz P., 2000. Systemy uczące się.WNT, W-wa.
Hurbans Rishal: Algorytmy sztucznej inteligencji. Ilustrowany przewodnik, Helion, Gliwice, 2021
S.J.Russell, P.Norvig, Artificial Intelligence A Modern Approach (Third Edition), Prentice-Hall, 2010, http://aima.cs.berkeley.edu/

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern carbon and inorganic materials in mechanical engineering**	
Name of the course in Polish: **Nowoczesne materiały węglowe i nieorganiczne w inżynierii mechanicznej**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **dr hab. inż. Mariusz Drygaś, prof. UPP**	
Discipline: **Mechanical engineering**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**2**
Total numer of hours:	**14**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize students with the properties, manufacturing technologies and applications of modern materials based on carbon structures, ceramics and composite materials that can be used in mechanical engineering.

TEACHING METHODS:
Lecture, presentation, group work

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - has basic knowledge of the structure of ceramic, carbon, polymer and composite materials, - knows the most important methods of producing advanced materials, - knows the relationships between the structure and properties of the obtained materials.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - has the ability to describe the structure of ceramic, carbon and polymer materials on a micro and macroscopic scale, - is able to list the methods of their production, - is able to select a specific material for practical applications.	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independent research planning and independent expansion of existing scientific achievements, - creatively addressing challenges in the professional and public spheres, taking into account their ethical dimension, - shaping models of proper conduct in teamwork, - maintaining and developing the importance and role of creative environments in social life.	P8U_K_1 P8U_K_2 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Final test, activity during classes

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The lecture topics are the basic issues concerning advanced carbon and inorganic materials based on the relationship structure - properties - production - application.
1. Traditional and advanced materials - definitions and basic differences.. The most important groups of modern engineering materials. History of carbon and inorganic materials (2 hours)
2. Internal structure of materials - materials with crystalline structure and amorphous materials (2 hours)
3. Physicochemical properties of modern engineering materials and their relationship with microstructure (2 hours) 4. Carbon and carbon-inorganic composites - structure and properties (2 hours)
5. The most important methods of obtaining advanced carbon, inorganic materials and their composites (2 hours)
6. Areas of application of modern materials in mechanical engineering - current and prospective (2 hours)

The course completion criteria and methods:	Percent of a final grade:
Activity during classes, Final test	25% 75%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

Marek Blicharski "Wstęp do inżynierii materiałowej" Wyd. AGH, 1995

Jerzy Dereń, Jerzy Haber, Roman Pampuch „Chemia ciała stałego“ PWN Warszawa, 1975

Michael. F. Ashby, David R.H. Jones „Materiały inżynierskie” t. 1,2. PNT Warszawa, 1995

Boczkowska Anna, Kapuściński Jerzy, Lindemann Zdzisław „Kompozyty i techniki ich wytwarzania” Oficyna Wydawnicza Politechniki Warszawskiej, 2016

Zenon Sarbak „Nieorganiczne materiały nanoporowate” Wydawnictwo Naukowe UAM, 2009

Bohdan Ciszewski, Bohdan Przetakiewicz „Nowoczesne materiały w technice” Bellona, 1993

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part IV**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część IV**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Conceptual models in empirical studies**	
Name of the course in Polish: **Modele koncepcyjne w badaniach empirycznych**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **Prof. Agnieszka Sujak**	
Discipline: **Mechanical engineering**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
- Practical classes	**4**
- Self-study	**8**
Total numer of hours:	**20**

OBJECTIVE OF THE COURSE:

The course aims to improve the doctoral student's abstract thinking ability and develop models based on empirical data. Study participants will acquire the skills to collect data correctly, group them, and create them using models of varying complexity. Examples of issues and data to which unconventional solutions have been applied will be presented. At the end of the course, the student will have acquired the knowledge and practical skills to analyse data independently and in teams.

TEACHING METHODS:

Lecture/presentation/discussion/brainstorming / self-study with the guidance of the lecturer

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the global achievements on specific issues related to the application of conceptual models -new theories and trends in data analysis and modelling	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use knowledge to solve research problems creatively - analyse data in an innovative way	P8_U_U1 P8_U_U2
In the area of social competencies (PhD students are capable to): - plan research independently - work in a team	P8_U_K1 P8_U_K4

Methods of evaluation of outcomes achievement:

Discussion, brainstorming

Presentation of the selected topic by the doctoral student

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

1. Methods of acquiring, analysing and reporting experimental results (reliability in data acquisition)
2. Definition of characteristics of objects, temporal and dimensional scaling of characteristics
3. Data clustering, analogy building, data generalisation, data normalisation and standardisation
4 The concept of model and reasons for subjecting data to modelling processes.
5. Difference between reality and model (analogue, generalisation, simplified model)
6. Examples of applications of numerical modelling to data analysis:
(a) Monte Carlo method,
(b) artificial neural networks,
(c) Bayesian networks,
(d) binomial distribution

The course completion criteria and methods:	Percent of a final grade:
Class attendance and student's activity	50%
Presentation of a selected topic	50%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Stanisław Pabis. 2009. Metodologia nauk empirycznych. Wydawnictwo Uczelniane Politechniki Koszalińskiej

2. Pfanzagl, J., *Theory of Measurement*, Wiley, New York, 2nd edition, 1968. Phisica-Verlag, Würzburg-Wien, 1971.

3. Evandro Agazzi 1980. *Logic and the Methodology of Empirical Sciences In:* Modem Logic - A Survey, str 255-282; D. Reidel Publishing Company.

4. Scientific texts according to the lecturer’s choice.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part V**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część V**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part VI**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część VI**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Neural modeling and machine learning in mechanical engineering

Name of the course in Polish:
Modelowanie neuronowe i uczenie maszynowe w inżynierii mechanicznej

Unit providing the course (Department):
Department of Biosystems Engineering

Course leader:
prof. dr hab. inż. Maciej Zaborowicz

Discipline:	Semester:
Mechanical Engineering	**7**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The purpose of the course is to present the possibilities of using modern neural modeling techniques in solving scientific problems in the broad field of mechanical engineering, and to demonstrate the capabilities of these methods in everyday computational and engineering practice. Neural modeling, due to its properties, is particularly suited for solving complex problems, often with non-linear characteristics. In the course of research processes, it is possible to identify the relevance of individual variables used in the generation of these models. Currently, neural modeling techniques, including deep learning and convolutional networks, are being used, allowing for the expansion of the range of analyzed problems and issues.

TEACHING METHODS:

Lectures in the form of multimedia presentations, which present the possibilities of using neural models in solving original scientific problems.
Practical exercises, workshops on carrying out the modeling process.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The world's scientific achievements in specific areas of neural modeling within the discipline of mechanical engineering and their practical implications. - The latest theories and trends in the field of artificial intelligence techniques in mechanical engineering, covered during the doctoral school training, will enable the development of original research concepts and their scientific interpretation.	P8U_W_1 P8U_W_2
In terms of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In terms of social competence (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects - initiate actions for the public good	P8U_K_1 P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Exercises: Preparation of a neural model addressing the issue selected by the doctoral student.

Lectures: Description of the prepared model, demonstration of its strengths and weaknesses, and practical knowledge of neural modeling.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

1. Introduction to neural modeling
2. Preparation and analysis of data
3. Preparation of training sets
4. Neural modeling
5. Verification of the developed models
6. Sensitivity analysis of the developed models
7. Selection of the optimal neural network topology

The course completion criteria and methods:	Percent of a final grade:
Exercises: Data preparation and development of a neural model.	50%
Lectures: Discussion of the developed model, highlighting its strengths and weaknesses.	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Ryszard Tadeusiewicz, Maciej Szaleniec: Leksykon sieci neuronowych
2. Krzysztof Różanowski, SZTUCZNA INTELIGENCJA: ROZWÓJ, SZANSE I ZAGROŻENIA
3. Valentino Zocca, Gianmario Spacagna, Daniel Slater, Peter Roelants, Deep Learning. Uczenie głębokie z językiem Python. Sztuczna inteligencja i sieci neuronowe
4. Kosiński Robert A. Sztuczne sieci neuronowe. Dynamika nieliniowa i chaos

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Optimization in engineering practice**	
Name of the course in Polish: **Optymalizacja w praktyce inżynierskiej**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **dr hab. inż. Tomasz Garbowski, prof. UPP**	
Discipline: **Mechanical engineering**	Semester: **8**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**24**
Total numer of hours:	**36**

OBJECTIVE OF THE COURSE:

This course will study principles of optimization, driven by current applications in biology, physics, economics, engineering, etc.

TEACHING METHODS:

Lecture with multimedia presentation and analysis of sample tasks

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice (), - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation (P8U_W_2), - aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity (P8U_W_4).	P8U_W_1 P8U_W_2 P8U_W_4
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - independently plan and realise their scientific development, as well as inspire and/or organise the development of others	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects - promote appropriate models of team work - - maintain and promote the importance and role of the intellectual community in social life.	P8U_K_1 P8U_K_2 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

There will be some programming in Scilab for some of the assignments as a part of evaluation of outcomes achievement, therefore there are following prerequisites: the course is appropriate for students who have taken ‘Computational Methods’ or the equivalent, as well as ‘Basic Algebra and Matrices’ or the equivalent.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Topics include: basic algorithms for one-dimensional optimization, multidimensional optimization; direct search and gradient methods; least-square problems; multiobjective optimization; linear and nonlinear programming; global optimization and model approximation techniques; topology od shape optimization. Students will pursue projects in a variety of fields, writing their own computer programs using higher-level tools such as Scilab.

The course completion criteria and methods:	Percent of a final grade:
# Student can choose one particular subject of his interest from the course content and prepare 15min presentation. A choice of a topic should be discussed with the lecturer first. # Student can take one recent article concerning optimization and prepare 15min presentation with a short review of the topic. A choice of an article should be discussed with the lecturer first. # Student can prepare a few-page report or presentation showing an application of some optimization techniques in her/his research work. An application should be discussed with the lecturer first. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Practical Optimization, Antoniou and Wu-Sheng Lu, Springer 2007; Numerical optimization, Nocedal and Wright, Springer 2006; Practical methods of optimization, Fletcher, Willey 2000.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Individual tutoring**	
Name of the course in Polish: **Tutoring indywidualny**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. UPP dr hab. Tomasz Garbowski; prof. dr hab. inż. Maciej Zaborowicz ; prof. dr hab. Agnieszka Sujak; prof. UPP dr hab. Wojciech Czekała; prof. UPP dr hab. Krzysztof Koszela; prof. dr hab. Inż. Jacek Dach**	
Discipline: **Mechanical engineering**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarise PhD students with methods of presenting their scientific achievements and to prepare them to present these achievements during their doctoral thesis defence.

TEACHING METHODS:

Discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - general issues and selected specific issues relevant to a scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; methodology for presenting research results	P8U_W P8S_WG
In the area of skills (PhD students know how to): - independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment; - utilize and creatively apply acquired knowledge; - draw conclusions based on research results; - transfer research findings to the economic and social spheres.	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on methods of presenting the results of the PhD student's research in view of the defense of the doctoral dissertation

TEACHING CONTENT:

The educational content includes the analysis of the doctoral student's research results and their optimal presentation during the doctoral thesis defense.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** **☒ pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Research results/publications of the PhD student related to the content of the thesis.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures and KIB seminars, part VII**	
Name of the course in Polish: **Wykłady monograficzne seminaria KIB, część VII**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **prof. dr hab. inż. Maciej Zaborowicz**	
Discipline: **Mechanical engineering**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
Total numer of hours:	**3**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with basic research methods based on the example of the presentation of achievements of employees of the Department of Biosystems Engineering representing the discipline of Mechanical Engineering.

TEACHING METHODS:

Multimedia presentation, discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific and creative achievements and their implications for practice - to the extent necessary to revise existing paradigms – global achievements encompassing: • theoretical foundations • general issues and selected specific issues relevant to the scientific or artistic discipline; main development trends in scientific or artistic disciplines relevant to the curriculum; research methodology	P8U_W P8S_WG
In the area of skills (PhD students know how to): Analyze and creatively synthesize scientific and creative achievements in order to identify and solve research problems and those related to innovative and creative activities; create new elements of this achievement; independently plan one's own development and inspire the development of others; participate in the exchange of experiences and ideas, including in an international environment - Use knowledge from various fields to creatively identify, formulate, and innovatively solve complex problems or perform research tasks, in particular: • define the purpose and subject of research, formulate a research hypothesis • develop research methods, techniques, and tools, and apply them creatively • draw conclusions based on research results and transfer research findings to the economic and social spheres	P8U_U P8S_UW
In the area of social competences (PhD students are capable to): - independent research that expands existing scientific and creative achievements; taking on challenges in the professional and public spheres, taking into account: • their ethical dimension, • responsibility for their consequences, and shaping models of appropriate conduct in such situations - critical evaluation of the achievements of the represented scientific or artistic discipline; critical evaluation of one's own contribution to the development of that discipline; recognizing the importance of knowledge in solving cognitive and practical problems	P8U_K P8S_KK

Methods of evaluation of outcomes achievement:

Active participation in the discussion on the presented topic

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The educational content includes familiarization and analysis of scientific research conducted by the employees of the Department of Biosystems Engineering in the discipline of Mechanical Engineering.

The course completion criteria and methods:	Percent of a final grade:
Discussion **Pass** ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Multimedia presentation and additional materials sent to PhD students by the Speakers

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Scientific internships**	
Name of the course in Polish: **Staże naukowe**	
Unit providing the course (Department): **Department of Ecology and Environmental Protection**	
Course leader: **Prof. dr hab. Klaudia Borowiak**	
Discipline: **Environmental engineering, mining and energetics**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
Acquiring the knowledge about benefits of international scientific internships, cooperation with the foreign institutes. Spreading the personal skills for developing the international research team

TEACHING METHODS:
Lecture, discussion, searching of the data on websites. There is also possible teaching with the aid of remote teaching methods.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - principles of planning and financing of research and evaluation of projects within international internships, - sources of data about open calls for scientific internships.	P8U_W_3
In the area of skills (PhD students know how to): - independently plan and realize their scientific internship, - apply knowledge in the process of creative formulation of their research problems during the scientific internship.	P8U_U_4 P8U_U_1
In the area of social competences (PhD students are capable to): - promote the knowledge received during the internship, - creatively solve challenges with achieved new skills and knowledge in the other scientific unit, - plan the scientific career with the taking into consideration international cooperation.	P8U_K_5 P8U_K_2 P8U_K_1

Methods of evaluation of outcomes achievement:

Evaluation of the presentation of the results and public discussion/defense

TEACHING CONTENT:

Types international scientific internships.
Data bases related to calls for scientific internships.
Role of scientific internship in the scientific career.
How to prepare the good proposal and CV and how to find a proper host institution?
Role of the referee. Preparation of a good internship plan and proposal.
Preparation of CV with pointing on the practical skills and research achievements. Proposal of a internship plan. Searching of a good internship option and host institution for the certain type of the internship. Presentation of results and discussion.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: Presentation of results and public discussion / defense of the idea □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Website current data about possible internship offer for PhD students

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Presentation and visualization of research results**	
Name of the course in Polish: **Prezentacja i wizualizacje wyników badań naukowych**	
Unit providing the course (Department): **Department of Construction and Geoengineering**	
Course leader: **prof. UPP dr hab. inż. Marek Urbaniak**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to acquire knowledge and the ability to present scientific content in graphic form. With particular emphasis on the presentation of research results for the purposes of scientific publications (in journals and live). The discussed content is also intended to indicate best practices in presenting ideas and hypotheses aimed at a wide audience. Including politicians, potential science sponsors and society.

TEACHING METHODS:

Lecture and practical exercises with the use of graphic packages of the R environment.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in visualization and presentation of scientific results, thus facilitating creation of original research concepts and their scientific interpretation - aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity	P8U_W_2 P8U_W_4
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - give classes and lectures and verify taught content - transfer research results to the economic sphere	P8U_U_2 P8U_U_5 P8U_U_3
In the area of social competences (PhD students are capable to): - promote appropriate models of team work - initiate actions for the public good - independently plan research and independently broaden the existing body of scientific literature	P8U_K_4 P8U_K_3 P8U_K_1

Methods of evaluation of outcomes achievement:

Preparation of a study in the form of a presentation, poster, graphic abstract, or website

TEACHING CONTENT:

During the first classes, the most popular types of graphical presentation of data, research results, and graphical summaries, used in science and everyday life, will be discussed. In the practical part, students individually will have the opportunity to prepare graphics based on given data sets.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: Assessment of a series of graphics that have been drawn up representing different types of data □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

- Knaflic, C.N. Storytelling with Data: A Data Visualization Guide for Business Professionals; Wiley, 2015; ISBN 9781119002260.
- Evergreen, S.D.H. Effective Data Visualization: The Right Chart for the Right Data; SAGE Publications, 2016; ISBN 9781506303079.
- https://seaborn.pydata.org
- https://www.tidyverse.org
- https://ggplot2.tidyverse.org

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar of the discipline**	
Name of the course in Polish: **Seminarium dyplomowe**	
Unit providing the course (Department): **Commission of the discipline environmental engineering, mining and power engineering in the Doctoral School at PULS**	
Course leader: **prof. UPP dr hab. inż. Tomasz Dysarz, the members of the Commission of the discipline**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **2, 4, 6, 8**

TYPE OF CLASSES:
(course load)

- seminars	**24**
Total numer of hours:	**24**

OBJECTIVE OF THE COURSE:
Verification of the progress in the process of the dissertation preparation, identification of problems that may result in delays in the completion of the dissertation; Preparation of doctoral students for the next steps and activities required in the Doctoral School

TEACHING METHODS:
Introductory lectures, seminars, doctoral students' own presentations, panel discussions

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - principles of planning and financing of research and evaluation of projects - aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity	P8U_W_4 P8U_W_3
In the area of skills (PhD students know and understand): - transfer research results to the economic sphere - independently plan and realise their scientific development, as well as inspire and/or organise the development of others - give classes and lectures and verify taught content	P8U_U_4 P8U_U_5 P8U_U_3
In the area of social competences (PhD students are capable to): - initiate actions for the public good - promote appropriate models of team work - maintain and promote the importance and role of the intellectual community in social life	P8U_K_3 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Active participation in classes and own work or other forms of activity of doctoral students

TEACHING CONTENT:
Introduction to the preparation of multimedia presentations; Conditioning and challenges of the doctoral student's role, including teaching; Discussion of the purpose, hypotheses and scope of the dissertation; Role of the supervisor and assistant supervisor; Introduction to the process of publishing an article; Principles of reviewing scientific articles and formulating responses to reviewers; Establishment and main elements of the Individual Research Plan; Preparing for the Midterm Evaluation; Formulating grant applications; Seeking foreign contacts and planning a research internship; The broader significance of the results of the research work and potential transfer to the economic sphere; The main elements of a doctoral dissertation, including dissertations composed of published articles; Preparing the application for the degree;

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
attendance and active participation in classes	20%
own presentations of doctoral students	60%
other forms of activity	20%
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- C. George Thomas (2022): Research Methodology and Scientific Writing, Springer;
- Iglesias M.E. (2016): Metodología de la investigación científica – Diseño y elaboración de protocolos y proyectos, Colección Universidad, Noveduc
- Rodríguez Rodríguez C., Breña Oré J.L., Vargas D.E. (2021): Las variables – en la metodología de la investigación cientifica, Ingeniería y Tecnología, Ciencias, Editorial Área de Innovación y Desarrollo, S.L.
- Mustajoki H., Mustajoki A. (): A New Approach to Research Ethics – Using Guided Dialogue to Strengthen Research Communities, Routledge, Taylor & Francis Group
- Glasman-Deal H. (2020): Scientific Research Writing for native and non-native speakers of English, World Scientific
- Legal acts collected on the Doctoral School website: https://puls.edu.pl/szkola_doktorska/akty-prawne
- Templates of documents collected on the Doctoral School website: https://puls.edu.pl/szkola_doktorska/do-pobrania

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Application of GIS in the natural environment**	
Name of the course in Polish: **Zastosowanie GIS w środowisku przyrodniczym**	
Unit providing the course (Department): **Department of Land Improvement, Environmental Development and Spatial Management**	
Course leader: **dr Jan Barabach**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to demonstrate the potential use of GIS in environmental studies at the stage of their planning, implementation and results presentation. The principles of using GIS systems to acquire, store, process, and presentation of environmental research results are outlined.

TEACHING METHODS:

Informative lectures, problem lectures, multimedia presentations, discussions, computer classes, problem - solving classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -world scientific literature concerning GIS application related to the discipline environmental engineering mining and energy with the resulting implications for practice. -the latest theories and trends in discipline of environmental engineering mining and energy, within which education was offered at the Doctoral School, thus facilitating the creation of original research concept and their scientific interpretation.	P8U_W1 P8U_W2
In the area of skills (PhD students know how to): -apply knowledge of GIS applications in the process of creative formulation of their research problems. -innovatively solve research tasks using GIS knowledge concerning state-of-the-art methods and research tools	P8U_U1 P8U_U2
In the area of social competences (PhD students are capable to): -independently plan research and independently broaden the existing body of GIS scientific literature -creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K1 P8U_K2

Methods of evaluation of outcomes achievement:

Labs: (evaluation of project and presentation of results) development of a geodatabase for own research object. Presentation of the possibility of using GIS for the PhD dissertation.
Lecture: evaluation of the exam.

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TEACHING CONTENT:

Lectures:
Use of GIS in natural environment research. Local and global spatial databases. Research tools in GIS environment. Automatization of geoprocessing data.
Laboratories:
Principles and requirements for data acquisition from geodatabases. Data acquisition from databases. Data collection and presentation. Rules of data processing. Use of research tools in GIS. Basics of geoprocessing modeling in ArcGIS Model Builder.

The course completion criteria and methods:	Percent of a final grade:
Project evaluation. Final exam score. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

- Zhu, Xuan. GIS for environmental applications: a practical approach. Routledge, 2016.
- Brimicombe, Allan. GIS, environmental modeling and engineering. CRC Press, 2009.
- Kumar, S., S. Arivazhagan, and N. Rangarajan. "Remote sensing and GIS applications in Environmental Sciences–A review." J. Environ. Nanotechnol 2, no. 2 (2013): 92-101.
- Wegmann, Martin, Benjamin Leutner, and Stefan Dech, eds. Remote sensing and GIS for ecologists: using open source software. Pelagic Publishing Ltd, 2016.
- Santra, Abhisek, and Shreyashi Santra Mitra, eds. Remote Sensing Techniques and GIS Applications in Earth and Environmental Studies. IGI Global, 2016.
- Wróżyński, Rafał, Mariusz Sojka, and Krzysztof Pyszny. "The application of GIS and 3D graphic software to visual impact assessment of wind turbines." Renewable Energy 96 (2016): 625-635.
- Wróżyński, Rafał, Krzysztof Pyszny, and Mariusz Sojka. "Quantitative landscape assessment using LiDAR and rendered 360 panoramic images." Remote Sensing 12, no. 3 (2020): 386.
- Kałuża, T., Sojka, M., Strzeliński, P., & Wróżyński, R. (2018). Application of terrestrial laser scanning to tree trunk bark structure characteristics evaluation and analysis of their effect on the flow resistance coefficient. Water, 10(6), 753.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Conceptual models in empirical research**	
Name of the course in Polish: **Modele koncepcyjne w badaniach empirycznych**	
Unit providing the course (Department): **Department of Biosystem Engineering**	
Course leader: **prof. dr hab. Agnieszka Sujak**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
- Practical classes	**4**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to improve the doctoral student's ability to think abstractly and develop models based on empirical data. Participants of the course will acquire the skills to correctly collect data, group it and process it using models with different levels of complexity. Upon successful completion of the course, the student will acquire knowledge and practical skills to solve scientific problems independently and in a team environment.

TEACHING METHODS:

lecture, multimedia presentation, brainstorming, reporting, working with computers, searching databases and publications

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the field of empirical research, analysis of data and conceptual model, thus facilitating creation of original research concepts and their scientific interpretation - world scientific literature concerning specific problems empirical research, analysis of data and conceptual model along with the resulting implications for practice	P8U_W_2 P8U_W_1
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - give classes and lectures and verify taught content	P8U_U_1 P8U_U_2 P8U_U_5
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - promote appropriate models of team work	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

test, thesis, discussion, brainstorming,
presentation of the chosen issue by the doctoral student

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TEACHING CONTENT:

Methods of acquiring, analyzing and reporting experimental results (reliability in data acquisition); Defining features of objects, temporal and dimensional scaling of the feature; Selection of measurement methods depending on the linear size of the object and spatio-temporal features of the issue; Linear and non-linear issues; Grouping of data, creation of analogies, generalization of data; Concept of model and reasons for subjecting data to modeling processes; Difference between reality and model (analog, generalization, simplified model); Evaluation of measurement quantities and their relationships; All topics will be based on examples of the application of relevant models

Translated with DeepL.com (free version)

The course completion criteria and methods:	Percent of a final grade:
Participation in the lectures and classes	50%
Presentation of the selected problem	50%
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- Stanisław Pabis. 2009. Methodology of empirical sciences [in polish]. Wydawnictwo Uczelniane Politechniki Koszalińskiej
- Pfanzagl, J., Theory of Measurement, Wiley, New York, 2nd edition, 1968. Phisica-Verlag, Würzburg-Wien, 1971.
- Evandro Agazzi 1980. Logic and the Methodology of Empirical Sciences; In: Modem Logic - A Survey, pp. 255-282; D. Reidel Publishing Company.
- Selected academic texts

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Applications of satellite remote sensing in environmental engineering**	
Name of the course in Polish: **Zastosowania teledetekcji satelitarnej w inżynierii środowiska**	
Unit providing the course (Department): **Department of Land Improvement, Environmental Development and Spatial Management**	
Course leader: **Dr. Joanna Jaskuła**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
The aims of this course are to get knowledge of remote sensing basics in environmental studies. After course students will have practical skills in download, process, analyze and interpret remotely sensed data.

TEACHING METHODS:
Multimedia presentation, group discussion, practical exercises.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in satellite remote sensing, thus facilitating creation of original research concepts and their scientific interpretation - world scientific literature concerning specific problems related to satellite remote sensing along with the resulting implications for practice	P8U_W_2 P8U_W_1
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - apply knowledge in the process of creative formulation of their research problems	P8U_U_2 P8U_U_1
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Knowledge test
Project of thematic maps with report of results

TEACHING CONTENT:
Lectures: Introduction to remote sensing. Sensor types and acquisition platforms. Remote sensing applications in the environmental studies
Classes: Data collection sources – acquiring Sentinel-2 data. Pre-processing of satellite data. Visual interpretation of remotely sensing data. Spectral indices Calculation and interpretation of spectral indices using in environmental studies.

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The course completion criteria and methods:	Percent of a final grade:
Classes: Project of thematic maps with report of results	60%
Lecture: Knowledge test	40%
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- Polska Agencja Kosmiczna (2020). Dane satelitarne dla administracji publicznej. System operacyjnego gromadzenia udostępniania i promocji cyfrowej informacji satelitarnej o środowisku – Sat4Envi.
- Thenkabail P. (2018). Remote Sensing Handbook-Three Volume Set. CRC Press.
- Chuvieco E. (2016). Fundamentals of satellite remote sensing: An environmental approach. Second edition. CRC Press/Taylor & Francis

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Hydrologic and hydrodynamic modeling**	
Name of the course in Polish: **Modelowanie hydrologiczne i hydrodynamiczne**	
Unit providing the course (Department): **Department of Hydraulic and Sanitary Engineering**	
Course leader: **prof. UPP dr hab. inż. Tomasz Dysarz**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**2**
- Practical classes	**10**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
Presentation of the current trends and methods applied in the field of water balance and water use including extreme events like floods and droughts.

TEACHING METHODS:
Lectures and practical classes

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -the latest theories and trends in the field of hydrologic and hydrodynamic modeling, thus facilitating creation of original research concepts and their scientific interpretation -world scientific literature concerning specific problems related to in the field of hydrologic and hydrodynamic modeling along with the resulting implications for practice	P8U_W_2 P8U_W_1
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - independently plan and realize their scientific development, as well as inspire and/or organize the development of others - apply knowledge in the process of creative formulation of their research problems	P8U_U_2 P8U_U_4 P8U_U_1
In the area of social competences (PhD students are capable to): - initiate actions for the public good - creatively solve challenges in the professional and public life, considering their ethical aspects - promote appropriate models of team work	P8U_K_3 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Evaluation of classes and lectures on the basis of the project. Work and activity during the classes are also assessed.

TEACHING CONTENT:

Lectures: The application areas and fundamental problems of hydrological and hydrodynamic modeling. The basic ideas and availability of the tools. Types and accessibility of data.
Classes: Collection of necessary spatial data and hydro-meteorological data for the selected terrain. Configuration of the hydrodynamic model including hydrological processes like precipitation and infiltration. Simulation of inundation process and flood wave propagation in the streams. Generation of the flood hazards maps on the basis of simulation results.

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The course completion criteria and methods: The project with model and computations for the selected terrain. □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	Percent of a final grade: 100% classes

RECOMMENDED LITERATURE:

- Wu W. (2008): Computational River Dynamics, Taylor & Francis Group;
- Brunner G.W. (200): HEC-RAS, River Analysis System Hydraulic Reference Manual, Report No. CPD-69, US Army Corps of Engineers, Hydrologic Engineering Center (HEC), Davis CA., https://www.hec.usace.army.mil/confluence/rasdocs/ras1dtechref/latest
- Feldman A.D. (ed.) (2020): Hydrologic Modeling System (HEC-HMS) Technical Reference Manual, Report No. CPD-74B, US Army Corps of Engineers, Hydrologic Engineering Center (HEC), Davis CA., https://www.hec.usace.army.mil/confluence/hmsdocs/hmstrm
- Chow V.T. (1959): Open-Channel Hydraulics, McGraw-Hill Book Company;
- Chow V.T., Maidment D., Mays L. (1988): Applied Hydrology, McGraw-Hill
- Szymkiewicz R. (2010): Numerical Modeling in Open Channel Hydraulics, Springer

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Specialized statistical analysis**	
Name of the course in Polish: **Specjalistyczne analizy statystyczne**	
Unit providing the course (Department): **Department of Construction and Geoengineering**	
Course leader: **prof. UPP dr hab. Anna Budka**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
Teaching students how to analyse data, derived from direct measurements, using more advanced statistical approaches used in environmental sciences. Individual selection of techniques and software [STATISTICA, R, MAPLE] for the interpretation and graphic presentation of the results.

TEACHING METHODS:
Lectures and practical classes complemented by individual consultation. Possibility to use remote teaching tools and techniques in both cases.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to statistical analysis along with the resulting implications for practice - the latest theories and trends in statistical analysis, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - transfer research results to the economic sphere - give classes and lectures and verify taught content	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_5
In the area of social competences (PhD students are capable to): - creatively solve challenges in the professional and public life, considering their ethical aspects - promote appropriate models of team work	P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of the preparation of analyzes and interpretation of the results

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TEACHING CONTENT:

The ability to apply the basic knowledge in the field of statistical analysis in practice, covering the following selected single- and multi-dimensional issues:

1.Testing for compliance with the normal distribution

2. Determining the measure of position and dispersion (mean, median, modal, variance, standard deviation, range, coefficient of variation) and their interpretation in statistical packages

3. Student's t-test (definition, application and consequences for statistical analysis).

4. Analysis of variance (definition, types of models, application, statistical value).

5. Correlation - regression (definition, relationship between correlation and regression, type of regression, application).

6. Non-parametric statistics (selected, most useful tests).

7. Application of principal components analysis, heat maps to the interpretation of multivariate data

The course completion criteria and methods:	Percent of a final grade:
Assessment of student's presence, activity and participation in discussion during conservatory.	10%
Assessment of the report consisting of individual calculations for the publication being prepared.	90%
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- Applied Statistics for Engineers. Volk W. New York: McGraw-Hill Book Company, 1958
- Thinking statistically. Elephants go to school. Sarjinder Singh. 2006. Kendall/Hunt Publishing Company, Dubuque, Iowa, 1958.
- Statystyka z programem Statistica. Małgorzata Rabiej. Wydawnictwo Helion. Gliwice, 2012.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Bioclimatology**	
Name of the course in Polish: **Bioklimatologia**	
Unit providing the course (Department): **Department of Ecology and Environmental Protection**	
Course leader: **prof. UPP dr hab. Bogdan Chojnicki**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
To gain knowledge of mass and energy exchange between terrestrial ecosystems and the atmosphere in the context of interactions between abiotic and biotic factors in the Earth-Atmosphere system.

TEACHING METHODS:
Lectures, classes, presentations, discussion panel

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -world scientific literature concerning specific problems related to balance of radiation, carbon exchange and water movement in terrestrial ecosystems with the resulting implications for practice -the latest theories and trends in balance of radiation, carbon exchange and water movement in terrestrial ecosystems, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - apply knowledge in the process of creative formulation of their research problems -	P8U_U_2 P8U_U_1
In the area of social competences (PhD students are capable to): - initiate actions for the public good - creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_4 P8U_K_3 P8U_K_2

Methods of evaluation of outcomes achievement:
Knowledge is tested by a written/oral exam
Skills are tested based on the projects completed in the exercises

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TEACHING CONTENT:

Lectures: To introduce the basic principles of the biosphere, the phenomena of energy flow and the circulation of matter in the Earth-atmosphere system. To familiarize students with the processes of mass (water, carbon dioxide, methane and nitrous oxide) and heat exchange between ecosystems and the atmosphere. To teach the basic concepts of bioclimatology such as radiation use coefficient, water use coefficient, gross ecosystem primary production, net ecosystem production and ecosystem respiration. Introduce measurement techniques used to estimate mass and energy exchange between ecosystems/plants and the atmosphere. Presentation of methods for estimating radiation, water and carbon balances of basic terrestrial ecosystems.
Classes: preparation of projects that will calculate the magnitudes of radiation, water and carbon balances of selected terrestrial ecosystems.

The course completion criteria and methods:	Percent of a final grade:
Classes: acceptance of project 100% Final exam: positive grade for classes 50% and positive evaluation of written/oral exam 50%	50% classes 50% exam
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

- Kędziora A. (2008). Podstawy agrometeorologii. PWRiL. Poznań.
- T.R. Oke, 1987 Boundary Layer Climates, 2nd Edition, Routledge Taylor & Francis Group
- R.B. Stull 2003 An Introduction to Boundary Layer Meteorology, Kluwer Academic Publisher Group
- IPCC, Zmiana Klimatu 2021, podstawy fizyczne, podsumowanie dla decydentów (2021) wersja polska, Nauka o klimacie

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Gas exchange measurements: basics and problems**	
Name of the course in Polish: **Podstawy i problemy pomiarów wymiany gazowej ekosystemów**	
Unit providing the course (Department): **Department of Construction and Geoengineering**	
Course leader: **prof. UPP dr hab. Marek Urbaniak**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The main objective of the course is to provide basic information regarding trace gases (CO2, CH4, H2O) exchange measurements – both theoretical and technical issues using the chamber method and eddy covariance method. In addition to the above problems, the classes will focus on the initial analysis of measurement data.

TEACHING METHODS:

The course starts with theoretical lectures, followed by practical classes with fieldwork where gained knowledge can be verified in ambient conditions. Since after the first semester of the Doctoral School Students should already have basic R software operation skills, most of the practical classes will be conducted using this software.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in gas exchange, thus facilitating creation of original research concepts and their scientific interpretation - world scientific literature concerning specific problems related to gas exchange along with the resulting implications for practice	P8U_W_2 P8U_W_1
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - apply knowledge in the process of creative formulation of their research problems	P8U_U_2 P8U_U_1
In the area of social competences (PhD students are capable to): - initiate actions for the public good - promote appropriate models of team work - maintain and promote the importance and role of the intellectual community in social life	P8U_K_3 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Project-based on the provided, sample measurement data. The scope of calculations includes verification of data sets in terms of quality, data evaluation in terms of rational values typical for specific conditions, data processing, and preparation of a synthesis of results. Fieldwork and practical organization of the measurement experiment.

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TEACHING CONTENT:

Basic theoretical and practical issues regarding flux measurements methods will be covered during the course, specifically:

1. Eddy covariance method - theory of operation, advantages and disadvantages
2. Setup of the measurements - instrumentation
3. Fluxes calculation (EddyPro and custom software)
4. Chamber method – main kinds, theory of operation and potential sources of errors
5. Theory of chamber system operation (main components, step-by-step instruction how to use smart chamber system)
6. Gas fluxes calculations – formulas and available software
7. View on the possible data structure: txt, csv, json, etc. and how to proceed different output files
8. Loading data to: a) Excel-like spreadsheet, b) directly to R software

The course completion criteria and methods:	Percent of a final grade:
Assessment of the report consisting of individual exercises/calculations. □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

- Details regarding smart chamber system/ documents and SoilFluxPro software operation information can be found here:
  https://www.licor.com/env/support/Smart-Chamber/docs.html
  https://www.licor.com/env/products/soil_flux/soilfluxpro?gclid=CjwKCAiA9bmABhBbEiwASb35V2FqIA_AE2WZDY0L92dE9BsA62mDaQpYEdeEZRMMcned8AqnfEwNoxoCHX0QAvD_BwE
  https://licor.app.box.com/s/z7gouerfo1fes3jb0hyo3w2snajsbalc
  https://www.licor.com/env/products/eddy_covariance/resources
- M. Urbaniak, B.H. Chojnicki, R. Juszczak, J. Augustin, J. Leśny, K. Ziemblińska, N. Kowalska, K. Sakowska, P. Siedlecki, J. Olejnik. 2016. Chapter in: Measuring Major Components of the Terrestrial Carbon Balance. L. Mueller, A. K. Sheudshen, i F. Eulenstein (Eds.), Novel methods for monitoring and managing land and water resources in Siberia (pp. 401–423). Springer International Publishing. (https://link.springer.com/chapter/10.1007/978-3-319-24409-9_17)
- Marc Aubinet, Timo Vesala, Dario Papale (eds), Eddy Covariance. 2012, doi:10.1007/978-94-007-2351-1.
- Heard, D., Whalley, L.K., Brown, S.S. (2021). Gas Analysers and Laser Techniques. In: Foken, T. (eds) Springer Handbook of Atmospheric Measurements. Springer Handbooks. Springer, Cham. https://doi.org/10.1007/978-3-030-52171-4_16
- Mauder, M., Foken, T., Aubinet, M., Ibrom, A. (2021). Eddy-Covariance Measurements. In: Foken, T. (eds) Springer Handbook of Atmospheric Measurements. Springer Handbooks. Springer, Cham. https://doi.org/10.1007/978-3-030-52171-4_55
- Subke, JA., Kutzbach, L., Risk, D. (2021). Soil Chamber Measurements. In: Foken, T. (eds) Springer Handbook of Atmospheric Measurements. Springer Handbooks. Springer, Cham. https://doi.org/10.1007/978-3-030-52171-4_60

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Methods of soil remediation**	
Name of the course in Polish: **Metody remediacji gleb**	
Unit providing the course (Department): **Department of Soil Science, Land Reclamation and Geodesy**	
Course leader: **Dr. Katarzyna Wiatrowska**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The purpose of the course is to familiarize students with the methods of remediation of soils both in-situ and ex-stu. To introduce students to the problems of post-mining land remediation. As part of the course, students will deepen their knowledge of modeling the processes of chemical and biological remediation of the soil environment.

TEACHING METHODS:

Lecture, analysis of cases (case studies) related to sites under remediation processes, Computational classes

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in soil remediation, thus facilitating creation of original research concepts and their scientific interpretation -world scientific literature concerning specific problems related to soil remediation with the resulting implications for practice	P8U_W_2 P8U_W_1
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - transfer research results to the economic sphere	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): - initiate actions for the public good - creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_3 P8U_K_2

Methods of evaluation of outcomes achievement:

Written exam

TEACHING CONTENT:

1. Degradation and pollution of soils - characteristics of the problem
2. Transport of substances in a porous environment
3. Methods and techniques of remediation of soils contaminated with inorganic substances
4. Specificity of methods of remediation of soils contaminated with organic substances
5. The concept of post-mining land remediation

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The course completion criteria and methods:	Percent of a final grade:
lecture: Oral exam	45%
Active participation in classes	5%
exercises: test	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

- Jeff Kuo. Practical Design Calculations for Groundwater and Soil Remediation. CRC Press
- Meuser H. Soil remediation and rehabilitation. Springer, 2013
- Essington M. E. Soil and Water Chemistry. An Integrative Approach. CRC Press, 2004
- Otten A.M. In situ remediation. Springer
- FAO. Soil pollution a hidden reality. 2018

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern solutions in water and sanitary management**	
Name of the course in Polish: **Nowoczesne rozwiązania w gospodarce wodnej i sanitarnej**	
Unit providing the course (Department): **Department of Hydraulic and Sanitary Engineering**	
Course leader: **prof. UPP dr hab. inż. Mateusz Hammerling/prof. UPP dr hab. inż. Agnieszka Pilarska**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to present and explain to students of the modern solutions for water and sanitary management. The subject includes selected technologies, methods, processes that were not presented during the subjects as part of studies, mainly due to their short implementation time.

TEACHING METHODS:

The didactic method is a lecture in the form of a multimedia presentation, with the possibility of supplementing with a demonstration and the exercises in the form of short experiments, computational tasks or workshops aimed of the specific problem solving.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to water and sanitary management along with the resulting implications for practice - the latest theories and trends in water and sanitary management, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Knowledge: written work/presentation concerning the problems realized during lectures and exercises; assessment of the tasks performed individually or in groups; assessment of the substantive discussion participation
Skills: assessment of the performance of experiments and calculations during exercises; evaluation of the individual written works; evaluation of project work; assessment of student activity during exercises performance
Social competences: assessment of activity during classes, assessment of group work in the laboratory

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The lectures and exercises will discuss elements of the barrage and their location. Influence of damming structures on sediment transport and disruption of its continuity. Structures and types of fish ladders. Detailed description of different modern types of fish ladders. Location, conditions of good work of fish ladders. Influence of dam reservoirs on river processes. Causes and description of local scour formation process. Examples of local scour on rivers. Characteristics of the process of longitudinal erosion below the reservoir, together with a description of the dynamics of this process. Methods to reduce the dynamics of the erosion process below the reservoir. Assessment of reservoir siltation and bed erosion below grade with examples.

Recently reports on the role of sewage sludge as a substrate and inoculum in anaerobic digestion process (AD) will be discussed. Moreover: comparison of physicochemical properties of raw and digested sewage sludge. Dynamics of changes in microbiological parameters of sewage sludge – innovative technological solutions of the AD process. Methods of estimating the biochemical methanogenic potential (BMP) of sewage sludge. Immobilization of dedicated microbiological carriers in the methane and hydrogen production with the use of sewage sludge. Evaluation of the modification in the bacterial microbiome of sewage sludge using the modern Next-Generation Sequencing (NGS) method. The currently reports relating to the application of adsorbents in wastewater treatment technology.

The course completion criteria and methods:

The subject ends with an individual work (paper/presentation), concerning the knowledge transferred during lectures and exercises.

□ **pass (Z)** ☒ **course credit with a grade** □ **examination**

Percent of a final grade:

The final grade is 60% of the lecture content and 40% of the exercises content

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RECOMMENDED LITERATURE:

- Mehariya, S.; Patel, A.K.; Obulisamya, P.K.; Punniyakottia, E.; Wong, J.W.C. Co-digestion of food waste and sewage sludge for methane production: Current status and perspective. Bioresource Technology, 2018, 265, 519-531.
- Xu, F.; Li, Y.; Ge, X.; Yang, L.; Li, Y. Anaerobic digestion of food waste—Challenges and opportunities. Bioresour. Technol. 2018, 247, 1047–1058.
- Weiß, S.; Zankel, A.; Lebuhn, M.; Petrak, S.; Somitsch, W.; Guebitz, G.M. Investigation of microorganisms colonising activated zeolites during anaerobic biogas production from grass silage. Bioresour. Technol. 2011, 102, 4353–4359.
- Pilarska, A.A.; Pilarski, K.; Waliszewska, B.; Zborowska, M.; Witaszek, K.; Waliszewska, H.; Kolasiński, M.; Szwarc-Rzepka, K. Evaluation of bio-methane yields for high-energy organic waste and sewage sludge: A pilot-scale study for a wastewater treatment plant. Environmental Engineering and Management Journal, 2019, 18(9), 2023-2034.
- Pilarska, A.A.; Wolna-Maruwka, A.; Niewiadomska, A.; Pilarski, K.; Adamski, M.; Grzyb, A.; Grządziel, J.; Gałązka A. Silica/Lignin Crrier as a Factor Increasing the Process Performance and Genetic Diversity of Microbial Communities in Laboratory-Scale Anaerobic Digesters. Energies 14(15) (2021) 4429-4452.
- Guisan, J.M. Methods in Biotechnology: Immobilization of Enzymes and Cells; Humana Press: Totowa, NJ, USA, 2006.
- Bonilla-Petriciolet, A.; Mendoza-Castillo, D.I.; Reynel-Ávila, H.E.; Adsorption Processes for Water Treatment and Purication. Springer International Publishing AG 2017, ISBN 978-3-319-58136-1 (eBook).
- Reza, A.; Abedin, M.Z. Application of Bioadsorbents for the Wastewater Treatment of a Composite Knit Industry. Journal of the Environment, 2011, 8(1), 19-26. Reza, A.; Abedin, M.Z. Application of Bioadsorbents for the Wastewater Treatment of a Composite Knit Industry. Journal of the Environment, 2011, 8(1), 19-26.
- Aamir, M., and Ahmad, Z. 2016. “Review of literature on local scour under plane turbulent wall jets.” Phys. Fluids. , 28 10, 105–102
- Blazejewski, R., Pilarczyk, K. W., & Przedwojski, B. (1995), River training techniques: fundamentals, design and applications. CRC Press.
- Cui, Y., Booth, D. B., Monschke, J., Gentzler, S., Roadifer, J., Greimann, B., & Cluer, B. (2017). Analyses of the erosion of fine sediment deposit for a large dam-removal project: an empirical approach. International Journal of River Basin Management, 15(1), 103-114.
- Hamada, Y. M. (2017). Effects of Dams and Barrages on River Channels. In The Grand Ethiopian Renaissance Dam, Its Impact on Egyptian Agriculture and the Potential for Alleviating Water Scarcity (pp. 59-75). Springer, Cham.
- Hamdy Elsayed, Esam Helal, Moustafa El-Enany & Mohamed Sobeih (2021) Impacts of multi-gate regulator operation schemes on local scour downstream, ISH Journal of Hydraulic Engineering, 27:1, 51-64,
- Hammerling, M. (2019). SELECTION OF THE OPTIMAL TYPE OF FISH PASS USING THE REMBRANDT METHOD. Acta Scientiarum Polonorum. Formatio Circumiectus, 18(1), 51-61.
- Hammerling, M., Walczak, N., Nowak, A., Mazur, R., Chmist, J. (2019). Modelling Velocity Distributions and River Bed Changes Using Computer Code SSIIM below Sills Stabilizing the Riverbed. Polish Journal of Environmental Studies, 28(3), 1165-1179.
- Zheng, S., Xu, Y. J., Cheng, H., Wang, B., Xu, W., & Wu, S. (2018). Riverbed erosion of the final 565 kilometers of the Yangtze River (Changjiang) following construction of the Three Gorges Dam. Scientific reports, 8(1), 1-11.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Pressure of agrosystems on the environment and climate**	
Name of the course in Polish: **Presja agroekosystemów na środowisko i klimat**	
Unit providing the course (Department): **Department of Ecology and Environmental Protection**	
Course leader: **Dr hab. Inż. Jerzy Mirosław Kupiec**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
- Practical classes	**4**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
The aim is to learn about changes and trends in agriculture as well as environmental and climate threats posed by modern agriculture. Ability to use selected methods limiting the negative impact of agriculture on the environment

TEACHING METHODS:
Educational methods are based on lectures with multimedia presentations and field exercises supported by appropriate documentation, data and help in the form of technological solutions and know-how

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning detailed issues related to the development of new forms of agriculture along with the resulting implications for practice - the latest theories and trends the field of shaping agricultural production space, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - apply knowledge in the process of creative formulation of their research problems	P8U_U_2 P8U_U_1
In the area of social competences (PhD students are capable to): - initiate actions for the public good - maintain and promote the importance and role of the intellectual community in social life	P8U_K_3 P8U_K_5

Methods of evaluation of outcomes achievement:

The test of knowledge concerning practical and theoretical aspects of new trends and threats in agriculture

TEACHING CONTENT:
Development of agriculture in the world and its features – typology; Regionalization and development of agriculture in various climatic zones; New trends and the threats of modern agriculture to the climate, nature and environment; Possibilities and examples of practical solutions for water protection in rural areas; New tools for the development of rural space and a vision of future agriculture

The course completion criteria and methods:	Percent of a final grade:
Participation in lectures and active work and discussion in practical classes	50%
The test of knowledge	50%

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

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RECOMMENDED LITERATURE:

- Kostrowicki J., Tyszkiewicz W. 1970. Agricultural typology. Selected methodological materials. International Geographical Union Commission on Agricultural Typology. Instytut Geografii PAN. 1. 73.
- Głębocki B., Kacprzak E. Kossowski T.M. 2019. Multicriterion Typology of Agriculture: A Spatial Dependence Approach. Quaestiones Geographicae 38(2):29-49.
- Fischer G., Nachtergaele F.O., Prieler S., Teixeira E., Tóth G., Velthuizen H., Verelst L., Wiberg D. 2012. Global Agro-ecological Zones (GAEZ v3.0). Model Documentation. IIASA, FAO UN.
- FAO, 2017. The future of food and agriculture. Trends and challenges. Rome.
- FAOSTAT, 2021. “Food and agriculture data”, http://www.fao.org/faostat/en/ (accessed September 2021) for livestock units, gross value of production and agricultural production index.
- OECD, 2021. Agri-environmental indicators database, http://www.oecd.org/agriculture/topics/agriculture-and-the-environment/ (accessed April 2021) for all other indicators.
- Dent D., Boincean B. 2021. Regenerative Agriculture: What's Missing? What Do We Still Need to Know? Springer, 374.
- Kadry S., Sharma V, Dhanaraj R.K., Jhaveri R.H., Vendhan G. 2024. Agri 4.0 and the Future of Cyber-Physical Agricultural Systems. Elsevier Science Publishing Co Inc. 330.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Biophysics in environmental engineering**	
Name of the course in Polish: **Biofizyka w inżynierii środowiska**	
Unit providing the course (Department): **Department of Ecology and Environmental Protection**	
Course leader: **prof. UPP dr hab. Anshu Rastogi**	
Discipline: **Environmental engineering, mining and power engineering**	Semester: **8**

TYPE OF CLASSES:
(course load)

- Lectures	**7**
- Practical classes	**5**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
Building the understanding of biophysics and its potential application in environmental engineering. Ability to use the biophysical tools for environmental research.

TEACHING METHODS:
Lecture and laboratory practice, introduction to some scientific measuring equipment and discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to biophysics along with the resulting implications for practice - the latest theories and trends biophysics, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - initiate actions for the public good - promote appropriate models of team work	P8U_K_3 P8U_K_4

Methods of evaluation of outcomes achievement:

The test of knowledge concerning theoretical and practical aspects of Biophysics in environmental engineering

TEACHING CONTENT:
Introduction to environmental biophysics; Movement of mass and energy between living organisms and their environment; Principals of energy exchange, conservation of energy and mass; Radiations, photosynthesis and its measurements

The course completion criteria and methods:	Percent of a final grade:
Participation in lectures and active work and discussion in practical classes	50%
The test of knowledge	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

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RECOMMENDED LITERATURE:

- An Introduction to Environmental Biophysics, eds: Gaylon S. CampbellJohn M. Norman. springer
- Chlorophyll Fluorescence Understanding Crop, eds: Mohamed H. Kalaji, Vasilij N. Goltsev, Krystyna Żuk-Golaszewska, Marek Zivcak, Marian Brestic. CRC press.
- Biophysics: Searching for Principles, William Bialek, Princeton U. Press

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Model organisms in biological sciences**	
Name of the course in Polish: **Organizmy modelowe w badaniach biologicznych**	
Unit providing the course (Department): **Department of Zoology**	
Course leader: **Prof. dr hab. Joanna Śliwowska**	
Discipline: **Biological Sciences**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**9**
- Seminars	**3**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to present the current knowledge on the use of various prokaryotic and eukaryotic models in biological research, with particular emphasis on microbiological, physiological and genetic studies.

TEACHING METHODS:

Lectures with multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation, -world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice	P8U_W1 P8U_W2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems, - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools, - independently plan and realise their scientific development, as well as inspire and/or organise the development of others, - give classes and lectures and verify taught content. - apply knowledge in the process of creative formulation of their research problems,	P8U_U1 P8U_U2 P8U_U4
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature, - creatively solve challenges in the professional and public life, considering their ethical aspects,	P8U_K1 P8U_K4 P8U_K5

Methods of evaluation of outcomes achievement:

Assessment of discussion skills at seminars
Assessment of the presentation

TEACHING CONTENT:

The importance of model organisms in biological sciences. Advantages and disadvantages of selected models. Viruses as models in molecular biology and biotechnology. Yeasts as models in genetic and biochemical research. Plant biological models. Invertebrate animals and vertebrates and their importance as model organisms in genetics, physiology, immunology, ecology and biomedical research.

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The course completion criteria and methods: Assessment of the presentation (50%) Test the material from lectures (50%) □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	Percent of a final grade: 100 %

RECOMMENDED LITERATURE:

Selected articles from Pubmed database, e.g. :
Chowdhury S, Saikia SK Use of Zebrafish as a Model Organism to Study Oxidative Stress: A Review. Zebrafish. 2022 Oct;19(5):165-176. doi: 10.1089/zeb.2021.0083
Guy B, Zhang JS, Duncan LH, Johnston RJ Jr. Human neural organoids: Models for developmental neurobiology and disease. Dev Biol. 2021 Oct;478:102-121. doi: 10.1016/j.ydbio.2021.06.012
Oblak AL et al., Model organism development and evaluation for late-onset Alzheimer's disease: MODEL-AD. Alzheimers Dement (N Y). 2020 Nov 23;6(1):e12110. doi: 10.1002/trc2.12110.
Leng G, MacGregor DJ. Models in neuroendocrinology. Math Biosci. 2018 Nov;305:29-41. doi:10.1016/j.mbs.2018.07.008.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Creating a modern research workshop - tools and organization of research**	
Name of the course in Polish: **Kreowanie nowoczesnego warsztatu badawczego – narzędzia i organizacja badań**	
Unit providing the course (Department): **Department of Food Technology of Plant Origin**	
Course leader: **prof. UPP dr hab. Dominik Kmiecik**	
Discipline: **Biological Science**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to acquire knowledge and skills in the use of modern tools in research work, time and project management, fundamentals of data visualization, and managing and creating a scientist's portfolio in databases.

TEACHING METHODS:

Lectures with a multimedia presentation, instructional videos, practical exercises.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): O1 The graduate knows and understands the need to create scientific networks in order to expand knowledge and develop new research fields. O2 The graduate knows and understands the need to use modern tools for a researcher to better visualize the obtained results and organize literature databases and acquire new knowledge in the field of research discipline.	P8U W1 P8U W2
In the area of skills (PhD students know how to): O3 Graduates are able to manage their own time and use it effectively. O4 The graduate is able to plan research tasks in time and work according to the planned schedule. O5 The graduate is able to use modern scientific tools to organize scientific work.	P8U U1 P8U U3 P8U U4
In the area of social competences (PhD students are capable to): O6 The graduate is ready to create his own scientific portfolio and collaborate with other scientists as well as promote his own scientific achievements. O7 The graduate is ready to create research networks at the national and international level.	P8U K1 P8U K5

Methods of evaluation of outcomes achievement:

Protocol of the completed partial tasks. Verification of scientific profiles in databases. Preparation of presentations and data visualisation.

TEACHING CONTENT:

Basics of time management and scientific projects.
Using modern tools for literature management (literature managers).
Creating an active portfolio on scientific websites (ORCID, ResearchGate).
Fundamentals of research data visualization.
Principles of content presentation.
Use of cloud-based tools - content co-creation, research collaboration, security and sharing of research data.

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The course completion criteria and methods:	Percent of a final grade:
Protocol of the completed partial tasks. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Lepsze wizualizacje danych. Jonathan Schwabish. PWN 2024
Mendeley.com
https://www.researchgate.net/
https://orcid.org/
https://desktop-download.mendeley.com/download/Getting_Started_Guide.pdf
Guide to Building a Research Profile, Shinton consulting, 2013
Time Management, Sue W. Chapman, Michael Rupured, The University of Georgia, 2008.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Disciplinary Seminar**	
Name of the course in Polish: **Seminarium dyscypilnowe**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **prof. dr hab. Izabela Szczerbal** Co-teachers: **prof. UPP dr hab. Paweł Kołodziejski** **prof. dr hab. Joanna Nowacka-Woszuk**	
Discipline: **Biological sciences**	Semester: **II- VIII**

TYPE OF CLASSES:
(course load)

- Practical classes	**24**
Total numer of hours:	**24**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with current trends and problems related to biological sciences discipline along with the implications for practice, teach creative and critical thinking, presentation of scientific results and discussion, write reports, thesis and scientific articles, teach the rules of teamwork and ethical values in science.

TEACHING METHODS:

practical workshops, journal club – multimedia presentations with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning biological sciences - the latest theories and trends in biological sciences disciplines - knows the legal and ethical aspects of conducting scientific research	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems - solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools - plan and realise scientific development - give classes and lectures and verify taught content	P8U_U_1 P8U_U_2 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): - plan research and broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects - promote appropriate models of team work	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Preparation of projects and presentations and evaluation of activity in classes.

TEACHING CONTENT:

Current trends in biological sciences – critical reading and discussion.
Rules of writing a doctoral thesis in biological sciences discipline.
Code of ethics for researchers.

The course completion criteria and methods:	Percent of a final grade:
Passing projects and presentations. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

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RECOMMENDED LITERATURE:

PubMed https://pubmed.ncbi.nlm.nih.gov/
Code Of Ethics For Research Workers
https://wwz.up.poznan.pl/sites/default/files/WMWNZ/ETYKA/Code_of_Ethics_for_Research_Workers.pdf
https://wwz.up.poznan.pl/sites/default/files/WMWNZ/ETYKA/Kodeks_Etyki_Pracownika_Naukowego_Wydanie_III.pdf

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Methodological aspects of the use of laboratory animals in in vivo and in vitro scientific research**	
Name of the course in Polish: **Metodyczne aspekty wykorzystywania zwierząt laboratoryjnych w badaniach naukowych in vivo i in vitro.**	
Unit providing the course (Department): **Department of Animal Physiology, Biochemistry and Biostructure**	
Course leader: **Prof. UPP dr hab. Katarzyna Szkudelska**	
Discipline: **Biological Sciences**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**6**
Total number of hours:	**18**

OBJECTIVE OF THE COURSE:

Presentation of the current knowledge on the methodological approach of the use of laboratory animals in scientific research.

TEACHING METHODS:

lectures, practical workshops, journal club – multimedia presentation with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning the use of laboratory animals in scientific research and implications for practice; - the latest methods and trends in research involving animals, thus facilitating the creation of original approach, new concepts and their scientific interpretation.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems; - innovatively solve research tasks using independently gained knowledge concerning methodological aspects of the use of laboratory animals in scientific research.	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature; - promote appropriate models of teamwork.	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Exam (lectures)
Activity during workshop and discussions

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

- purposes, types of studies, and principles of planning experiments using laboratory animals;
- advantages and disadvantages of experiments on laboratory animals;
- characteristics of in vitro methods developed on the basis of cells and tissues of laboratory animals;
- work with scientific literature related to the subject - presentation of a selected article and discussion;
- workshop – examples of the use of animals in scientific research.

The course completion criteria and methods:	Percent of a final grade:
Activity during workshops and discussions.	50%
Exam (the material covers content presented in lectures and during workshops)	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

"*The laboratory mouse*." Elsevier Academic Press, 2004.

Hubrecht R., Kirkwood J.: "*The UFAW Handbook of the Care and Management of Laboratory and other Research Animals"*. eight edition, Wiley-Blackwell, 2010

"*Best practice methodology in the use of animals for scientific purposes*." National Health and Medical Research Council (NHMRC) 2017, Australian Government

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **The Law and Ethics in Animal Research**	
Name of the course in Polish: **Prawo i etyka w badaniach na zwierzętach**	
Unit providing the course (Department): **Department of Animal Physiology, Biochemistry and Biostructure**	
Course leader: **dr hab. Ewa Pruszyńska-Oszmałek**	
Discipline: **Biological Sciences**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The main objective of the course is to familiarize students with the principles of conducting experiments on animals, including the rules for granting permits for conducting experiments on live vertebrates. In addition, to learn all the issues related to the bioethics of conducting experiments, the 3R principles and other rules.

TEACHING METHODS:

Theoretical lectures, practical, laboratory classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -global scientific achievements on specific issues related to a given scientific discipline and the resulting implications for practice -the latest theories and trends in the field of scientific disciplines in which education was carried out at the doctoral school, which will allow the creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills PhD students know how to): -use knowledge to formulate their own research problems creatively -solve research tasks innovatively, using independently acquired knowledge of the latest research methods and tools - independently plan and realise their scientific development, as well as inspire and/or organise the development of others,	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): -ndependent research planning and independent expansion of existing scientific achievements -creatively taking up challenges in the professional and public spheres, taking into account their ethical dimension -shaping patterns of proper conduct in teamwork	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of activity during laboratory classes and the presentation. Providing exam.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

• Legal regulations (Polish and European) – acts and regulations on animal experiments and animal rights (KKE, LKE, institutions and persons authorized to work with animals).
• Ethics in animal experiments (arguments for and against using animals for scientific or educational purposes. Ethical principles of animal treatment).
• Classification of the severity of experiments conducted using animals.
• Characteristics of laboratory animal species, animal models and the use of other animal species (including farm animals) for research, including: i) conditions for running animal facilities and/or breeding animals intended for use or used in procedures, taking into account the biology of the species and genetics; ii) standards for keeping these animals (environment, cages, feed) and enriching their environment; iii) recognizing signs of distress, pain and suffering specific to individual animal species.
• Basic procedures performed on animals, anesthesia and analgesia, the effect of anesthetics on the outcome of the experiment.
• Euthanasia – humane methods of killing recommended by the KKE, use of early and humane termination of the procedure.
• Alternative methods
• Genetic manipulations carried out on animals, legal regulations.
• Principles of functioning of the animal facility, feeding and keeping two species of laboratory animals – laboratory mice and laboratory rats (safety and hygiene rules for work with animals intended for use or used in procedures).
• Methods of handling laboratory animals: daily care of animals, capturing and moving laboratory animals, measuring, weighing and blood collection, basic types of animal behavior – using presentations and animal models.
• Methods of pain relief.
• Methods of monitoring the health of animals.
• Basics of anatomy and physiology of laboratory animals
• Ethical aspects of conducting experiments using laboratory animals

The course completion criteria and methods:	Percent of a final grade:
Final exam	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Patrick E. Sharp, Marie C. La Regina “The Laboratory Rat” CRC Press LLC 1998

Kaliste, E. (Ed.). (2004). *The welfare of laboratory animals* (Vol. 2). Springer Science & Business Media.

Animal research in the European Union (EU) is regulated under Directive 2010/63/EU on the protection of animals used for scientific purposes.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Protein research methods**	
Name of the course in Polish: **Metody badania białek**	
Unit providing the course (Department): **Department of Animal Physiology, Biochemistry and Biostructure**	
Course leader: **Dr hab. inż.Tatiana Wojciechowicz**	
Discipline: **Biological Sciences**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with the principles of planning experimental research and the selection of research methods in relation to proteins.

TEACHING METHODS:

Theoretical lectures, practical laboratory classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -global scientific achievements on specific issues related to a given scientific discipline and the resulting implications for practice -the latest theories and trends in the field of scientific disciplines in which education was carried out at the doctoral school, which will allow the creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): -use knowledge to formulate their own research problems creatively -solve research tasks innovatively, using independently acquired knowledge of the latest research methods and tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): -independent research planning and independent expansion of existing scientific achievements -creatively taking up challenges in the professional and public spheres, taking into account their ethical dimension -shaping patterns of proper conduct in teamwork	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of activity during laboratory classes and the presentation.

TEACHING CONTENT:

Methods for protein detection and analysis, e.g. protein measurement methods, Western Blot, immunocytochemical and immunohistochemical staining, immunofluorescence staining. Application of fluorescence confocal microscopy in protein analysis.

The course completion criteria and methods:	Percent of a final grade:
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Protein Blotting and Detection: Methods and Protocols. Methods in Molecular Biology. Biji T., Kurien R., Scofield H. Humana Press 2009

Kalyuzhny AE. Handbook of Elispot. Humana Press 2005

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Microscopic techniques in biological studies

Name of the course in Polish:
Techniki mikroskopowe w naukach biologicznych

Unit providing the course (Department):
Department of Genetics and Animal Breeding, Department of Histology and Embryology

Course leader:
dr hab. inż. Zofia E. Madeja, Department of Genetics and Animal Breeding
Collaborator:
dr Kinga Skieresz-Szewczyk, Department of Histology and Embryology

Discipline:	Semester:
Biological Sciences	**IV**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Practical classes	**7**
Total number of hours:	**12**

OBJECTIVE OF THE COURSE:

Understanding the basics of optics and fluorescent image detection, which includes the properties of fluorophores, the principles of fluorescent signal excitation, emission, and detection (laser scanning microscopy, LSM).
The basic course of electron microscopy, the background information about the methods used in the field of tissue preparation for scanning (SEM) and transmission (TEM) electron microscopy, and electronograms interpretation.

TEACHING METHODS:

Multimedia presentations, laboratory work dedicated to microscopic slide preparation, image acquisition and analysis, and microscopic work (confocal).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - how to find literature related to microscopic imaging, - what sort of information or data may be gathered from microscopic observations - understand the principles of modern microscopy – including LSM, super-resolution imaging (SR) and electron microscopy (TEM and SEM), - the latest trends in microscopy that would allow to create original research concepts and implement interpretation of scientific data. - has knowledge of advantages and limitations of each technique	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of the research problem, that include preparing of biological specimens for microscopic observations - apply different staining methods depending on the biological material - being able to plan an experiment (solving research tasks)	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competences (PhD students are capable to): - proper data interpretation, including critical thinking - independent planning of research and broadening the existing knowledge (that includes reading scientific literature) - creative solving of challenges in professional and public life, considering their ethical aspect	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Evaluation and analysis of chosen microscopic images.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Lecture 1 – principles of confocal microscopy: introduction to optics (properties of light, reflection, refraction, beam splitting, optical resolution, principles of fluorescence (excitation and emission spectra), image resolution and limitations of each method

Lecture 2 – principles of electron microscope, overview of the preparation steps of biological material for SEM and TEM microscopy

Practical classes 1 - making of microscopic slides dedicated to LSM/SR confocal, image acquisition (LSM confocal microscope), principles of image acquisition, data interpretation, and analytical methods (software for image analysis)

Practical classes 2 – practical preparation of tissue samples for SEM and TEM, image acquisition, and microscopic analysis.

The course completion criteria and methods:	Percent of a final grade:
Activities during classes.	40%
Project related to image analysis.	60%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Mahbubul H. Shihan, Samuel G. Novo, Sylvain J. Le Marchand, Yan Wang, Melinda K. Duncan. A simple method for quantitating confocal fluorescent images. Biochemistry and Biophysics Reports, Volume 25, 2021,100916. doi.org/10.1016/j.bbrep.2021.100916.
2. Elliott AD. Confocal Microscopy: Principles and Modern Practices. Curr Protoc Cytom. 2020, 92(1):e68. doi: 10.1002/cpcy.68.
3. Hayat, M.A. Eric. Basic techniques for transmission electron microscopy. Elsevier, 2012.
4. Goldstein, J. I., Newbury, D. E., Michael, J. R., Ritchie, N. W., Scott, J. H. J., & Joy, D. C. Scanning electron microscopy and X-ray microanalysis. Springer, 2017.
5. Pubmed and Google Schoolar

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Genome and epigenome analysis**	
Name of the course in Polish: **Analiza genomu i epigenomu**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **prof. dr hab. Joanna Nowacka-Woszuk**	
Discipline: **Biological Sciences**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with the principles of planning experimental research and the selection of research methods (e.g. DNA Sanger sequencing, droplet-digital PCR, DNA methylation analysis by pyrosequencing) in relation to nucleic acids.

TEACHING METHODS:

Theoretical lectures and practical laboratory classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice	P8U_W_1
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems	P8U_U_1
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - promote appropriate models of team work	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of activity during laboratory classes. Assessment of discussion skills during laboratory classes.

TEACHING CONTENT:

Methods used in molecular biology, molecular genetics and genetic engineering (e.g. Sanger sequencing, pyrosequencing, NGS, DNA methylation assay, droplet-digital PCR, CRISPR / Cas9).

The course completion criteria and methods:	Percent of a final grade:
Final test □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Ralph Rapley. The Nucleic Acid Protocols Handbook. Springer Protocols Handbooks (2000).

Yonglun Luo. CRISPR Gene Editing. Humana New York, NY (2019).

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Transcriptomic data analysis**	
Name of the course in Polish: **Metody badań transkryptomicznych**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **dr hab. Monika Dragan**	
Discipline: **Biological Sciences**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with the principles of planning experimental research and the selection of research methods (e.g. RNA isolation, reverse transcription, real-time PCR, RNA-seq) in relation to nucleic acids.

TEACHING METHODS:

Theoretical lectures and practical laboratory classes.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice	P8U_W_1
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems	P8U_U_1
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - promote appropriate models of team work	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Assessment of activity during laboratory classes. Assessment of discussion skills during laboratory classes.

TEACHING CONTENT:

Methods used in molecular biology, molecular genetics (e.g. RNA isolation and quality control, reverse transcription, real-time PCR and relative gene expression data analysis, RNA-seq data interpretation).

The course completion criteria and methods:	Percent of a final grade:
Final test □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Ralph Rapley. The Nucleic Acid Protocols Handbook. Springer Protocols Handbooks (2000).

Yejun Wang and Ming-an Sun. Transcriptome Data Analysis Methods and Protocols, Springer (2018).

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Selected aspects of ecology**	
Name of the course in Polish: **Wybrane aspekty ekologii**	
Unit providing the course (Department): **Department of Zoology**	
Course leader: **Professor Piotr Tryjanowski**	
Discipline: **Biological Sciences**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

This course aims to familiarize Ph.D. students with the main ecological issues, including: population ecology, differences between individuals, interaction with habitat.

TEACHING METHODS:

Classes, partly outdoors, to broaden students' understanding and practical experience of ecological assessment, especially interactions between organisms on different trophic levels; case study: amphibians and birds.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - methods of biodiversity assessment - scientific literature on the global issues in environmental conservation - knowledge of monitoring and assessing changes in the environment	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (PhD students know how to): - contextualise and describe nature-based solutions and ecosystem services to technical and non-technical audiences - utilizing specialized literature and theoretical knowledge to conduct experiments in nature - innovatively solve research tasks using independently gained knowledge concerning state of the art methods and research tools in environmental conservation	P8U_U_3 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature in the field of biodiversity - creatively solve challenges in the professional and public life, considering their environmental aspects	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Active participation, practical assignments to help internalise the material, final report.

TEACHING CONTENT:

Place of an individual in ecology population, trophic niches, predation, novel habitats

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Final report. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Brower, J. E., Zar, J. H., & Von Ende, C. N. (1998). *Field and laboratory methods for general ecology*. Boston: WCB McGraw-Hill.

Karban, R., Huntzinger, M., & Pearse, I. S. (2023). *How to do ecology: a concise handbook*. Princeton University Press.

Scheiner, S. M., & Willig, M. R. (2008). A general theory of ecology. *Theoretical ecology*, *1*, 21-28.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Selected aspects of environmental conservation**	
Name of the course in Polish: **Wybrane aspekty ochrony środowiska**	
Unit providing the course (Department): **Department of Zoology**	
Course leader: **Janusz Kloskowski, Associate Professor**	
Discipline: **Biological Sciences**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

This course aims to familiarize Ph.D. students with the main environmental issues, including: environmental pollution, biodiversity loss, climate change and species protection.

TEACHING METHODS:

Classes, partly outdoors, to broaden students' understanding and practical experience of biodiversity assessment, nature-based solutions and ecosystem services; case study: birds in urban environments.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - methods of biodiversity assessment - scientific literature on the global issues in environmental conservation - knowledge of monitoring and assessing changes in the environment	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (PhD students know how to): - contextualise and describe nature-based solutions and ecosystem services to technical and non-technical audiences - utilizing specialized literature and theoretical knowledge to conduct experiments in nature - innovatively solve research tasks using independently gained knowledge concerning state of the art methods and research tools in environmental conservation	P8U_U_3 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature in the field of biodiversity - creatively solve challenges in the professional and public life, considering their environmental aspects	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Active participation, practical assignments to help internalise the material, final report.

TEACHING CONTENT:

Biodiversity loss, biological aspects of conservation, climate change, sustainable development, ecosystem services, ecosystem restoration, ecological engineering.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:			Percent of a final grade:
Final report.			100%
□ pass (Z)	□ **course credit with a grade**	☒ examination	

RECOMMENDED LITERATURE:

Aronoff, J. B. *Handbook of nature conservation: global, environmental and economic issues*. Nova Science Publishers, 2009.

Hansson L. (ed.): *Ecological Principles of Nature Conservation*. Elsevier Applied Science, London & New York, 1992.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Biostatistics and bioinformatics in data analysis**	
Name of the course in Polish: **Biostatystyka i bioinformatyka w analizie danych**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **dr hab. Ewa Sell-Kubiak**	
Discipline: **Biological Sciences**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with the principles of planning and the selection of analytical methods, when analyzing the outcomes of experiments in biological sciences.

TEACHING METHODS:

Practical classes in the computer room with the use of statistical package R and freely available databases.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation.	(P8U_W) W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems, - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools, - independently plan and realise their scientific development, as well as inspire and/or organise the development of others.	(P8U_U) U_1 U_2 U_4
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature, - creatively solve challenges in the professional and public life, considering their ethical aspects.	(P8U_K) K_1 K_2

Methods of evaluation of outcomes achievement:

Active participation, presence and overall performance during classes. Final report.

TEACHING CONTENT:

Biostatistics and bioinformatics methods used in analyzes of experimental outcomes in biological sciences.

The course completion criteria and methods:	Percent of a final grade:
Final report. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Quick M. John, Statistical Analysis with R, Packt Publishing, 2010

Maclean Dan, R Bioinformatics Cookbook: Use R and Bioconductor to perform RNAseq, genomics, data visualization, and bioinformatic analysis, Packt Publishing, 2019

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Statistical methods in environmental biology**	
Name of the course in Polish: **Metody statystyczne w badaniach środowiskowych**	
Unit providing the course (Department): **Department of Zoology**	
Course leader: **dr Łukasz Dylewski**	
Discipline: **Biological Science**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

This course aims to familiarize Ph.D. students with advanced analytical methods used to analyze environmental biology data.

TEACHING METHODS:

Practical classes in the computer room with the use of statistical package R and freely available databases.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - how to use statistical methods in biology in-depth - world scientific literature concerning statistical analyses - possess knowledge of forecasting statistics (modeling) natural phenomena and processes, as well as specialized R skills	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (PhD students know how to): - uses advanced statistical methods in the interpretation of research results and natural observations - utilizing specialized literature and theoretical knowledge to conduct experiments in nature - innovatively solve research tasks using independently gained knowledge concerning state of the art methods and research tools	P8U_U_2 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): - maintain and promote the importance and role of the intellectual community in social life - independently plan research and independently broaden the existing body of scientific literature,	P8U_K_1 P8U_K_2 P8U_K_3 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

During classes, active participation, presence, and overall performance are expected. Final report.

TEACHING CONTENT:

Statistical methods used in the modeling and forecasting of data from environmental biology.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Final report. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Zuur AF, Ieno EN, Walker NJ, Saveliev AA, Smith GM Mixed effects models and extensions in ecology with R. New York, Springer., 2009.

Brunsdon C, Comber L. An introduction to R for spatial analysis and mapping. Sage, 2014.

Borcard D, Gillet F, Legendre P. Numerical ecology with R. New York, Springer, 2011.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Financing research and conducting scientific projects**	
Name of the course in Polish: **Finansowanie badań i prowadzenie projektów naukowych**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **prof. dr hab. Izabela Szczerbal**	
Discipline: **Biological sciences**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with principles of planning and financing scientific research and project implementation as well as aspects concerning intellectual property.

TEACHING METHODS:

Lecture, practical workshops - multimedia presentations with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - principles of planning and financing of research and evaluation of projects in biological discipline - aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity	P8U_W_3 P8U_W_4
In the area of skills (PhD students know how to): - transfer research results to the economic sphere - independently plan and realise their scientific development, as well as inspire and organise the development of others	P8U_U_3 P8U_U_4
In the area of social competences (PhD students are capable to): - creatively solve challenges in the professional and public life, considering their ethical aspects - initiate actions for the public good - maintain and promote the importance and role of the intellectual community in social life	P8U_K_2 P8U_K_3 P8U_K_5

Methods of evaluation of outcomes achievement:

Preparation of projects and presentations and evaluation of activity in classes.

TEACHING CONTENT:

Principles of writing a successful grant proposal.
Introduction into National Science Centre (NCN) and other agencies programs (calls).
Knowledge transfer from research to industry and society.
Intellectual property rights.

The course completion criteria and methods:	Percent of a final grade:
Passing projects and presentations. □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

PubMed https://pubmed.ncbi.nlm.nih.gov/
NCN https://www.ncn.gov.pl/en
Centrum Innowacji i Transferu Technologii na Uniwersytecie Przyrodniczym w Poznaniu
https://ciitt.up.poznan.pl/aktualnosci/publikacje

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Global importance of forests and forestry**	
Name of the course in Polish: **Globalne znacznie lasów i leśnictwa**	
Unit providing the course (Department): **Department of Forest Utilisation/Department of Botany and Forest Habitats**	
Course leader: **Prof. Dr. Piotr S.Mederski**	
Discipline: **Forestry**	Semester: **Year 1, semestr 2**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:
The objective of the course is to provide knowledge about importance of forests in global context with forestry in Europe and in Poland

TEACHING METHODS:
Lectures with supplementary materials including presentations and films with elements of discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific achievements on issues related to global importance of forests and forestry; - the latest theories and trends in the field of forest resources and their utilisation.	P8U_W
In the area of skills (PhD students know how to): - use their knowledge to creatively discussion on forestry - use their knowledge to solve research problems.	P8U_U
In the area of social competences (PhD students are capable to): - graduates are capable to be leaders of public debate on forest and forestry	P8U_K

Methods of evaluation of outcomes achievement:

Oral exam with test

TEACHING CONTENT:

A comparison of forest resources and their utilisation around the World (1h)
Forest-based sector in sustainable development (1h)
Forest aspects of soil protection strategy in EU (2h)
Forest impact on protection of climate and water resources (6h)
Reducing soil erosion (2h)

The course completion criteria and methods:	**Percent of a final grade:**
Oral exam	50%
Test	50%

□ pass (Z) **□ course credit with a grade** **☒ examination**

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

The State of the World's Forests, 2020. FAO/UN;
https://wedocs.unep.org/bitstream/handle/20.500.11822/32473/WF20BEN.pdf?sequence=1
The European Green Deal;
https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
Soil strategy for 2030; https://environment.ec.europa.eu/topics/soil-and-land/soil-strategy_en
Water Framework Directive; https://environment.ec.europa.eu/topics/water/water-framework-directive_en
Biodiversity strategy for 2030; https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Economic importance of forests, forestry and timber industry**	
Name of the course in Polish: **Ekonomiczne znaczenie lasów, leśnictwa i drzewnictwa**	
Unit providing the course (Department): **Department of Economics and Forest Technology**	
Course leader: **Prof. dr hab. Krzysztof Adamowicz**	
Discipline: **Forestry**	Semester:

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The subject aims to present the world's scientific achievements on issues related to the place of forest natural resources in economic sciences. Learning about the mutual interactions of economic and natural mechanisms. Graduates acquire competences in the field of economic effects of human impact on the natural environment. The acquired knowledge will contribute to the practical use of the methods learned to evaluate business activities in forestry and the wood industry.

TEACHING METHODS:

1. Multimedia presentations
2. Discussion related to the lecture

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The latest theories and trends in economics for analyzing and solving problems in the forestry and timber industry.	P8U_W
In the area of skills (PhD students know how to): - Define and apply extended economic knowledge in the process of formulating their own research problems	P8U_U
In the area of social competences (PhD students are capable to): - Develop your awareness of critical evaluation of your knowledge and received content regarding economic issues and independently expand existing scientific achievements.	P8U_K

Methods of evaluation of outcomes achievement:

Individual report from lectures.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

1. Non-profit monopoly in the context of implementing economic tasks in forestry and woodworking.
2. Modern indicator analysis as a tool for assessing the activities of forest management and the wood industry.
3. Review and evaluation of modern methods of evaluating forest functions.
4. A contemporary view of the interaction between economic and natural factors in forest management.

The course completion criteria and methods:	Percent of a final grade:
Lectures - Individual report ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Lectures – 100%

RECOMMENDED LITERATURE:

1. Adamowicz, K. (2018). A review of selected methods to determine the economic value of forest: Polish research. New Perspectives in Forest Science.
2. Aggestam, F., Konczal, A., Sotirov, M., Wallin, I., Paillet, Y., Spinelli, R., ... & Winkel, G. (2020). Can nature conservation and wood production be reconciled in managed forests? A review of driving factors for integrated forest management in Europe. Journal of Environmental management, 268, 110670.
3. Aszalós, R., Thom, D., Aakala, T., Angelstam, P., Brūmelis, G., Gálhidy, L., ... & Keeton, W. S. (2022). Natural disturbance regimes as a guide for sustainable forest management in Europe. Ecological Applications, 32(5), e2596.
4. Austin, K. G., Baker, J. S., Sohngen, B. L., Wade, C. M., Daigneault, A., Ohrel, S. B., ... & Bean, A. (2020). The economic costs of planting, preserving, and managing the world's forests to mitigate climate change. Nature communications, 11(1), 5946.
5. Bergstrom J.C., Randall A., 2010. Resource Economics. An Economicc Approach to Natural Resource and Environmental Policy. Edward Elgar, Cheltenham.
6. Bont, L. G., Fraefel, M., Frutig, F., Holm, S., Ginzler, C., & Fischer, C. (2022). Improving forest management by implementing best suitable timber harvesting methods. Journal of Environmental Management, 302, 114099.
7. Campbell, D. E. (2020). Environmental goods and services: economic and non-economic methods for valuing. In Terrestrial Ecosystems and Biodiversity (pp. 205-211). CRC Press.
8. Chakraborty, S., Saha, S. K., & Selim, S. A. (2020). Recreational services in tourism dominated coastal ecosystems: Bringing the non-economic values into focus. Journal of Outdoor Recreation and Tourism, 30, 100279.
9. Ćosović, M., Bugalho, M. N., Thom, D., & Borges, J. G. (2020). Stand structural characteristics are the most practical biodiversity indicators for forest management planning in Europe. Forests, 11(3), 343.
10. *Dróżdż, K. (2022). Dynamika rynku drzewnego w Polsce w latach 2000-2020. Academic Review of Business and Economics, 2, 1-19.*
11. Grebner, D. L., Bettinger, P., Siry, J. P., & Boston, K. (2021). Introduction to forestry and natural resources. Academic press.
12. Lovrić, M., Da Re, R., Vidale, E., Prokofieva, I., Wong, J., Pettenella, D., ... & Mavsar, R. (2020). Niedrzewne produkty leśne w Europie – przegląd ilościowy. Polityka leśna i ekonomia, 116, 102175.
13. Martynova, M., Sultanova, R., Khanov, D., Talipov, E., & Sazgutdinova, R. (2021). Forest management based on the principles of multifunctional forest use. Journal of Sustainable Forestry, 40(1), 32-46.
14. Neykov, N., Krišťáková, S., Hajdúchová, I., Sedliačiková, M., Antov, P., & Giertliová, B. (2021). Economic efficiency of forest enterprises—Empirical study based on data envelopment analysis. Forests, 12(4), 462.
15. Taye, F. A., Folkersen, M. V., Fleming, C. M., Buckwell, A., Mackey, B., Diwakar, K. C., ... & Saint Ange, C. (2021). Wartości ekonomiczne globalnych usług ekosystemów leśnych: metaanaliza. Ekonomia ekologiczna, 189, 107145.
16. Winpenny J.T., 1995. Wartość środowiska. Metody wyceny ekonomicznej. PWE, Warszawa.
17. Wolff, F. (2022). Tworzenie instrumentów polityki międzynarodowej: badanie przejścia w kierunku instrumentów ekonomicznych w międzynarodowym zarządzaniu różnorodnością biologiczną i usługami ekosystemowymi (rozprawa doktorska, rozprawa doktorska, Universität Freiburg, 2022).
18. Zhang, D., & Stenger, A. (2015). Value and valuation of forest ecosystem services. Journal of Environmental Economics and Policy, 4(2), 129-140.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **The role of forests in the preservation of biodiversity**	
Name of the course in Polish: **Rola lasów w zachowaniu różnorodności biologicznej**	
Unit providing the course (Department): **Department of Botany and Forest Habitats**	
Course leader: **prof. dr hab. Paweł Rutkowski**	
Discipline: **Forestry**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Global biodiversity protection requires global action. The aim of this course is to give a general understanding of the principles and trends in modern forestry based on environmental rules and prepare for challenging discussions on the global function of forests in nature conservation.

TEACHING METHODS:

Lectures with multimedia presentation, group discussions, consultations, guest experts

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): ● global scientific achievements on issues related to biodiversity conservation; ● the latest theories and trends in the field of impacts of climate change on forest biodiversity resources; ● principles of planning and financing of research and evaluation of projects related to biodiversity conservation.	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (PhD students know how to): ● use their knowledge to creatively discussion on forestry; ● use their knowledge to solve research problems related to biodiversity conservation; ● transfer research results on biodiversity conservation to the economic sphere; ● give classes and lectures and verify taught content related to biodiversity conservation	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_5
In the area of social competences (PhD students are capable to): ● graduates are capable to be leaders of public debate on forestry and biodiversity conservation	P8U_K_2, P8U_K_5

Methods of evaluation of outcomes achievement:

Participation in the discussion

TEACHING CONTENT:

a) The key factors affecting forest biodiversity (2 h)
b) Importance of fungi and lichens in forest ecosystems (2 h)
c) Biodiversity of forest plant species (2 h)
d) Why animals are key to restoring the world's forests? (2 h)
e) NATURA 2000: The backbone of nature conservation in the EU (4 h)

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The course completion criteria and methods:	Percent of a final grade:
Passing the course without a grade, based on:	
activity in class	80%
attendance in class	20%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- „Biodiversity and Conservation" (Springer)
- "Journal for Nature Conservation" (Elsevier)
- "Global Ecology and Conservation" (Elsevier)
- "Conservation Science and Practice" (Wiley)
- "Conservation" (MDPI)

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Sustainable forest management**	
Name of the course in Polish: **Zrównoważona gospodarka zasobami leśnymi**	
Unit providing the course (Department): Dept. of Forest Management Planning	
Course leader: **Prof. UPP dr hab. Cezary Beker**	
Discipline: **Forestry**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The main objective of the subject is to acquire theoretical knowledge on: (1) modeling the growth and structure of forest stands, (2) forest inventory methods, (3) forest management planning methods which are used in the process of formulating forest management plan as a main document regulating rules of sustainable, multi-functional and balanced forestry, (4) urban forestry and social functions of the forest.

TEACHING METHODS:

- Lecture with multimedia presentation.
- Case study.
- Discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - principles of developing, using and applying forest stand growth models - principles of forest inventory and forest management planning methods - concept of urban forestry - distinctiveness of management problems in contrast to forests of other forms of ownership - current legal provisions taking into account the management of forests with increased social function managed by the State Forests	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): - interpret current legal acts related to urban forests and forests with increased social function managed by the State Forests - compare the forest management issues between urban forests, forests with increased social function managed by the State Forests - independently plan and realise their scientific development, as well as inspire and/or organise the development of others	(P8U_U_1) (P8U_U_2) (P8U_U_4)
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - creatively solve challenges in the professional and public life, considering their ethical aspects - initiating activities for multifunctional and sustainable forest management	(P8U_K_1) (P8U_K_2) (P8U_K_3)

Methods of evaluation of outcomes achievement:

□ pass (Z) **□ course credit with a grade** **☒ examination**

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Basic terms and definitions. Historical outline and legal background. Modeling the growth and structure of forest stands. Methods of forest inventory. Calculation and estimation of main stands' attributes together with management directions for single stands. Analysis and prediction of forest condition and resources. Rules of forest management plan's preparation. Main cutting plan, plan of intermediate cutting products, forest conversion plan, silvicultural management plan, forest nature protection plan, recreation development plan. Urban forest management in a geographical context. The impact of urban forests on public health, mental well-being, and community resilience. Ensuring inclusive access to urban green spaces for all citizens.

The course completion criteria and methods:	Percent of a final grade:
- Exam/pass	100 %

RECOMMENDED LITERATURE:

1. Beker C.,.Andrzejewski T. 2013. Growth model of unthinned Scots pine stands. I. Local reference model Pinus Zielonka. Acta Sci. Pol. Silv. Colendar. Rat. Ind. Lignar, vol. 12, nr 3, pp. 5-13.
2. Beker C., Andrzejewski T. 2013. Growth model of unthinned Scots pine stands. II. Local site index model Pinus. Acta Sci. Pol. Silv. Colendar. Rat. Ind. Lignar, vol. 12, nr 3, pp. 15-23.
3. Beker C., Turski M., Kaźmierczak K., Najgrakowski T., Jaszczak R., Rączka G., Wajchman-Świtalska S. 2021. The Size of the Assimilatory Apparatus and Its Relationship with Selected Taxation and Increment Traits in Pine (Pinus sylvestris L.) Stands. Forests, 12 (11), 1502.
4. Konijnendijk, C. C. 2024. Rethinking Urban Green Spaces. Wielka Brytania: Edward Elgar Publishing Limited.
5. Konijnendijk, C.C., 2018. The Forest and the City: the cultural landscape of urban woodland. 2nd revised edition. New York etc., Springer.
6. Randrup, T.B., Konijnendijk, C.C., Dobbertin, M.K. 2005. The concept of urban forestry in Europe. Chapter 1. In: Konijnendijk et al. (Eds.), Urban Forests and Trees. New York etc., Springer.
7. Jaszczak, R., Wajchman, S. 2014. Problems of forest management in municipal forests of the city of Poznań. Civil and Environmental Engineering Reports 12 (1): 45-54.
8. Ważyński, B. 2011. Urządzanie i rekreacyjne zagospodarowanie lasu. Poradnik leśnika. PWRiL, Warszawa.
9. Miś R. Urządzanie lasów wielofunkcyjnych. Wydawnictwo AR, Poznań, 2003.
10. Glossary of Forestry Terms. http://www.dnr.state.md.us/forests/gloss.html

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Studies on selected properties of forest products using instrumental analysis**	
Name of the course in Polish: **Badania wybranych właściwości produktów leśnych z wykorzystaniem analizy instrumentalnej**	
Unit providing the course (Department): **Department of Chemistry**	
Course leader: **prof. dr hab. Izabela Ratajczak**	
Discipline: **Forestry**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Practical classes	**8**
- Self-study	**4**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Presentation of development of selected aspects of trees and mushroom studies. Presentation of analytical methods used in forestry and wood technology.

TEACHING METHODS:

Lectures and workshops on analytical instruments.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice, - the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation, - aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.	P8U_W_1 P8U_W_2 P8U_W_4
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems, - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools, - independently plan and realise their scientific development, as well as inspire and/or organise the development of others.	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature, - creatively solve challenges in the professional and public life, considering their ethical aspects, - promote appropriate models of team work.	P8U_K_1 P8U_K_2 P8U_K_4

Methods of evaluation of outcomes achievement:

The attendance list.

TEACHING CONTENT:

Dendroremediation – biological method for decontamination of highly polluted substrates.
Basidiomycetes – selected aspects of research in terms of growing interest in mushrooms.

Possibilities of using instrumental analysis in forestry and wood technology:
1. Analysis of elements in wood preparations and modified wood by atomic absorption spectrometry.
2. Elemental analysis used in the study of lignocellulose biomass.
3. Possibilities of using infrared spectroscopy to analyse lignocellulose material.
4. Spectrophotometric and chromatographic analyses of plant metabolites synthetized in response of woody species to environmental stress.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: Attendance at lectures. Non-graded completion. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Gąsecka M., Magdziak Z., Siwulski M., Mleczek M. 2018. Profile of phenolic and organic acids, antioxidant properties and ergosterol content in cultivated and wild growing species of Agaricus. European Food Research and Technology 244(2): 259–268.

Gąsecka, M., Drzewiecka, K., Magdziak, Z., Piechalak, A., Budka, A., Waliszewska, B., Szentner, K., Goliński, P., Niedzielski, P., Budzyńska, S., Mleczek, M. 2021. Arsenic uptake, speciation and physiological response of tree species (Acer pseudoplatanus, Betula pendula and Quercus robur) treated with dimethylarsinic acid. Chemosphere 263:127859.

Kalač, P. 2019. Mineral Composition and Radioactivity of Edible Mushrooms. Academic Press / Elsevier, ISBN 978-0-12-817565-1

Magdziak Z., Mleczek M., Rutkowski P., Goliński P. 2017. Diversity of low-molecular weight organic acids synthesized by Salix growing in soil characterized by different Cu, Pb and Zn concentrations. Acta Physiologiae Plantarum 39(6):137.

Mleczek, M., Siwulski, M., Budka, A., Mleczek, P., Budzyńska, S., Szostek, M., Kuczyńska-Kippen, N., Kalač, P., Niedzielski, P., Gąsecka, M., Goliński, P., Magdziak, Z., Rzymski, P. 2021. Toxicological risks and nutritional value of wild edible mushroom species - a half-century monitoring study. Chemosphere 263:128095.

Ratajczak I., Woźniak M., Kwaśniewska-Sip P., Szentner K., Cofta G., Mazela B. 2018. Chemical characterization of wood treated with a formulation based on propolis, caffeine and organosilanes. European Journal of Wood and Wood Products, 76:775-781.

Ratajczak I., Woźniak M., Szentner K., Babicka M., Jenczyk J., Mazela B. 2020. Aminosilane binding to wood substance through an alkyd resin. Journal of Wood Chemistry and Technology. 40: 73-79.

Vasavi A., et al. 2010. Phytoremediation- An overview Review. Journal of Industrial Pollution Control 26(1):83-88.

Yan A., et al. 2020. Phytoremediation: A Promising Approach for Revegetation of Heavy Metal-Polluted Land. Frontiers in Plant Science 11:359.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **The protection of forests against the biotic and abiotic harmful factors**	
Name of the course in Polish: **Ochrona lasu przed czynnikami biotycznymi i abiotycznymi**	
Unit providing the course (Department): **Department of Botany and Forest Habitats**	
Course leader: **prof. dr hab. Paweł Rutkowski**	
Discipline: **Forestry**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total number of hours:	**12**

OBJECTIVE OF THE COURSE:

Forests around the world are exposed to damage caused by biotic and abiotic, natural and non-natural factors. The aim of the course is to discuss the main factors affecting forest damages in local and global scale and how to counteract it.

TEACHING METHODS:

Lectures with multimedia presentation, group discussions, consultations, guest experts

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): ● global scientific achievements on issues related to factors causing forest damages; ● the latest theories and trends in the field of impact of natural and non-natural factors affecting forest degradation.	P8U_W_1 P8U_W_2
In the area of skills (graduates know how to): ● counteract forest degradation ● transfer research results on factors causing forest damages to the economic sphere	P8U_U_1 P8U_U_3
In the area of social competences (graduates are capable to): ● be leaders of public debate on main factors affecting forest damages	P8U_K_2, P8U_K_5

Methods of evaluation of outcomes achievement:

Participation in the discussion

TEACHING CONTENT:

a) advancements in forest fire prevention (2 h);
b) invasive species affecting forests and forestry (2 h);
c) protection of forests against insect outbreaks (2 h);
d) protection of forests against damage caused by forest animals (2 h);
e) tree diseases: how to identify them and protect forest (2 h)
f) protection of forests against pollutions (2 h).

The course completion criteria and methods:	Percent of a final grade:
oral exam ☐ **pass (Z)** ☐ **course credit with a grade** ☒ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

- Forest Ecology and Management (Elsevier)
- Fire Safety Journal (Elsevier)
- Fire Ecology (Springer)
- Invasive Plant Science and Management (WSSA)
- Environmental Pollution (Elsevier)
- Annual Review of Phytopathology

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Contemporary furniture industry**	
Name of the course in Polish: **Współczesne meblarstwo**	
Unit providing the course (Department): **Department of Furniture Design**	
Course leader: **Prof. dr hab. inż. Jerzy Smardzewski**	
Discipline **:Forestry**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The course aims to provide students with knowledge of design requirements, safety of use, design principles and technology for combining and refining furniture.

TEACHING METHODS:

Teaching methods include lectures, multimedia presentations, and case discussions.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): The student knows the world's scientific achievements regarding issues related to the design and technology of furniture production. Students can learn about the possibilities of using ICT in the furniture industry and the impact of design on improving the quality of life of susceptible groups: seniors, children, and people with disabilities.	P8U_W
In the area of skills (PhD students know how to): The student can use their knowledge of furniture design to formulate their research problems creatively. The student can innovatively use research tasks, using independently acquired knowledge of research tools typical of the furniture industry	P8U_U
In the area of social competences (PhD students are capable to): The student is ready to plan research and expand existing scientific achievements independently.	P8U_K

Methods of evaluation of outcomes achievement:

Multiple choice test.

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

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TEACHING CONTENT:

The teaching content concerns i.e. human-centered design and the issues of designing furniture adapted to the needs of the elderly, children and people with disabilities, especially the possibilities of improving the quality of life of these groups, particularly due to the use of ICT (information and communication technologies) in the designed products. Prototype solutions developed during international research and development projects implemented at the Department of Furniture Design will be presented. Certain attention will be paid to the potential of creating inclusive solutions by combining ideas from various disciplines, including the integration of the furniture industry with modern solutions originating from the ICT sector. Discussion of the functional, ergonomic, material, construction and safety requirements of furniture. Presentation of contemporary solutions used in the design of residential, office and school furniture. Discussion on methods of engineering furniture design. Presentation of non-wooden materials for furniture. Discussion on eco-friendly adhesives. Presentation of UV lacquer products for finishing of wood and wood-based composites for furniture production.

The course completion criteria and methods:	Percent of a final grade:
The course is passed if at least 60% of the points are obtained on the test: 60%<=3.0<65%; 65%<=3.5<70%; 70%<=4.0<80%; 80%<=4.5<90%; 90%<=5.0	The course is passed if at least 60% of the points are obtained on the test.

RECOMMENDED LITERATURE:

1. Smardzewski J.(2015) Furniture Design, Springer ISBN of 978-3-319-19532-2.
2. Smardzewski J., Tokarczyk M. (2024) Lightweight honeycomb furniture panels with discreetly located strengthening blocks. Composite Structures 331 (2024) 117927 https://doi.org/10.1016/j.compstruct.2024.117927
3. Słonina M., Dziurka D., Smardzewski J. (2023) Failure mechanism map for bending wood-based honeycomb sandwich beams with starch-impregnated core. Composite Structures, 116749, https://doi.org/10.1016/j.compstruct.2023.116749
4. Kasal A., Smardzewski J., Kuşkun T., Güray E. (2023) Analyses of L-Type Corner Joints Connected with Auxetic Dowels for Case Furniture. Materials 2023, 16(13), 4547; https://doi.org/10.3390/ma16134547
5. Smardzewski J., Wojciechowski W.K. (2023) Study on the bending and failure behaviour of wooden sandwich panels with corrugated core, randomized gaps, and wood defects. Construction and Building Materials, Volume 409, 15 December 2023, 133924, https://doi.org/10.1016/j.conbuildmat.2023.133924
6. Fabisiak B., Jankowska A., Kłos R., Knudsen J., Gillsjö C., et al. (2021): Preferences of seniors living in selected Baltic Sea region countries towards the use of indoor public space furniture. PLOS ONE 16(12): e0258676. https://doi.org/10.1371/journal.pone.0258676
7. Fabisiak B., Jankowska A., Kłos R., Knudsen J., Merilampi S., Priedulena E. (2021): Comparative study on design and functionality requirements for senior-friendly furniture for sitting, BioResources 16(3), 6244-6266. https://doi.org/10.15376/biores.16.3.6244-6266
8. Czech Z., Bartkowiak M., Krystofiak T. (2023): Effect of Residue Acrylic Monomers in Synthesized Solvent-Free Photoreactive Pressure-Sensitive Adhesives on the Main Properties of Transfer Tapes Applied to Joining Wooden Elements. Materials 16(24):7563, DOI: 10.3390/ma16247563
9. Bernaczyk A., Wagenfuhr A., Terfloth Ch., Lincke J., Krystofiak T., Niemz P. (2023): Investigations into the Influence of Temperature on the Tensile Shear Strength of Various Adhesives. Materials 16(18), 6173; https://doi.org/10.3390/ma16186173
10. Tokarczyk, M.; Lis, B.; Salca,E.A. (2024): Krystofiak, T. Adhesion ofVarnish Coatings as a Background forAnalogue and Digital PrintingTechnologies. Appl. Sci. 14, 304 *(11) (PDF) Adhesion of Varnish Coatings as a Background for Analogue and Digital Printing Technologies*. DOI: 10.3390/app14010304
11. Salca E.-A., Krystofiak T., Lis B., Hiziroglu S. (2021): Glossiness Evaluation of Coated Wood Surfaces as Function of Varnish Type and Exposure to Different Conditions**.** Coatings 11(5), 558. DOI: 10.3390/coatings11050558
12. Matyašovský J., Sedliačik J., Šimon P., Novák I., Krystofiak T., Jurkovič P., Duchovič P., Sedliačiková M., Cibulková Z., Mičušík M., Kleinová A. (2019): Antioxidant activity of keratin hydrolysates studied by DSC. Journal of the American Leather Chemists Association 114: 20-28.

Poznań 2024-12-15

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załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern trends in biomass conversion**	
Name of the course in Polish: **Współczesne trendy w przerobie biomas**y	
Unit providing the course (Department): **Department of Chemical Wood Technology**	
Course leader: **prof. dr hab. Magdalena Zborowska**	
Discipline: **Forestry**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Discussion of the modern directions of development of chemical processing of wood and its components. Presentation of the most current trends in european and world technological progress in this field.

TEACHING METHODS:

Lectures with multimedia presentation, discussions, consultations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): - global scientific achievements regarding the chemical processing of biomass and the resulting implications for practice, - the latest theories and trends in the field of chemical processing of biomass, which allow the creation of original research concepts and their scientific interpretation,	P8U_W_1 P8U_W_2
In the area of skills (graduates know how to): - use knowledge to creatively formulate your own research problems, - innovatively solve research tasks using independently acquired knowledge in the field of chemical biomass processing, regarding the latest research methods and tools,	P8U_U_1 P8U_U_2
In the area of social competences (graduates are capable to): - independent research planning and independent expansion of existing scientific achievements,	P8U_K_1

Methods of evaluation of outcomes achievement:

Participation in the discussion

TEACHING CONTENT:

The use of forest biomass in the production of composites. Biomass carbon materials and their applications. Thermochemical conversion of biomass. Cellulose pulp production technologies

The course completion criteria and methods:	Percent of a final grade:
Passing the course with based on:	
- a grade of exam	70%
- activity in class	20%
- attendance in class.	10%
☐ **pass (Z)** ☐ **course credit with a grade** ☒ **examination**	

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RECOMMENDED LITERATURE:

- **Hsu, M.**, **Davies, E.** (Eds) (2017). *Activated Carbon: Synthesis, Properties and Uses.* Nova Biomedical Books
- Talapatra, S., K. (2015). *Chemistry of Plant Natural Products.* Springer-Verlag GmbH
- Fangming, J. (2014). *Application of Hydrothermal Reactions to Biomass Conversion.* Springer Berlin Heidelberg
- Basu, P. (2018). *Biomass Gasification, Pyrolysis and Torrefaction: Practical Design and Theory* Academic Press
- Lee, S., Lum, W.C., Boon, J.G., Kristak, L., Antov, P., Pędzik, M., Rogoziński, T., Taghiyari, H.R., Lubis, M.A.R., Fatriasari, W., Yadav, S.M., Chotikhun, A., Pizzi, A. (2022). *Particleboard from agricultural biomass and recycled wood waste: a review*. Journal of Materials Research and Technology, 20, 4630-4658
- Garcia-Perez, M., Chejne, J.F., Noriega, M. (2023*). Applications of Biomass-Derived Materials for Bioproducts and Bioenergy*. Hanser Publications, Munich, Germany.
- Ek, M., Gellerstedt, G., Henriksson, G. (Eds.). (2009). *Pulping chemistry and technology*. Volume 2. Walter de Gruyter.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Utilization of Forest, Timber, and Agricultural Biomass in the Production of New Materials

Name of the course in Polish:
Wykorzystanie biomasy leśnej, drzewnej i rolniczej do produkcji nowych materiałów

Unit providing the course (Department):
Mechanical Wood Technology Dept.

Course leader:
Prof. dr hab. Bartłomiej Mazela
Other lecturers:
dr inż. Wojciech Grześkowiak
dr inż. Waldemar Perdoch

Discipline:	Semester:
Forestry	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

This course aims to provide students with a comprehensive understanding of the utilization of forest, timber, and agricultural biomass in the production of new materials. By exploring various topics such as biomass as a source of cellulose, molded fiber technologies, opportunities for lignocellulose-based materials modification, and challenges in fire protection, students will develop knowledge, skills, and social competences necessary for contributing to sustainable innovation in the bio-based industry.

TEACHING METHODS:

- Lectures: In-depth presentations on each topic by the instructor.
- Case Studies: Analysis of real-world applications and industry examples.
- Group Discussions: Engaging discussions to encourage critical thinking and idea exchange.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
• world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice:	P8U_W_1
Understanding the role of forest, timber, and agricultural biomass in bio-based industries.	
Knowledge of molded fiber technologies and their applications in the packaging industry	
• the latest theories and trends in forest sciences, thus facilitating creation of original research concepts and their scientific interpretation:.	P8U_W_2
Awareness of opportunities for lignocellulose-based materials modification.	
Familiarity with challenges and strategies for fire protection of lignocellulose-based materials.	
In the area of skills (PhD students know how to):	
● apply knowledge in the process of creative formulation of their research problems:	P8U_U_1
Ability to analyze biomass as a source of cellulose for bio-based industry.	
Proficiency in evaluating and implementing molded fiber technologies.	
● innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools:	P8U_U_2
Skill in identifying and exploring opportunities for materials modification.	
Competence in addressing challenges related to fire protection of lignocellulose-based materials.	
In the area of social competences (PhD students are capable to):	
● independently plan research and independently broaden the existing body of scientific literature,	P8U_K_1
● creatively solve challenges in the professional and public life, considering their ethical aspects,	P8U_K_2 P8U_K_3
● initiate actions for the public good.	P8U_K_5
● maintain and promote the importance and role of the intellectual community in social life.	

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Methods of evaluation of outcomes achievement:

•Attendance: Students are expected to attend all lectures.
•Performance: Defend of case study presentation

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

TEACHING CONTENT:

hours 1-2: Forest- and Agro-Biomass as a Source of Cellulose for Bio-based Industry
- Overview of biomass sources
- Extraction and processing of cellulose from forest and agricultural residues
- Applications of cellulose in various industries

hours 3-4: Molded Fiber Technologies - Development of Packaging Industry
- Principles and manufacturing processes of molded fiber
- Applications of molded fiber packaging
- Environmental benefits and challenges

hours 5-6: Opportunities for Future Lignocellulose-Based Materials Modification
- Chemical and physical modification techniques
- Enhancement of mechanical and functional properties
- Emerging trends and research directions

hours 7-8: Challenges in Lignocellulose-Based Materials Fire Protection
- Fire behavior of lignocellulosic materials
- Strategies for fire retardation and suppression
- Environmental considerations in fire protection methods

hours 9-11: Group Discussions and Case Studies
- Analysis of case studies related to biomass utilization and materials production
- Group discussions on opportunities and challenges in the field

hours 12: Case study presentation

The course completion criteria and methods:	**Percent of a final grade:**
• Class Participation:	50%
• Disscussion:	20%
• Final Project Presentation:	30%

RECOMMENDED LITERATURE:

Lignocellulosic Fibers and Wood Handbook: Renewable Materials for Today's Environment. By Mohamed Naceur Belgacem (Editor), A. Pizzi (Editor)
Wood Modification Technologies. Principles, Sustainability, and the Need for Innovation. By Dick Sandberg, Andreja Kutnar, Olov Karlsson, Dennis Jones (Editors)
Wood & Fire Safety. Proceedings of the 9th International Conference on Wood & Fire Safety 2020
Springer Handbook of Wood Science and Technology. Autor Peter Niemz, Alfred Teischinger, Dick Sandberg
Fire Safe Use of Wood in Buildings Global Design Guide Edited by Andrew Buchanan & Birgit Östman. First edition published 2022- by CRC Press, *Taylor & Francis Group, LLC. DOI: 10.1201/9781003190318*
Charles M. A., Kang C. L. (2024) Recent development and challenges in enhancing fire performance on wood and wood-based composites: A 10-year review from 2012 to 2021. JOURNAL OF BIORESOURCES AND BIOPRODUCTS (FEB 2024) Vol. 9, no. 1, pp. 27 – 42
Mensah, R. A., Jiang, L., Renner, J. S., & Xu, Q. (2022). Characterisation of the fire behaviour of wood: From pyrolysis to fire retardant mechanisms. Journal of Thermal Analysis and Calorimetry, 1-16.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Nanomaterials in woodworking**	
Name of the course in Polish: **Nanomateriały w drzewnictwie**	
Unit providing the course (Department): **Department of Chemical Wood Technology**	
Course leader: **prof. dr hab. Magdalena Zborowska**	
Discipline: **Forestry**	**Semester:** **6**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Transfer of knowledge about nanomaterials obtained from lignocellulosic materials. The students will gain knowledge about the methods of producing these materials, studying their properties and possibilities of applying them in the wood industry. The student will be aware of the threats resulting from the production and use of nanomaterials.

TEACHING METHODS:

Lectures with multimedia presentation, discussions, consultations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific achievements on specific issues related to nanomaterials obtained from biomass and the resulting implications for practice - the latest theories and trends in the field of nanomaterials from biomass, which allow the creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): -use knowledge to creatively formulate your own research problems, -innovatively solve research tasks using independently acquired knowledge in the field of nanomaterials from biomass, regarding the latest research methods and tools,	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independent research planning and independent expansion of existing scientific achievements,	P8U_K_1

Methods of evaluation of outcomes achievement:

Participation in the discussion

TEACHING CONTENT:

Carbon nanomaterials from lignocellulosic raw materials. Nanocellulose and nanolignin - research and applications. Safety of use of nanomaterials.

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The course completion criteria and methods:	Percent of a final grade:
Passing the course without a grade, based on:	
activity in class	80%
attendance in class	20%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

- Malkiat, S. J. (2018). Understanding Nanomaterials. CRC Press
- Dunwe, W. (Ed.), Guozhong Cao (Eds.) (2017). Nanomaterials for Energy Conversion and Storage. WSPC (Europe)
- Craig, E. (Ed.) (2019.) Nanomaterials: An Introduction to Properties, Synthesis and Applications. Larsen and Keller Education
- Alves, A.K. (Ed.) (2019). Nanomaterials for Eco-friendly Applications. Springer
- Sarah Perrett, Alexander K. Buell, Tuomas P.J. Knowles (2019) Biological and Bio-inspired Nanomaterials: Properties and Assembly Mechanism.s Springer
- Shakeel, A. (Ed.), Wazed Ali (Editor) (2020) Green Nanomaterials: Processing, Properties, and Applications. Springer
- Lydia, D. (2012). Nanomaterials – the materials of the future, Fast Book Publishing,
- Volath, D. (2013). Nanoparticles- Nanocomposites-Nanomaterials. Wiley.
- Kurzydłowski K., Lewandowska M. (2010): Nanomateriały inżynierskie – konstrukcyjne i funkcjonalne, WNT Warszawa
- Barhoum , A. (Ed.) (2022). Handbook of Nanocelluloses: Classification, Properties, Fabrication, and Emerging Applications.
- Kargarzadeh , H. et al. (Eds.) (2017). Handbook of nanocellulose and cellulose nanocomposites. John Wiley & Sons.
- Pillai, S., Lang, Y. (Eds). (2019).Toxicity of Nanomaterials Environmental and Healthcare Applications. CRC Press
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* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern engineering techniques in forest management and forest environment protection**	
Name of the course in Polish: **Nowoczesne technologie inżynieryjne w gospodarce leśnej i ochronie środowiska leśnego**	
Unit providing the course (Department): **Department of Forest Engineering**	
Course leader: **Bernard Okoński, Ph.D., D.Sc.**	
Discipline: Forestry **Forestry**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Familiarizing students with:

- Engineering methods of water management in forests,
- Engineering methods of preventing and mitigating the impacts of climate change and extreme natural events,
- Engineering infrastructure employed for forest access providing, conservation and utilization of forests.

TEACHING METHODS:
Lectures

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): EO1.The latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating the creation of original research concepts and their scientific interpretation	P8U_W_2
In the area of skills (PhD students know how to): EO2. P8S_UW1) apply knowledge in the process of creative formulation of their research problems	P8U_U_1
In the area of social competences (PhD students are capable to): EO3. independently plan research and independently broaden the existing body of scientific literature EO4. creatively solve challenges in the professional and public life, considering their ethical aspects	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Examination (EO1- EO4)

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Engineering methods of water management in forests:

- Key concepts and aims of general water management and water management in forestry, interactions between water as a resource and the forest environment
- Issues of introducing of strategies and water management methods to meet needs of ecosystems and aims of forest management
- Water management and water storage forms, “stable and unstable”, controllable and uncontrollable water storage; forms, significance of water storage for ecosystems and forest management, water storage control and management in forests
- Contemporary engineering methods and water managements systems and approaches, examples of case studies
- Restoration/protection projects of wetlands and hydrogenic habitats

Engineering methods of preventing and mitigating the impacts of climate change and extreme natural events

- Issues concerning the management of natural hazards in forests, and adopted engineering solutions applied to forest environment protection
- Methods of investigating, preventing and minimizing the effects of drought, heavy rainfall, hurricanes, fires and catastrophic mass movements,
- Methods of investigating and stabilising landslides,
- Examples of remote sensing and geophysical techniques, including GPR method, used for assessment of vulnerability and effects of extreme events,
- Case studies of engineering solutions applied for dealing with natural hazards in Polish forests.

Engineering infrastructure employed for forest access providing, conservation and utilization of forests

- Innovative methods of design and construction of logging and fire-fighting forest roads
- Issues of optimization of the forest road network for improving the logistics of transport of wood raw material,
- Aspects of forest accessibility for tourism and recreation,
- Modern techniques for construction of forest cubature objects for social and educational purposes,
- Aspects of construction infrastructure impact on forest environment

The course completion criteria and methods:	Percent of a final grade:
Examination	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Chang M., 2013, Forest Hydrology: An Introduction to water and forest. CRC Press.
Czerniak A., Grajewski S., Krysztofiak-Kaniewska A., Kurowska E.E., Okoński B., Górna M., Borkowski R., 2020: Engineering methods of forest environment protection against meteorological drought in Poland. Forests 11/6, 614, http://www.mdpi.com/1999-4907/11/6/614/pdf
Czerniak, A., et al. "Technical methods of preventing and limiting the effects of natural disasters in Polish forests caused by severe weather conditions." Acta Sci.Pol. Silv. 20.4 (2021): . https://doi.org/10.17306/J.AFW.2021.4.26
Grigg N. 2023. Water Resources Management: Principles, Methods, and Tools. Wiley.
Holden J. 2022. Water Resources. An Integrated Approach. Taylor & Francis.
Shuttleworth W.J., 2012, Terrestrial Hydrometeorology. Wiley.
Singh V.P, 2016, Handbook of Applied Hydrology, 2nd eition. McGraw-Hill Education.
Mikoś, J. (2000): Budownictwo ekologiczne. Wydawnictwo Politechniki Śląskiej, Gliwice.
Ferrara, C., Barone , P.M., Salvati, L., Pettinelli, E., Ground Penetrating Radar as Remote Sensing Technique to Investigate the Root System Architecture. Applied Ecology and Environmental Research 12(3): 695-702. DOI: 10.15666/aeer/1203_695702
Czerniak A., Grajewski S.M., Kurowska E.E., Bearing Capacity Standards for Forest Roads Constructed Using Various Technologies from Mechanically and Chemically Stabilised Aggregate. Croat. j. for. eng. 42(2021)3, 447-489, https://doi.org/10.5552/crojfe.2021.996

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Innovative materials and technologies in the woodworking industry**	
Name of the course in Polish: **Innowacyjne materiały I technologie w przemyśle drzewnym**	
Unit providing the course (Department): **Department of Wood Science and Thermal Techniques, Department of Mechanical Wood Technology**	
Course leader: **Dr habil. Tomasz Krystofiak**	
Discipline: **Forestry**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The course aims to teach students about surface activation methods, innovative bonding and finishing technologies, wood-based composites for structural applications, innovative bio-based adhesives for the production of wood-based composites, and the use of solid wood in structural applications.

TEACHING METHODS:

Teaching methods include lectures and multimedia presentations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to the discipline of forestry science along with the resulting implications for practice – forestry and woodworking industry - the latest theories and trends in the discipline of forestry science, thus facilitating the creation of original research concepts in the scope of innovative bonding and finishing technologies, innovative bio-based adhesives for the production of wood-based composites and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (graduates know how to): - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art materials, innovative technologies, methods and research tools for investigations the properties of final products - transfer research results to the economic sphere in the forestry, woodworking industry and furniture companies	P8U_U_2 P8U_U_3
In the area of social competences (graduates are capable to): - creatively solve challenges in the professional and public life introduce innovative materials for production of furniture and wooden buildings - initiate actions for the public good to introduce to the forestry and wood technology companies innovative technologies allow to produce ecological products with the use of energy-saving technologies	P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Multiple choice test.

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TEACHING CONTENT:

The teaching content concerns surface activation methods prior to gluing and finishing, improving the quality of glue-lines and lacquer coatings. Proecological adhesives and materials in the innovative technologies will be presented. The attention will be paid to the ecological and energy-saving surface finishing technologies.
The most common wood-based materials intended for the use in structural applications will be presented: characteristics of wood as a raw material for the production of composites, production process of glued laminated timber (GLT), cross laminated timber (CLT) and the requirements for wood-based materials applied in constructions.
Adhesives of plant origin will be characterized: the history of natural adhesives, formaldehyde substitutes in the production of amino resins, raw materials for the production of bio-adhesives, current challenges for natural adhesives and examples of their application. Methods of modifying the initial products for the production of bio-adhesives in order to improve their properties will also be presented.
The possibilities of the use of solid wood in buildings will be presented: history of the use of wood in structures, current trends in wooden construction, properties of wood in the context of structural applications, wood defects important from the point of view of structural applications, requirements for structural wood and current challenges related to the use of wood in constructions.

The course completion criteria and methods:

The course is passed if at least 60% of the points are obtained on the test: 3.0 <60%; 60%<=3.5<70%; 70%<=4.0<80%; 80%<=4.5<90%; 90%<=5.0

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

Percent of a final grade:

The course is passed if at least 60% of the points are obtained on the test.

RECOMMENDED LITERATURE:

1. Asdrubali F., Ferracuti B., Lombardi L., Guattari C., Evangelisti L., Grazischi G. (2017): A review of structural, thermo-physical, acoustical, and environmental properties of wooden materials for building applications. Building and Environment, 114: 307-332.
2. Bernaczyk A., Wagenführ A., Zboray R., Flisch A., Lüthi T., Vetter B., Rentsch M., Terfloth C., Lincke J., Krystofiak T., Niemz P. (2022): Investigations on the characterization of various adhesive joints by means of nanoindentation and computer tomography. Materials, vol. 15 (iss. 23), art. no. 8604 ; p-ISSN: 1996-1944, DOI: 10.3390/ma15238604
3. Dunky M., Mittal K.L. (2023): Bio-based Adhesives: Sources, Characteristics and Applications. Scrivener Publishing, Austin, TX, United States.
4. He, Z. (2017): Bio-based Wood Adhesives: Preparation, Characterization and Testing. Taylor & Francis INC International Concepts, Milton Park, United Kingdom.
5. Henke M., Lis B., Krystofiak T. (2022): Gloss level of HDF finished with different numbers of layers and hardened with UV Hg-Ga lamps of selected power. Coatings. vol. 12 (iss. 4), p-ISSN: 2079-6412,DOI: 10.3390/coatings12040533
6. Jones D., Brischke C. (2017): Performance of Bio-based Building Materials. Woodhead Publishing, Duxford, United Kingdom.
7. Kollmann F.F., Kuenzi E.W., Stamm A.J. (2012): Principles of Wood Science and Technology: II Wood-Based Materials. Springer, Berlin, Germany.
8. Krystofiak T. (2023): Adhesion promoters for gluing-selected materials in furniture industry. Wood Industry – Past, Present and Future Outlook (by Guanben Du and Xiaojian Zhou). InTechOpen DOI: 10.5772/intechopen.106329
9. Niemz P., Sonderegger W., Keplinger T., Jiang J., Lu J. (2023): Physical Properties of Wood and Wood-Based Materials. In: Niemz, P., Teischinger, A., Sandberg, D. (eds) Springer Handbook of Wood Science and Technology. Springer Handbooks. Springer, Cham.
10. Novák I., Sedliačik J., Krystofiak T., Lis B., Popelka A., Kleinová A. Matyašovský J., Jurkovič P., Bekhta P. (2019): Study of wood surface pre-treatment by radio-frequency discharge plasma. Drewno 62 (203), DOI: 10.12841/wood.1644-3985.D14.06.
11. Pizzi A., Mittal K.L. (2018): Handbook of Adhesives. Third Edition. by Taylor & Francis Group, LLC
12. Proszyk S., Krystofiak T., Lis B., Jóźwiak M. (2011): Laser and plasma techniques in application of HM adhesives for edgebands technology of board elements in furniture industry. Intercathedra (27/3): 62-66.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Natural substances of plant origin**	
Name of the course in Polish: **Naturalne substancje pochodzenia roślinnego**	
Unit providing the course (Department): **Department of Chemical Wood Technology**	
Course leader: **prof. dr hab. Magdalena Zborowska**	
Discipline: **Forestry**	Semester: **8**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Providing knowledge about the latest research directions and applications of natural biomass components. Indication of the importance of these ingredients in the light of striving to reduce global climate change.

TEACHING METHODS:

Lectures with multimedia presentation, discussions, consultations

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific achievements regarding the natural biomass components and the resulting implications for practice, - the latest theories and trends in the field of natural components from plants, which allow the creation of original research concepts and their scientific interpretation,	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use knowledge to creatively formulate your own research problems, - innovatively solve research tasks using independently acquired knowledge in the field of plants components, regarding the latest research methods and tools,	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independent research planning and independent expansion of existing scientific achievements,	P8U_K_1

Methods of evaluation of outcomes achievement:

Participation in the discussion

TEACHING CONTENT:

The latest trends in cellulose and lignin research. Applications of extractive substances. Use of phytoalexin compounds.

The course completion criteria and methods:	Percent of a final grade:
Passing the course without a grade, based on:	
activity in class	80%
attendance in class	20%

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

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RECOMMENDED LITERATURE:

- Poletto, M. (Ed.). (2018). *Lignin: Trends and applications*. BoD–Books on Demand.
- de Morais, L. C., de Carvalho, G. B. (2023). *Potential Applications of Lignin.* In *Handbook of Biomass* (pp. 1-23). Singapore: Springer Nature Singapore.
- Hatakeyama, H., Hatakeyama, T. (2010). *Lignin structure, properties, and applications*. *Biopolymers: lignin, proteins, bioactive nanocomposites*, 1-63.
- Luo, H., Abu-Omar, M. M. (2017). *Chemicals from lignin*. *Encyclopedia of sustainable technologies*, *3*, 573-585.
- Heinze, T. J., Glasser, W. G. (1998). *Cellulose derivatives* (Vol. 688, pp. 2-18). American Chemical Society.
- Wüstenberg, T. (2014). *Cellulose and cellulose derivatives in the food industry: fundamentals and applications*. John Wiley & Sons.
- Kamide, K. (2005). *Cellulose and cellulose derivatives*. Elsevier.
- Heinze, T., El Seoud, O. A., Koschella, A. (2018). *Cellulose derivatives: synthesis, structure, and properties*. Springer.
- Hamad, W. Y. (2017). *Cellulose nanocrystals: properties, production and applications*. John Wiley & Sons.
- Rodrigues, F., Delerue-Matos, C. (2022). *Plant Extracts: Chemical Composition, Bioactivity and Potential Applications*. MDPI-Multidisciplinary Digital Publishing Institute.
- Jeandet P. (2015). *Phytoalexins: Current Progress and Future Prospects*. Molecules. 2015 Feb 5;20(2):2770–4. doi: 10.3390/molecules20022770. PMCID: PMC6272513.
- Daniel, M. (2017). *Handbook of phytoalexin metabolism and action*. Routledge.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Agriculture 2050 – Food Security

Name of the course in Polish:
Rolnictwo 2050 - Bezpieczeństwo Żywnościowe

Unit providing the course (Department):
Agricultural Chemistry and Environmental Biogeochemistry (6h)
Soil Science and Microbiology (5h)
Agronomy (1h)
Phytopathology and Seed Science (2h)
Genetics and Plant Breeding (1h)
Plant Physiology (1h)

Course leader:
Prof. dr hab. Jean Diatta

Discipline:	Semester:
Agriculture and Horticulture	**II**

TYPE OF CLASSES:
(course load)

- Lectures	**16**
- Self-study	**16**
Total numer of hours:	**32**

OBJECTIVE OF THE COURSE:

This course focuses on various arrays dealing with reaching the goal: Agriculture 2050 and its open challenge related to Food Security. The key objective is to familiarize PhD students with the quantitative and qualitative value of soil reserves, achievements in plant breeding, the role of microorganisms in controlling the biological turnover of organic matter and plant nutrients. Plant protection and the currently challenging EU and International regulation. Specific focus is given to plant nutrition and crop yield forming physiology, criteria for evaluating physiological and agronomic factors important for both productivity of crop plants and for the environment. Finally an interdisciplinary dynamic exchange, where Agriculture (at large) is outlined as a worldwide heterogenic human food security task.

TEACHING METHODS:

Lectures based on multimedia presentation with elements of discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. global scientific achievements on specific issues related to a given scientific discipline and the resulting implications for practice	P8U_W
In the area of skills (PhD students know how to): 1) use knowledge to creatively formulate your own research problems, 2) innovatively solve research tasks using independently acquired knowledge of the latest research methods and tools, 3) conduct teaching classes and verify the content provided	P8U_U
In the area of social competences (PhD students are capable to): 1) independent research planning and independent expansion of existing scientific achievements, 2) creatively taking up challenges in the professional and public sphere, taking into account their ethical dimension, 3) shaping patterns of proper conduct in teamwork,	P8U_K

Methods of evaluation of outcomes achievement:

Exam

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TEACHING CONTENT:

1. **World Food Security by 2050 – Conditions, Strategies, Challenges (2 h)**
   (Department of Agricultural Chemistry and Environmental Biogeochemistry, Prof. dr hab. Jean Diatta)
2. **Basic Reserves: Crop Plants, Biological Progress and Agrotechnics (2 h)**
   (Dr hab. Tomasz Piechota, Department of Agronomy; Prof. UPP dr hab. Danuta Kurasiak-Popowska, Department of Genetics and Plant Breeding)
3. **Reserves and Efficient Use of Arable Soils; Water and Energy (2 h)**
   (Prof. UPP dr hab. Zbigniew Kaczmarek, Department of Soil Science and Microbiology)
4. **Productive and Proecological Role of Microorganisms in Controlling Fertility Indices of Arable Soils (2 h)**,
   (Prof. UPP Alicja Niewiadomska, Department of Soil Science and Microbiology)
5. **Nitrogen – Critical Factor in Food Production; „Humanity Benefactor", or „Public Enemy" (2 h)**
   (Prof. dr hab. Jean Diatta, Department of Agricultural Chemistry and Environmental Biogeochemistry; Prof. UPP Agnieszka Wolna-Maruwka, Department of Soil Science and Microbiology)
6. **Phosphorus and Potassium – Controllers of Nitrogen Efficiency – Reserves and New Sources (2 h)**
   (Prof. dr hab. Jean Diatta, Department of Agricultural Chemistry and Environmental Biogeochemistry; Prof. dr hab. Przemysław Barłóg, Department of Agricultural Chemistry and Environmental Biogeochemistry)
7. **Crop Plant Protection Under EU Regulations – Concept of Sustainable Intensification of Food Production (2 h)**
   (Prof. UPP dr hab. Zbigniew Karolewski; Department of Phytopathology and Seed Science)
8. **Chemical and Physiological Diagnosis of Crop Plants Nutrition – Current and Future Solutions (2 h)**
   (Prof. UPP dr hab. Przemysław Barłóg, Department of Agricultural Chemistry and Environmental Biogeochemistry; Prof. UPP dr hab. Tomasz Kleiber, Department of Plant Physiology)

The course completion criteria and methods:	Percent of a final grade:
Presence	40%
Exam	60%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

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RECOMMENDED LITERATURE:

Diatta J. (Lecture 1)

1. Michael Lipton, Richard Longhurst (1989): New Seeds and Poor People. Routledge; Edition 1. ISBN-13: 978-0415595377
2. Udaya Sekhar Nagothu (2015): Food security and development: country case studies. ISBN: 978-1-315-74582-4.
3. Terry Marsden and Adrian Morley (2014): Sustainable food systems: building a new paradigm. Routledge is an imprint of the Taylor & Francis Group. ISBN: 978-0-203-08349-9

Piechota T. / Kurasiak-Popowska D. (Lecture 2)

Magdoff F., Van Es H., 2009: Building soils for better crops, sustainable soil management. Wyd. SARE, USDA, 294 p

Kaczmarek Z. (Lecture 3)

1. Bajkiewicz-Grabowska E. Mikulski Z., 2013, Hydrologia Ogólna. Wydawnictwo Naukowe PWN. Warszawa.
2. Gutry-Korycka 2018M., Zasoby wód płynących Polski. Uwarunkowania, wykorzystanie, zmiany. IMGW-PIB, Warszawa, ss. 116

Niewiadomska A. / Barłóg P. (Lecture 4)

1. Ballabio C., Lugato E., Fernández-Ugalde O., Orgiazzi A., Jones A., Borrelli P., Montanarella L., Panagos P (2019): Mapping LUCAS topsoil chemical properties at European scale using Gaussian process regression, Geoderma, 355, 113912.
2. Herrick, J.E., Beh, A. (2015): A Risk-Based Strategy for Climate Change Adaptation in Dryland Systems Based on an Understanding of Potential Production, Soil Resistance and Resilience, and Social Stability. In: Lal, R., Singh, B., Mwaseba, D., Kraybill, D., Hansen, D., Eik, L. (eds) Sustainable Intensification to Advance Food Security and Enhance Climate Resilience in Africa.

Diatta J. / Maruwka A. (Lecture 5)

1. Udvardi M, Below FE, Castellano MJ, Eagle AJ, Giller KE, Ladha JK, Liu X, Maaz TM, Nova-Franco B, Raghuram N, Robertson GP, Roy S, Saha M, Schmidt S, Tegeder M, York LM and Peters JW (2021): A Research Road Map for Responsible Use of Agricultural Nitrogen. Front. Sustain. Food Syst. 5:660155. doi: 10.3389/fsufs.2021.660155
2. Grzebisz, W.; Łukowiak, R. Nitrogen Gap Amelioration is a Core for Sustainable Intensification of Agriculture—A Concept. Agronomy 2021, 11, 419. https://doi.org/10.3390/agronomy11030419
3. Grzyb, A., Wolna-Maruwka, A., & Niewiadomska, A. (2021). The significance of microbial transformation of nitrogen compounds in the light of integrated crop management. *Agronomy*, *11*(7), 1415
4. Mahala, D. M., Maheshwari, H. S., Yadav, R. K., Prabina, B. J., Bharti, A., Reddy, K. K., Ramesh, A. (2020). Microbial Transformation of Nutrients in Soil: An Overview. *Rhizosphere Microbes: Soil and Plant Functions*, 175-211

Diatta J. / Barłóg P. (Lecture 6)

1. Cordell D., White S. (2011): Peak Phosphorus: Clarifying the Key Issues of a Vigorous Debate about Long-Term Phosphorus Security. Sustainability 3, 2027-2049.
2. Panagos O., Köningner J., Ballabio C., Liakos L., Muntwyler A., Borrelli O., Lugato E. (2022): Improving the phosphorus budget of European agricultural soils. Science of The Total Environment, 853, 158706.
3. Grzebisz W., Diatta J.B., Popp T., Szczepaniak W. 2004. Potas w produkcji roślinnej. IPI Basel/Switzerland, s.88. ISBN 3-9801577-3-3
4. Mizerska M. 2017. Sole potasowo-magnezowe. Państwowa Służba Geologiczna o surowcach mineralnych Polski. Państwowy Instytut Geologiczny PIB. IS BN 978-83-7863-743-1

Karolewski Z. (Lecture 7)

1. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0381
2. https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590574123338&uri=CELEX:52020DC0380

Barłóg P. / Kleiber T. (Lecture 8)

1. Bartosz Markiewicz, Tomasz Kleiber and Maciej Bosiacki (2016): Hydroponic Cultivation of Tomato. Alternative Crops and Cropping Systems, ISBN 978-953-51-2279-1; DOI: 10.5772/62263
2. Muhammad Zahir, Siti Anis Dalila & Jamlos, Mohd & Omar, Ahmad & Jamlos, Mohd & Mamat, Rizalman & Muncan, Jelena & Tsenkova, Roumiana. (2023). Review – Plant nutritional status analysis employing the visible and near-infrared spectroscopy spectral sensor. Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy. 304. 123273. 10.1016/j.saa.2023.123273.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Research projects – funding application

Name of the course in Polish:
Projekty badawcze – pozyskiwanie środków finansowych

Unit providing the course (Department):
Biochemistry and Biotechnology

Course leader:
Prof. UPP, dr hab. n. med. Anna Woźniak
Prof. UPP, dr hab. Łukasz Wolko

Discipline:	Semester:
Agriculture and Horticulture	**II**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**10**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize doctoral students with the specifics of applying for funding for scientific activities in grant dedicated to doctoral students. Additionally, PhD students will learn about the applications of electronic scientific information systems.

TEACHING METHODS:

Lectures in the form of multimedia presentations. Working on an online platform for grant applications on the example of OSF (Support for Financing Streams).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): E1 The PhD student knows and understands the principles of planning and financing scientific research and project evaluation.	P8U_W
In the area of skills (PhD students know how to): E2 The PhD student is able to independently plan and implement his own scientific development and inspire and/or organize the development of other people.	P8U_U
In the area of social competences (PhD students are capable to): E3 The PhD student is prepared to independently plan research and independently expand existing scientific achievements.	P8U_K

Methods of evaluation of outcomes achievement:

The PhD student activity. Preparation of a project application in a grant dedicated to doctoral students.

TEACHING CONTENT:

1. The offer for research projects based on the example of national centers financing scientific activities.
2. Strategies for selecting optimal types of grants for PhD students, assessment of the applicant's chances and capabilities.
3. Application regulations.
4. Applications platform.
5. Application proposal analysis based on the example of the National Science Center Preludium competition.
6. Individual scientific plans.
7. Individual project proposals.
8. Account registration and use of electronic scientific information systems: PBN, POL-on, People of Science, ORCID, People of Science, Web of Science, Scopus

The course completion criteria and methods: Preparation of a project proposal in a grant competition dedicated to PhD students. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

No universal manual.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Experimental Design and Statistical Data Analysis in Natural Science Research**	
Name of the course in Polish: **Planowanie doświadczeń i statystyczna analiza danych w badaniach przyrodniczych**	
Unit providing the course (Department): **Department of Mathematical and Statistical Methods.**	
Course leader: **Dr hab. Agnieszka Łacka**	
Discipline: **Agriculture and Horticulture**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
Total numer of hours:	**4**

OBJECTIVE OF THE COURSE:

The aim of the course is to equip students with the tools and skills necessary for conducting advanced scientific research in the field of natural sciences, as well as for effectively analyzing and interpreting the obtained results.

TEACHING METHODS:

Lectures supplemented with multimedia presentations, charts, tables, and examples of practical applications. Discussions. Group work.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -Understands basic methods of experimental design in natural science research. -Understands the principles of experimental design to ensure precise and reliable results. -Familiar with experimental sdesigns that allow for the elimination of both unidirectional and multidirectional heterogeneity of the experimental material.	1.1
In the area of skills (PhD students know how to): -Can independently design research experiments, including determining variables, sample size, and the number of treatment replications. -Possesses skills in conducting statistical data analysis, including performing statistical tests, analysis of variance, and interpretation of results. -Can utilize appropriate statistical tools and software.	2.2
In the area of social competences (PhD students are capable to): -Is ready to effectively collaborate with other members of the research team in planning and conducting experiments as well as data analysis. -Can present research findings in a clear and understandable manner to other members of the research team as well as to a broader audience. -Is prepared to critically evaluate the results of experiments and data analysis and formulate conclusions and recommendations based on them.	3.4

Methods of evaluation of outcomes achievement:

Project task

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TEACHING CONTENT:

Methods of data acquisition in scientific research.
Experiment as a research method (Purpose of the experiment, Conditions for its conduct).
Concepts of experimental material.
Concepts of experimental unit and experimental factor, as well as their significance for assessing the impact of the factor on the phenomenon under study.
Understanding the principles of experiment planning, including:

- Division of experimental material into experimental units.
- Selection of levels of the experimental factor.
- Determination of the number of replications and the method of assigning them to individual treatments.
- Application of grouping principles and random allocation of experimental units to treatments.

Single-factor experiments. Analysis and post-hoc tests.
Completely randomized design, randomized complete block design, Latin square.
The issue of missing observations.
Determination of the optimal number of treatment replications.
Factorial experiments: split-plot and split-block designs.

The course completion criteria and methods:

Project Task: Group work, oral presentation of project results (multimedia presentation)

This task involves working collaboratively in a group to complete a project and presenting the project results orally using a multimedia presentation format.

Percent of a final grade:

100%

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

RECOMMENDED LITERATURE:

Kozlowska M. (2014) Przewodnik po dobrej praktyce eksperymentalnej. ISBN: 978-83-64246-18-0
Casler, M.D.(2015) Fundamentals of Experimental Design: Guidelines for Designing Successful Experiments. Agron. J., 107, 692–705.
Pearce, S. (2005)The factorial field experiment. Exp. Agric. 41, 109–120.
William G. Cochran, Gertrude M. Cox,(1992) Experimental Designs, 2nd Edition; ISBN: 978-0-471-54567-5

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Doctoral seminar**	
Name of the course in Polish: **Seminarium doktoranckie**	
Unit providing the course (Department): **Department of Agronomy**	
Course leader: **Prof. dr hab. Katarzyna Panasiewicz**	
Discipline: **Agriculture and horticulture**	Semester: **II, IV, VI,VIII**

TYPE OF CLASSES:
(course load)

- Lectures	**6 hours per semester, (24 hours in total)**
- Self-study	**12 h (48h)**
Total number of hours:	**24 (72h)**

OBJECTIVE OF THE COURSE:

The aim of the seminars is primarily to: familiarize doctoral students with the methods of scientific work and creating and improving research/scientific workshop, formal requirements of scientific works and dissertations, stimulating scientific interests and self-improvement, implementing research work, the importance of scientific cooperation, improving editorial workshop. Learning and discussing the research issues implemented as part of the doctoral thesis. Preparing doctoral students to present their scientific achievements in the form of an oral presentation - multimedia or poster, answering questions, conducting scientific discussions. Verification of the progress of the doctoral dissertation (in subsequent semesters).

TEACHING METHODS:

Case study, problem solving, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -world scientific achievements concerning specific issues related to a given scientific discipline and the resulting implications for practice, -the latest theories and trends in the scientific disciplines in which education was carried out at the doctoral school, which will allow for the creation of original research concepts and their scientific interpretation, - conditions concerning intellectual property and confidentiality rules related to scientific and teaching activities.	P8U_W1 P8U_W2 P8U_W_4
In the area of skills (PhD students know how to): - use knowledge to creatively formulate own research problems, - innovatively solve research tasks using independently acquired knowledge regarding the latest research methods and tools, - independently plan and implement own scientific development and inspire and/or organize the development of other people.	P8U_U1 P8U_U2 P8U_U_4
In the area of social competences (PhD students are capable to): - independently plan research and independently expand existing scientific achievements, - creatively take up challenges in the professional and public sphere, taking into account their ethical dimension.	P8U_K1 P8U_K2

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Methods of evaluation of outcomes achievement:

Assessment of speeches and presentations during classes, in terms of: comprehensible presentation of issues, well-formulated research hypothesis and research objective, appropriate selection of forms of presentation of the issues discussed, use of the most up-to-date literature on the subject and the latest multimedia techniques, ability to discuss.

TEACHING CONTENT:

The scope of the seminars conducted in each year of doctoral studies includes aspects organized in a way that supports the progress of the doctoral student's scientific work. The topics and scope of the seminars should, in particular, include issues related to the methods of acquiring and processing data and the methods of collecting and developing results. Presentations by first-year students should present the general state of knowledge in the field related to the problems of the doctoral thesis. Second-year doctoral students should present, in particular, the aim, research hypothesis, characteristics of the research object and the adopted research methods. Presentations by third-year students should include a presentation of preliminary research results and an attempt to interpret them. Presentations by fourth-year students should present the obtained results together with their discussion and initially formulated conclusions.

The course completion criteria and methods:	Percent of a final grade:
Assessment based on prepared thematic presentations,	70%
Evaluation of activity during classes	30%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

Basic literature:
1. Apanowicz J., "Methodological conditions of scientific work: doctoral theses, habilitation theses", Warsaw 2005
2. Heller M. "How to be a scholar" Wydawnictwo Znak, Cracow 2009
3. Gambarelli G., Łucki Z., "How to prepare a diploma or doctoral thesis" UNIVERSITAS Cracow 2001.
4. Krajewski M. "On the methodology of science and the principles of scientific writing", 2010
Supplementary literature:
1. Legal acts concerning the doctoral school and the doctoral dissertation.
2. Available scientific and industry journals, literature sources related to the subject of the doctoral theses being carried out.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Agricultural environmental problems**	
Name of the course in Polish: **Rolnicze problemy środowiskowe**	
Unit providing the course (Department): **Department of Soil Science and Microbiology**	
Course leader: **Prof. dr hab. Monika Jakubus**	
Discipline: **Agriculture and horticulture**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**24**
Total numer of hours:	**36**

OBJECTIVE OF THE COURSE:

Presentation for PhD students the current agricultural problems that should be considered in connection with the state of the natural environment. A key element of the module will be to make PhD students aware of the importance of a sustainable and comprehensive approach to modern plant production. In this context, the interactions between soil health, its microbiological activity, the sustainable balance of nutrients and appropriate methods of rational conservation cultivation will be discussed. In the network of these connections, anthropogenic human activity will be emphasized in the light of the need to protect soil resources and shape the food production of the highest quality.

TEACHING METHODS:

Lecture, panel discussion, case study

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - global scientific achievements on specific issues related to a given scientific discipline and the resulting implications for practice -the latest theories and trends in the field of scientific disciplines in which education was carried out at the doctoral school, which will allow the creation of original research concepts and their scientific interpretation -	P8U_W1 P8U_W2
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - solve research tasks innovatively, using independently acquired knowledge of the latest research methods and tools -transfer the results of research work to the economic sphere	P8U_U1 P8U_U2 P8U_U3
In the area of social competences (PhD students are capable to): - independent research planning and independent expansion of existing scientific achievements - creatively taking up challenges in the professional and public sphere, taking into account their ethical dimension -initiating activities in the public interest	P8U_K1 P8U_K2 P8U_K3

Methods of evaluation of outcomes achievement:

Assessment based on a prepared thematic essay

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The series of lectures within this block will thematically refer to issues related to: soil degradation caused by biotic and abiotic factors in relation to modern agricultural practices in the field of plant production. The importance of maintaining soil health and counteracting erosive changes and any anthropogenic soil pollution will be discussed in detail. In this context, the idea of conservation agriculture and the systems associated with it (carbon farming, regenerative agriculture, agroforestry) will be emphasized. Another important issue that will be presented to PhD students is the role and importance of microorganisms in the soil, the transformation of organic compounds and the microbiological preparations used. In connection with the content indicated above, the important issue of plant quality depending on environmental factors as well as agrotechnical practices including the use of mineral fertilizers and maintaining the balance and homeostasis of nutrients will be discussed. When talking about plant production, it is difficult to ignore the issue of biomass, especially waste, which nowadays plays an increasingly important role not only in broadly understood agriculture. Current trends in biomass management will be presented in the last lecture part of the module and will concern the issues of biological and thermal processing of agro-wastes.

The course completion criteria and methods:	Percent of a final grade:
Assessment of thematic essay	70%
Evaluation of activity during classes	30%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

[1] Gurria et al. 2020. Biomass flos in the European Union: The EU biomass flows tool version 2020. Doi: 10.2760/14342,JRC122379

[2] Magdoff F., Van Es H., 2009: Building soils for better crops, sustainable soil management. Wyd. SARE, USDA, 294 p

[3] Marschner P. 2012. Marschner's Mineral Nutrition of Higher Plants. Third Edition, School of Agriculture, Food and Wine. The University of Adelaide, Australia

[4] Olsson et al. 2019. Land degradation. In climate change and land. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjxgfCSwdCEAxX_QvEDHZihC4oQFnoECDwQAQ&url=https%3A%2F%2Fwww.ipcc.ch%2Fsite%2Fassets%2Fuploads%2Fsites%2F4%2F2019%2F11%2F07_Chapter-4.pdf&usg=AOvVaw3itYpdKQ2VftobAOZKzf5a&opi=89978449

[5] Osman K.T. 2014. Soil degradation, conservation and remediation. Springer Science + Bisness Media, Dordrecht

[6] Salgueiro D. 2022. Soil Microbiology, Larsen and Keller Education, NY, USA

[7] Subba R. 2020. Agricultural Microbiology, Third Edition, Medtech, New Delhi

[8] Vendan, Balachandar. 2021 Soil Microbiology, New India Publishing Agency, New Delhi

[9] The current literature on the subject presented within the course.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Plant under stress**	
Name of the course in Polish: **Roślina w warunkach stresu**	
Unit providing the course (Department): **Department of Plant Physiology**	
Course leader: **Prof. UPP dr hab. Tomasz Kleiber**	
Discipline: **Agriculture and Horticulture**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Self-study	**12**
Total numer of hours:	**18**

OBJECTIVE OF THE COURSE:

Learning the physiological basis of plant responses to abiotic stressors and the mechanisms and strategies of resistance, including biological and agricultural resistance.

TEACHING METHODS:

Lecture with the multimedia presentation, discussion

Characteristics of abiotic stress factors. Stress factors vs. plant stress state, damage, biochemical changes, effects (water deficit, salinity, soil pollution). Strategies and mechanisms of resistance (stress avoidance, stress tolerance).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice.	P8U_W_1
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems, - innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools, - transfer research results to the economic sphere.	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature.	P8U_K_1

Methods of evaluation of outcomes achievement:

written work

TEACHING CONTENT:

The course completion criteria and methods: pass based on the result of written work ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Bandurska H. 2022. Drought Stress Responses: Coping Strategy and Resistance. Plants, 11, 922. https://doi.org/10.3390/ plants11070922

Bosiacki M., Kleiber T., Markiewicz B. 2014. Continuous and Induced Phytoextraction — Plant-Based Methods to Remove Heavy Metals from Contaminated Soil "Environmental Risk Assessment of Soil Contamination", book edited by Maria C. Hernandez-Soriano, ISBN 978-953-51-1235-8,

Kleiber T., Borowiak K., Kosiada T., Breś W., Ławniczak B. Application of Selenium and Silicon to Alleviate Short-Term Drought Stress in French Marigold (*Tagetes patula* L.) as a model plant species. Open Chemistry 2020; 18: 1468–1480. . https://doi.org/10.1515/chem-2020-0183

Kleiber T., T. Chadzinikolau, M. Formela-Luboińska, J. Larte Lartey, and T. Kosiada. 2024. "Enhancing Lettuce Drought Tolerance: The Role of Organic Acids in Photosynthesis and Oxidative Defense" *Applied Sciences* 14, no. 12: 5119. https://doi.org/10.3390/app14125119

Starck Z. 2005. Reakcje roślin na abiotyczne stresy środowiskowe – aklimatyzacja i adaptacja. Łąkarstwo w Polsce 8: 173-184.

Woźny A., K. Przybył. 2004. Komórki roślinne w warunkach stresu. Tom I, część 1 i 2. Wyd. naukowe UAM.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Selected topics in organic and conventional plant protection**	
Name of the course in Polish: **Wybrane zagadnienia z ekologicznej i konwencjonalnej ochrony roślin**	
Unit providing the course (Department): **Department of Entomology and Environmental Protection**	
Course leader: **prof. dr hab. Romuald Górski**	
Discipline: **Agriculture and horticulture**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	15
- Self-study	10
Total numer of hours:	25

OBJECTIVE OF THE COURSE:
Update and expand knowledge of selected topics in organic and conventional plant protection

TEACHING METHODS:
Lectures combined with multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): W1. The student knows and understands advanced technologies used in organic and integrated crop production including the use of microorganisms, nematodes and arthropods. - -	
In the area of skills (PhD students know how to): U1. The student is able to analyze biological and environmental data in an advanced way and optimize the application of plant protection methods - -	
In the area of social competences (PhD students are capable to): S1. The student is ready to solve multifaceted problems of crop protection occurring on organic farms and integrated production. -	

Methods of evaluation of outcomes achievement:

- written exam

TEACHING CONTENT:

1. The role of plant protection in the food production chain.
2. Requirements for conventional and organic plant protection.
3. The use of beneficial arthropods and nematodes in organic plant protection.
4. The use of microorganisms to control pests in organic crops.
5. Optimization of methods of weed control in crops.
6. Optimization of fungicide treatment in agricultural crops.
7. Use of plant pathogen biology in reducing the use of chemical protection against diseases.
8. Modern trends in molecular diagnostics of plant pathogens.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods: discussion and written exam	Percent of a final grade: 100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Dehne W.W., AQdam G., Diekmann M., Frahm J., Mauler-Macghnik A., van Halteren P. (1996). Diagnosis and identification of plant pathogens. Wyd. Kluwer Academic Publishers, Dordrecht/Boston/London.
Bernat, E. (2012). Praktyczne wykorzystanie systemu decyzyjnego NegFry w uprawie ziemniaka. Biuletyn Instytutu Hodowli i Aklimatyzacji Roślin, (266).
Dyrektywa Parlamentu Europejskiego i Rady 2009/128/WE z dnia 21 października 2009 r. ustanawiająca ramy wspólnotowego działania na rzecz zrównoważonego stosowania pestycydów.
Górski R. 2008. Integrowana ochrona chryzantem (cz. I). Owoce, Warzywa, Kwiaty 14: 44-47.
Górski R. 2008. Integrowana Ochrona chryzantem (cz. II). Owoce, Warzywa, Kwiaty 15:
Irzykowska L. (2010). Molekularna identyfikacja patogenów. W: Fitopatologia T 1. Red. S. Kryczyński, Z Weber, Wyd. PWRiL, Poznań.
Kapsa, J., Osowski, J. (2002). Wprowadzanie i ocena systemu decyzyjnego NegFry w strategii ochrony przed zarazą ziemniaka w warunkach polskich. Biuletyn Instytutu Hodowli i Aklimatyzacji Roślin, (223-224), 351-359.
Kryczyński S. (2005). Zasady identyfikacji i klasyfikacji wirusów roślin. Fundacja "Rozwój SGGW", Warszawa.
Kryczyński, S., & Weber, Z. (2011). Fitopatologia. Tom 2. Choroby roślin uprawnych. Poznań: PWRiL, 2011
Masny, S., Jankowski, P. (2012). Wpływ czynników meteorologicznych na wysiewy askospor grzyba Venturia inaequalis i występowanie okresów krytycznych parcha jabłoni.[Influence of meteorological factors on release of Venturia inaequalis ascospores and occurrence of critical infection periods of apple scab]. Progress in Plant Protection/Postępy w Ochronie Roślin, 52(3), 638-641.
Meszka, B., Masny, S. (2017). Parch jabłoni. Plantpress.
Rozporządzenie Parlamentu Europejskiego i Rady (WE) NR 1107/2009 z dnia 21 października 2009 r. dotyczące wprowadzania do obrotu środków ochrony roślin
Rozporządzenie Parlamentu Europejskiego i Rady (UE) 2018/848 z dnia 30 maja 2018 r. w sprawie produkcji ekologicznej i znakowania produktów ekologicznych.
Śledź W., Łoś E., Łojkowska E. (2010). Technologia Luminex xMAP® – nowe narzędzie w diagnostyce chorób roślin. Biotechnologia 1(88): 97–108.
Thakur N., Kaur S., Tomar P., Thakur S., Yadav A. N. (2020). Microbial biopesticides: current status and advancement for sustainable agriculture and environment. In New and future developments in microbial biotechnology and bioengineering (pp. 243-282). Elsevier.
Ustawa o ochronie roślin przed agrofagami z dnia 22 stycznia 2021 r., Dz. U. poz. 256
Ustawa o rolnictwie ekologicznym i produkcji ekologicznej z dnia 23 czerwca 2022 r., Dz. U. poz. 1370

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Digital agriculture and horticulture

Name of the course in Polish:
Rolnictwo i ogrodnictwo cyfrowe

Unit providing the course (Department):
Department of Agronomy

Course leader:
prof. UPP dr hab. inż. Piotr Rybacki

Discipline:	Semester:
Agriculture and horticulture	**IV**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
- Practical classes	**6**
Total number of hours:	**14**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarise students with the concept of 'Agriculture 4.0' and methods of data digitisation at the stage of collection, analysis and visualisation.

TEACHING METHODS:

Problem lecture, demonstration of modern digital solutions, discussion,

Methods of evaluation of outcomes achievement:

Implementation of the commissioned task - presentation, lecture,

TEACHING CONTENT:

The essence and meaning of the idea of "Agriculture 4.0", Digital systems for monitoring field crops, point fertilization, precise control of weeds and pests, the use of machines and autonomous vehicles in agricultural production, systems of parallel machine guidance, automatic management of the microclimate of livestock rooms and herd, digital warehouse management systems , drying rooms and storage rooms for agricultural products. Using modern communication techniques and obtaining industry information.

The course completion criteria and methods:	Percent of a final grade:
Presentation of a selected scientific problem	30%
Passing the theoretical part	70%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

Korzeniowski S. 2013. Rolnictwo energetyczne i precyzyjne. Wybrane zagadnienia. Państwowa Wyższa Szkoła Zawodowa w Suwałkach. ISBN:978-83-934-3405-3
Stępień M., Pudełko R., Gozdowski D., Dobers E. S., Samborski S. 2022. Rolnictwo precyzyjne. Wydawnictwo Naukowe PWN, Warszawa, ISBN:9788301198985

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Modern technologies for horticulture crops**	
Name of the course in Polish: **Nowoczesne technologie uprawy roślin ogrodniczych**	
Unit providing the course (Department): **Department of Plant Physiology, Department of Vegetable Crops**	
Course leader: **prof. UPP dr hab. Tomasz Kleiber**	
Discipline: **Agriculture and horticulture**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	**14**
Total numer of hours:	**14**

OBJECTIVE OF THE COURSE:
Introduction of students to modern methods of horticultural crop production in the soil and under cover

TEACHING METHODS:
Lectures with multimedia presentations, discussion, example of calculation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): E1 - The latest research in horticultural production E2 - Modern trends in horticultural production management-	W1 W2
In the area of skills (PhD students know how to): E3 - Use knowledge gained for own research projects- -	U1
In the area of social competences (PhD students are capable to): E4 - plan horticultural crop experiments independently -	K1

Methods of evaluation of outcomes achievement:

Written pass

TEACHING CONTENT:

Microgreens as a new trend in vegetable production. Light control in spice crops. Tools and software to facilitate production control: automatic measurement systems, computer simulations, decision support systems and climate computers. Vertical gardens. The technology of crop nutrition under covers (technical equipment, among other fertigation systems). Presentation of soilless cultivation using organic and inert substrates. Quality of water for fertigation systems. Controlled plant nutrition. Methods for calculating nutrient requirements in cover crops and outdoor cultivation. Nutrition of orchard crops.

The course completion criteria and methods:	Percent of a final grade:
Written pass ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100 %

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Frąszczak, B.; Kula-Maximenko, M. 2022. The biometric parameters of microgreen crops grown under various light conditions. Agriculture, 12, 576.

Microgreens Growing Guide (https://docs.google.com/document/d/1wtDdr0L3tfEqtgdbhjFad0SlW2TTY-6ynb2JLuGkgBI/edit?usp=sharing)

Frąszczak, B.; Kula-Maximenko, M. The Preferences of Different Cultivars of Lettuce Seedlings (*Lactuca sativa* L.) for the Spectral Composition of Light. *Agronomy* 2021, *11*, 1211.

Dróżdż-Szczybura M. 2014. Vertical farms in the cities of the future. Technical transactions. Architecture, 2-A: 51-66

Benkea K., Tomkins B. 2017. Future food-production systems: vertical farming and controlled-environment agriculture. Sustainabilty: Science, Practice and Policy 13: 13–26.

Chapter 'Plant nutrition' (aut. Kleiber T.) in book „Selected topics in horticulture", edited by prof. H. Hołubowicz, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu

Rozdział w monografii: Markiewicz B., Kleiber T., Bosiacki M. 2016. Hydroponic Cultivation of Tomato; „Alternative Crops and Cropping Systems", book edited by Petr Konvalina, ISBN 978-953-51-2279-1,

The Fertigation Bible Technologies to optimise fertigation in intensive horticulture.Editors Rodney Thompson, Ilse Delcour, Els Berckmoes, Eleftheria Stavridou. European Union (2018)

Kleiber T., Borowiak K., Schroeter-Zakrzewska A., Budka A., Osiecki Sz. Effect of ozone treatment and light colour on photosynthesis and yield of lettuce. Scientia Horticulturae 217 (2017) 130–136

Komosa A., Markiewicz B., Kleiber T., Mieloszyk E., Mieloch M. 2020. *Yield and nutrient status of greenhouse tomato (Lycopersicon esculentum* Mill.*) grown in new and re-used rockwool, polyurethane, NFT and aeroponics*. J. Elem., 25(2): 523-536.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Selected aspects of modern fruit production**	
Name of the course in Polish: **Wybrane aspekty nowoczesnego sadownictwa**	
Unit providing the course (Department): **Department of Ornamental Plants, Dendrology and Pomology**	
Course leader: **prof. dr hab. Grzegorz Łysiak**	
Discipline: **Agriculture and Horticulture**	Semester:

TYPE OF CLASSES:
(course load)

- Lectures	**10**
- other with teacher participation (consultations)	**2**
- Self-study	**4**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

Getting to know the latest trends in modern fruit production

TEACHING METHODS:

Lectures using multimedia presentations.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice, - the latest theories and trends in disciplines, thus facilitating creation of original research concepts and their scientific interpretation. -	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - independently plan and realise their scientific development, as well as inspire and/or organise the development of others	P8U_U_4
In the area of social competences (PhD students are capable to): - independently plan research and independently broaden the existing body of scientific literature - initiate actions for the public good (P8U_K_3),	P8U_K_1 P8U_K_3

Methods of evaluation of outcomes achievement:

Verification of knowledge by means of an exam.
Self-reflection on your knowledge and skills.
Assessment of students' activity during classes.

TEACHING CONTENT:

Storage methods of horticultural commodities. Methods of determining fruit maturity and optimal harvest date. Integrated and ecological fruit production. Integrated and ecological methods of combating diseases and pests in orchards. Will climate change allow the cultivation of new species of fruit plants? The Use of Temperature Based Indices for Estimation of Fruit Production Conditions and Risks in Temperate Climates. Mineral and chemical composition of fruits and the biologically active substances they contain.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:	Percent of a final grade:
Final assessment of lectures based on active participation in the discussion ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Handbook of Environmental Physiology of Fruit Crops. volume I, Temperate Crops (2018)
2. Postharvest Biology and Nanotechnology of Fruits, Vegetables and Flowers (2018)
3. Automation in Tree Fruit Production_ Principles and Practice (2017)
4. Fruit and Vegetable Phytochemicals, Chemistry and Human Health, John Wiley & Sons (2018)

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **New trends in plant breeding and seed production**	
Name of the course in Polish: **Nowe trendy w hodowli roślin i nasiennictwie**	
Unit providing the course (Department): **Department of Plant Pathology, Seed Science and Technology, Department of Genetics and Plant Breeding, Department of Agronomy**	
Course leader: **prof. dr hab. Roman Hołubowicz**	
Discipline: **Agriculture and Horticulture**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Lectures	15
- Self-study	30
Total numer of hours:	45

OBJECTIVE OF THE COURSE:

Teaching PhD students about the newest technologies and techniques used in Plant Breeding, Seed Science and Technology

TEACHING METHODS:

Lectures and branch movies

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - In the area of knowledge graduates know and understand the published papers concerning plant breeding, seed science and technology and the implications coming out of them for practice - In the area of knowledge graduates know and understand the principles of planning and financing research projects concerning plant breeding, seed science and technology and the principles of their evaluation	P8U_W01 P8U_W03
In the area of skills (PhD students know how to): - In the area of skills graduates know how to use their knowledge to create their own problems in research in the area of plant breeding, seed science and technology - In the area of skills graduates know how to transfer the results of their research work in the area of plant breeding, seed science and technology to the commercial area	P8U_U01 P8U_U03
In the area of social competences (PhD students are capable to): - in the area of social competences the graduates are capable of planning independently their research experiments in plant breeding, seed science and technology and increasing independently research achievements in this area - in the area of social competences the graduates are capable of initiating activities in the area of plant breeding, seed science and technology for the benefit of the public interest	P8U_K01 P8U_K03

Methods of evaluation of outcomes achievement:

Evaluation of essays on selected subjects

TEACHING CONTENT:

Lectures: New methods of improving seed quality. Seed market in Poland and in the world. Improving crop disease resistance with modern genetics and breeding techniques. Marker assisted selection in plant breeding. Specifics of agricultural seed production and the role of variety and certified seeds.

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The course completion criteria and methods:	Percent of a final grade:
Evaluation (for grades) of an essay on a selected topic □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Hołubowicz, R. Seed Production and Technology. Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu: Poznań, 2016
Hołubowicz R. 2016. Tylko dla amatorów? (cz. 1.). Warzywa i Owoce Miękkie. 6:20-22.
Hołubowicz R. 2016. Tylko dla amatorów? (cz. 2.). Warzywa i Owoce Miękkie. 7:20-22.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Importance and protection of biodiversity in agricultural and horticultural production

Name of the course in Polish:
Znaczenie i ochrona różnorodności biologicznej w produkcji rolniczej i ogrodniczej

Unit providing the course (Department):
Department Entomology and Environmental Protection

Course leader:
Prof. UPP dr hab. Paweł Sienkiewicz

Discipline:	Semester:
Agriculture and horticulture	**VI**

TYPE OF CLASSES:
(course load)

- Lectures (in part as a discussion)	**10**
- Self-study	**10**
Total number of hours:	**20**

OBJECTIVE OF THE COURSE:

The aim of the course is to provide an understanding of biodiversity and its importance and protection in wider agricultural production. To familiarise students with ways of reducing negative human impact on biodiversity.

TEACHING METHODS:

Multimedia presentations, video, discussion

Methods of evaluation of outcomes achievement:

Evaluation of activity
Preparation of a study of an issue in the form of a multimedia presentation or film
Final oral examination

TEACHING CONTENT:

Brief description of the programme content:
During lectures and conversation classes, students will be able to expand their knowledge of current issues related to the shaping of a nature-friendly agricultural environment. Water conservation, which in times of climate change is, together with the heterogeneity of terrestrial landscape forms, a key element in biodiversity conservation, will be addressed in particular. The impact of climate change on biodiversity will also be discussed. The legal basis for biodiversity conservation will be presented.

Topics of the individual lectures:
1. Biodiversity theoretical basis
2. Protection of biodiversity in EU legislation and international conventions
3. Biodiversity of Poland against the background of European and world diversity
4. Biodiversity in aquatic and wetland ecosystems
5 The importance of biodiversity and the causes of threats to agricultural and horticultural production
6. Species disappearance, population decline and alien and invasive species, contemporary problems of biodiversity conservation
7. Changes in biodiversity due to climate change
8. Ways of maintaining biodiversity in agroecosystems and opportunities for its introduction (good practices)
9. Measurement and assessment of biodiversity I
10. Measurement and assessment of biodiversity II

The course completion criteria and methods:	Percent of a final grade:
Form: exam	
Criteria:	
Activity during conversation classes	20%
Presentation of a selected issue based on the literature or a case study	30%
Oral exam	50%

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

RECOMMENDED LITERATURE:

ANDRZEJEWSKI R., WEIGLE A. (red.) 2003. Różnorodność biologiczna Polski. Narodowa – Fundacja Ochrony Środowiska, Warszawa
„Czerwone Księgi Zwierząt i Roślin";
GŁOWACIŃSKI Z. [ed.] 2002: Czerwona lista zwierząt ginących i zagrożonych w Polsce. IOP PAN, Kraków;
GUTOWSKI J. M., BOBIEC A., Ciach M., Kujawa A., Zub K., Pawlaczyk P. 2022. Drugie życie drzewa. Fundacja WWF Polska (dostępny bezpłatny pdf online);
KREBS Ch. J., 2011. Ekologia. PWN, Warszawa;
MIREK Z., ZARZYCKI K., WOJEWODA W., Szeląg Z. 2006: Red list of plants and fungi in Poland. Kraków;
PAULIN A. S. 2007: Biologiczne podstawy ochrony przyrody. PWN;
RICHLING A., SOLON J., 2011: Ekologia Krajobrazu. PWN, Warszawa;
SIENKIEWICZ P. 2019: Carabid communities (Coleoptera, Carabidae) of xerothermic grasslands of the eastern edge of Central European Plain. Polish Entomological Monographs, vol. 18, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Polish Entomological Society, pp. 1- 195;
SIMONIDES E. 2008: Ochrona przyrody. WUW, Warszawa;
STALENGA J., Brzezińska K., Stańska M., Błaszkowska B., Czekała W., Feledyn-Szewczyk B., Gutkowska A., Hajdamowicz I., Kaliszewski G., Kazuń A., Kotowska K., Kulik M., Nasiłowska B., Radzikowski P., Sienkiewicz P., Staniak M., Teper D., Berbeć A., Dach J., Dzierża P., Ebertowska B., Kowalska M., Stasiak K., Szczepaniuk A., Wielgosz M. 2016. Code of good agricultural practices supporting biodiversity. Monograph. IUNG-PIB, Puławy: 1-250. ISBN 978-83-7562-249-2;
WEINER J., 2020. Życie i ewolucja biosfery. Podręcznik ekologii ogólnej, PWN, Warszawa;

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Genetic basis of plant resistance to pests**	
Name of the course in Polish: **Genetyczne podstawy odporności roślin na agrofagi**	
Unit providing the course (Department): **Genetics and Plant Breeding**	
Course leader: **Prof. UPP dr hab. Janetta Niemann**	
Discipline: **Agriculture and Horticulture**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Lectures	**10**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:

The course aims to demonstrate Ph.D. students knowledge in the field of resistance breeding and to familiarize with the latest research on genetic resistance mechanisms existing in plants.

TEACHING METHODS:

Lectures in the form of multimedia presentations.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - The PhD student knows and understands the mechanisms responsible for plant resistance and their conditions at various levels of organization. He has knowledge of plant genetic resistance to fungal pathogens. - The PhD student demonstrates knowledge of contemporary research trends in the field of plant resistance breeding. - The PhD student has in-depth knowledge of the interactions between plants and pests.	P8U_W
In the area of skills (PhD students know how to): - The PhD student is able to independently and comprehensively analyze problems related to plant resistance to pests. - The PhD student has the ability to search and use information from various sources regarding the mutual relations between plants and harmful organisms. - The PhD student is able to assess the risk of developing and breaking resistance in plants.	P8U_U
In the area of social competences (PhD students are capable to): -The PhD student is aware of the use of plant defense mechanisms to improve their health and ensure food and feed security. - The PhD student is aware of constant updating of knowledge. - The PhD student shows creativity in choosing preventive and environmentally safe activities in order to limit the resistance breakdown.	P8U_K

Methods of evaluation of outcomes achievement:

Active participation in discussions and preparing individual presentations.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

The concept of biological stress and infectious disease. Plant reactions to stress. Plant resistance to pathogens and pests, physiological and genetic classification of resistance. Plant resistance mechanisms in relation to pathogens and pests. Types of immunity and their genetic determinants. Possibilities of using genetic resistance in plant protection

The course completion criteria and methods:	Percent of a final grade:
Presence and active participation in the discussion. Oral presentation – assessment. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

1. Michalik B. 2009. Hodowla roślin z elementami genetyki i biotechnologii. PWRiL.
2. Malepszy S. 2023. Biotechnologia roślin. Wydawnictwo naukowe PWN, Warszawa.
3. Acquaah G. 2020. Principles of Plant Genetics and Breeding, 3rd Edition. John Wiley and Sons Ltd.
4. Priyadarshan P. M. 2019. Plant Breeding: Classical to moredr. Springer Nature.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Biotechnology and food microbiology**	
Name of the course in Polish: **Biotechnologia i mikrobiologia żywności**	
Unit providing the course (Department): **Department of Biotechnology and Food Microbiology**	
Course leader: **Prof. UPP dr hab. Wojciech Białas**	
Discipline: **Nutrition and food technology**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**2**
- Practical classes	**10**
- exam	**1**
- Self-study	**2**
Total number of hours:	**15**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce doctoral students to practical aspects and new trends/techniques in food microbial diagnostics and industrial biotechnology. The basis of the organization of work in a genetic laboratory and the organization of work with microorganisms on a laboratory scale are also presented.

TEACHING METHODS:

Multimedia presentation, conducting laboratory experiments

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the current principles and latest trends in microbiological analysis of food and industrial biotechnology, which enables the creation of original research concepts and their scientific interpretation in the field of food biotechnology.	P8_U_W_2
In the area of skills (PhD students know how to): -use the knowledge of food biotechnology and microbiology to formulate their own research problems - independently plan and implement research in the field of biotechnology and food microbiology	P8_U_U_1 P8U_U_4
In the area of social competences (PhD students are capable to): - independently plan research in the field of food biotechnology and microbiology and independently broaden the existing body of scientific literature.	P8U_K_1

Methods of evaluation of outcomes achievement:

Exam and protocols. Performance of experiments in the microbiology and genetic laboratory.

TEACHING CONTENT:

Lecture:
New trends and techniques in food microbial diagnostics and industrial biotechnology Workshops:
- Organization of work in the microbiology laboratory. Microbiological analysis of selected food products
- Organization of work in the genetic laboratory. Use of high-resolution melting analysis in detection of adulteration of selected fermented products.

The course completion criteria and methods:	Percent of a final grade:
The prerequisite for passing the exercises is active participation in laboratory classes and receiving a positive evaluation of the protocols of the performed experiments.	40%
The exam will be held in written form (test). A positive grade will be given with at least 60% correct answers.	60%
□ **pass (Z)** □ **course credit with a grade** ☒**examination**	

RECOMMENDED LITERATURE:

Wheelis M. Principles of modern microbiology
Norma PN-EN ISO/EIC 17025
Borkowska M., Celińska E. 2023. Multiple region high resolution melting-based method for accurate differentiation of food-derived yeast at species level resolution. Food Microbiology, 109, 104120
Druml B., Cichna-Markl M. 2014. High resolution melting (HRM) analysis of DNA – its role and potential in food analysis. Food Chemistry, 158, 245-254
A Guide to high resolution melting (HRM) analysis – Applied Biosystem protocols

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Application of bioinformatics and computer tools in research studies**	
Name of the course in Polish: **Zastosowanie narzędzi bioinformatycznych i informatycznych w pracach badawczych**	
Unit providing the course (Department): **Department of Meat Technology, Department of Food Technology of Plant Origin**	
Course leader: **prof. dr hab. Magdalena Montowska**	
Discipline: **Nutrition and food technology**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Familiarization of students with proteomic tools for protein and peptide identification and acquire knowledge and skills in handling and creating a researcher's portfolio in scientific databases. The ability to use modern tools for scientific work and time management skills. Presentation of mass spectrometry methods for protein and peptide detection and application of proteomic strategies. Bioinformatic analysis of MS/MS results. Identification of specific peptide markers. Verification of protein and peptide specificity. Proteomics in food authenticity and allergen detection.

TEACHING METHODS:

Lectures with a multimedia presentation, workshops, instructional videos, conversations.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - Global scientific achievements on detailed issues related to proteomics and peptide marker detection and the resulting implications for protein analysis in food products.Knows and understands the need to create scientific networks in order to expand knowledge and develop new research fields. - The latest methods and trends in the field of proteomics which will allow for the creation of original research concepts and their scientific interpretation. - The need to use modern tools for a researcher to better visualize the obtained results and organize literature databases and acquire new knowledge in the field of food technology and nutritional research.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - Creatively formulate own proteomic research problems and is able to manage its own time and use it effectively. -Innovatively solve research tasks using independently acquired knowledge about the latest proteomic methods and bioinformatic tools. - Plan research tasks in time and work according to the planned schedule. - Use modern scientific tools to organize scientific work.	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_4
In the area of social competences (PhD students are capable to): - Plan proteomic research and independently increase the existing scientific achievements. - Create his own scientific portfolio and collaborate with other scientists as well as promote his own scientific achievements. -Create research networks at the national and international level.	P8U_K_1

Methods of evaluation of outcomes achievement:

Protocol of the completed partial tasks. Verification of scientific profiles in databases. Preparation of presentations and data visualization, conversations.

TEACHING CONTENT:

Basics of proteomic analysis. Peptide sequencing from MS/MS spectrum. In-silico enzymatic digestion. Protein sequence alignment using Clustal Omega for in silico peptide discovery. Determination of peptide specificity with Protein BLAST tool. Identification of peptide markers from MS/MS data using MASCOT Server. Protein-protein interaction (PPI) network analysis.
Basics of time management and scientific projects. Using modern tools for literature management (literature managers). Creating an active portfolio on scientific websites (ORCID, ResearchGate). Fundamentals of research data visualization. Principles of content presentation.

The course completion criteria and methods:
Report of completed tasks for assessment.

Percent of a final grade: 100%

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

RECOMMENDED LITERATURE:

1. Montowska M. 2017. Using peptidomics to determine the authenticity of processed meat. In: Proteomics in Food Science From Farm to Fork. Edited by M.L. Colgrave. Academic Press, Elsevier Inc., 225-240 (ISBN: 978-0-12-804007-2).
2. Montowska M. 2013. Proteins and peptides in the authentication of meat and meat products. In: Food Authentication using Bioorganic Molecules. Edited by S. Sforza. DEStech, USA, 75-102 (ISBN: 978-1-60595-045-7).
3. Spectrometry-Based Chemical Proteomics. W. Andy Tao (Editor), Ying Zhang (Editor), Wiley Online Library, July 2019. E-Book 978-1-118-97020-1.
4. Mallick, P., Kuster. B. (2010). Proteomics: a pragmatic perspective. Nature Biotechnology, 28, 695-709. doi:10.1038/nbt.1658.
5. Montowka M. Fornal E. (2018). Detection of peptide markers of soy, milk and egg white allergenic proteins in poultry products by LC-Q-TOF-MS/MS. LWT - Food Science and Technology, 87, 310-317. http://dx.doi.org/10.1016/j.lwt.2017.08.091
6. Fornal, E. & Montowska, M. (2019). Species-specific peptide-based liquid chromatography–mass spectrometry monitoring of three poultry species in processed meat products. Food Chemistry, 283, 489–498. https://doi.org/10.1016/j.foodchem.2019.01.074
7. Kotecka-Majchrzak K., Sumara A., Fornal E., Montowska M. (2021). Proteomic analysis of oilseed cake: a comparative study of species-specific proteins and peptides extracted from ten seed species. J Sci Food Agric, 101: 297–306. (wileyonlinelibrary.com) DOI 10.1002/jsfa.10643
8. Mendeley.com
9. https://www.researchgate.net/
10. https://orcid.org/
11. https://desktop-download.mendeley.com/download/Getting_Started_Guide.pdf
12. Guide to Building a Research Profile, Shinton consulting, 2013
13. Time Management, Sue W. Chapman, Michael Rupured, The University of Georgia, 2008.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Department of Food Technology of Plant Origin**	
Course leader: **Prof. dr hab. Jolanta Tomaszewska-Gras**	
Discipline: **Nutrition and food technology**	Semester: **2, 4, 6, 7**

TYPE OF CLASSES:
(course load) I each semester

- Seminar	**6**
- consultation with supervisor	**2**
- Self-study	**4**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim is to activate PhD students to independent and mature analysis of research problems. PhD studentsprepare oral presentations on a given topic, obtain scientific information and data from appropriate literature sources in order to acquire the state of knowledge on the issue being researched. Additionally, by preparing and presenting audiovisual presentations and participating in seminar discussions, doctoral students acquire the ability to convey their knowledge in an interesting, clear and understandable way.

TEACHING METHODS:

Multimedia presentation, discussion,

Presentations by PhD students presenting the purpose and scientific justification of the undertaken research problem and concerning the prepared dissertation - in the form of an audiovisual presentation and group discussion.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the of knowledge, the Graduates (know and understand): -the conditions regarding intellectual property and confidentiality rules related to scientific and teaching activities -know and verify the world's scientific achievements regarding specific issues related to the discipline of food technology and nutrition -know the latest theories and trends in the scope of the research topics being pursued	P8U_W_4
In the area of skills (PhD students know how to): - present their own scientific achievements and verify the content provided	P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): -maintain, develop the importance and role of creative environments in social life	P8U_K_5

Methods of evaluation of outcomes achievement:
Assessment of the ability to discuss and prepare a presentation

TEACHING CONTENT:

1. Presentation and discussion on research goals and hypotheses prepared by PhD students (sem. 2)
2. Discussion on the preparation of the Individual Research Plan. (sem. 2)
3. Presentations and discussions on the realization of IRP and experimental data for the mid-term evaluation (sem. 4)
4. Presentations and discussions regarding prepared scientific publications (sem. 6)
5. Discussion on the editorial rules for preparing a written doctoral dissertation (sem. 6)
6. Preparation for the defense of a doctoral thesis. Discussion on the rules of preparing presentations for the defense (sem. 7)

The course completion criteria and methods:	Percent of a final grade:
Audiovisual presentations - 1 per semester (ppt)	90%
Group discussion on a given topic	10%

☒**pass (Z)** □ **course credit with a grade** □ **examination**

RECOMMENDED LITERATURE:

Thomas C.G.. Research Methodology and Scientific Writing. Springer Nature Switzerland AG. 2021.
Turabian K. L. Manual for Writers of Research Papers, Theses, and Dissertations. The University of Chicago Press,. 2018
Kumar P. B. Kumar P. Scientific Research Methodology. Concepts & Quality. Discovery Publishing House Pvt Ltd, 2019
Van den Akker M. The Ultimate Guide to Doing a Phd. World Scientific Pub Europe. 2023
Van Gundy A. Shauntey J. Writing Your Doctoral Dissertation or Thesis Faster. SAGE Publications Inc, 2014
Wojcik, K. Piszę akademicką pracę promocyjną : licencjacką, magisterską, doktorską. Warszawa. Wydawnictwo Placet. 2005.
Lewandowska E., Piątek M. Rozprawa doktorska jako przedmiot prawa autorskiego Acta Iuris Stetinensis. 2017/18/2
Marszałek L. Edytorstwo publikacji naukowych. Warszawa: PWN 1986
Pyrża A. Poradnik wynalazcy. Wyd. Krajowa Izba Gospodarcza. Warszawa 2009.
Wójcik K., Piszę pracę promocyjną – licencjacką, magisterską, doktorską, Wolters Kluwer Polska, Warszawa 2015.
Bieguński L. Ochrona własności przemysłowej. Wyd. Polska Agencja Rozwoju Przedsiębiorczości. Warszawa 2004.
Weiner J. Technika pisania i prezentowania przyrodniczych prac naukowych. Poradnik praktyczny. PWN Warszawa 2018

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Chromatography and hyphenated techniques in food analysis**	
Name of the course in Polish: **Chromatografia i techniki łączone w analizie żywności**	
Unit providing the course (Department): **Katedra Technologii Żywności Pochodzenia Roślinnego** **Katedra Chemii, Wydział Leśny i Technologii Drewna**	
Course leader: **Prof. dr hab. Henryk Jeleń**	
Discipline: **Nutrition and food technology**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The course is aimed at presentation of chromatography (mainly GC, HPLC) and hyphenated techniques (GC-MS) potential in food analysis. It is to present the various options of chromatographic separation to the analysis of different products.

TEACHING METHODS:

Experimental learning based on hands-on approach in the laboratory preceded by theoretical background information to understand the fundamentals, especially in method development.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. The up-to date information on chromatographic techniques that allow them to tailor appropriate technique for specific food application 2. Fundamentals, possibilities and limitations of techniques used.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 1. Solve his/hers current research analytical problems with presented chromatographic methods (if applicable) 2. Provide a rationale explanation for method choice in GC, HPLC and GC-MS based on a knowledge provided in a workshop.	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): 1. Team work 2. Engage in point-of-view exchange and discussion	P8U_K_4 P8U_K_2

Methods of evaluation of outcomes achievement:

- Laboratory experiments involving various techniques for which an analytical report will be generated with crucial methodological issues, analytical conditions, results and possible explanation.
- A short multiple choice test on methods fundamentals

TEACHING CONTENT:

Basics of theory of chromatographic separation; role of column in chromatography, comparison of gas with liquid chromatography; Sample introduction and compounds detection in chromatography; Fundamentals of mass spectrometry and hyphenated techniques (GC-MS, LC-MS); What to analyze by which techniques – possibilities and limitations. Focus on analysis of basic primary metabolites (aminoacids by HPLC and GC, sugars and organic acids by HPLC and GC, - derivatization in chromatography, fatty acids as FAME) as well as secondary metabolites (terpenes in essential oils by GC-MS and volatile compounds in fermented beverages by HS-GC-FID, GC-FID, mycotoxins and sterols by HPLC).

Four experiments run within the course:

1. Analysis of alcoholic beverages and FAME using dual column GC-FID system (concept of column selectivity, retention times, linear retention indices, quantitative aspects of chromatography)
2. Analysis of alcoholic beverages using static headspace – gas chromatography with FID detection (concept of partition coefficient, matrix effects)
3. Analysis of mycotoxins/sterols by HPLC/LC-MS (concept of selective detection in HPLC)
4. Analysis of essential oils/alcoholic beverages by GC-MS (concept of identification of compounds based on mass spectra and retention)

The course completion criteria and methods:	Percent of a final grade:
1. Assessment of PhD students' lab work – preparing and carrying on the experiments. Explanation of the experiments to the others.	20%
2. Written lab report with appropriate observations and conclusions	50%
3. Results of a multiple choice test on chromatography/mass spectrometry fundamentals	30%
□ **pass (Z)** ☒**course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Poole CF. The essence of chromatography, Elsevier, 2003
2. Watson JT, Sparkman OD, Introduction to mass spectrometry. John Wiley & Sons Ltd, 4th Edition, 2007
3. Lehotay SJ, Hajslova J. Application of gas chromatography in food analysis. Trends in Analytical Chemistry, 2002, 21, 686 – 697
4. Di Stefano, V, Avellone G, Bongiorno D, Cunsolo V, Muccilli V, Sforza S, Dossena A, Drahos L, Vekey K. Applications of liquid chromatography – mass spectrometry for food analysis. J. Chromatogr. A. 2012, 1259, 74-85
5. Improved amino acid methods using Agilent Zorbaz eclipse plus C18 columns for a variety of Agilent instrumentation and separation goals. Application note Agilent Technologies 5990-4547EN. Alternatively – Amino acids analysis. Application Compendium. Agilent Technologies 5994-0033EN-us-agilent
6. He X., Gaca A., Jeleń HH. Determination of volatile compounds in Baijiu using simultaneous chromatographic analysis on two columns. J. Inst. Brew. 2020, 126, 2016-212

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures on food analytics**	
Name of the course in Polish: **Wykłady monograficzne z analityki żywności**	
Unit providing the course (Department): **Department of Food Biochemistry and Analysis** **Department of Food Technology of Plant Origin**	
Course leader: **Prof. UPP dr hab. Dorota Kwiatkowska-Piasecka**	
Discipline: **Nutrition and food technology**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Exam	**1**
- Self-study	**3**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce the theoretical and practical aspects of advanced analytical methods used in research laboratories.

TEACHING METHODS:

Lectures with Power Point presentation connected with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
● Global developments in application of analytical methods in scientific research	P8U_W_1
● Principles of these methods, possibility of applications and limitations	P8U_W_2
In the area of skills (PhD students know how to):	P8U_U_1
● Select an analytical method appropriate for solving a specific research problem	
● Interpret results obtained using advanced analytical methods	P8U_U_2
In the area of social competences (PhD students are capable to):	
● Plan scientific research using advanced analytical methods	P8U_K_1
● Actively participate in discussions related to the selection of analytical methods	P8U_K_2
● Present their position in a substantive manner, remaining open to various perspectives when solving scientific problems.	P8U_K_4

Methods of evaluation of outcomes achievement:

Discussion during the lecture

Exam

TEACHING CONTENT:

The PhD students will discuss sample preparation techniques, which are a key step in food analysis, and various advanced analytical methods applicable to scientific research. Special attention will be given to practical aspects of methods application.

Lecture topics:

- Advanced Sample Preparation Methods: Enhancing Precision in Food Analysis
- Application of dynamic light scattering and reflection spectroscopy in food analysis
- Fluorescence spectroscopy as an analytical tool in food analysis
- Antibodies as precision analytical tools in food research
- ELISA and WesternBlotting, a powerful tools in protein research
- Rational fundamentals of method development in chromatography
- Basics of mass spectrometry
- GPC/SEC theory and background – analysis of food
- Thermal properties of food components
- Differential scanning calorimetry. Fundamentals, methods and application in food analysis
- Enzyme as analytical tool - benefits and problems of their use in food analysis
- Analytical approach to assess allergenicity of novel food proteins and protein source

The course completion criteria and methods:	Percent of a final grade:
The exam will be held in written form of the test. A positive grade will be given with at least 60% correct answers	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Advances in Food Analysis. (2020). Edited by Alessandra Gentili and Chiara Fanali. Printed Edition of the Special Issue Publish in Molecules. MDPI, Basel, Switzerland. https://doi.org/10.3390/books978-3-03921-743-4
2. Alahmad W., Kaya S.I., Cetinaya A., Varanusupakul P., Ozkan S.A. (2023). Green chemistry methods for food analysis: Overview of sample preparation and determination. Advances in Sample Preparation, 5, 1000053. https://doi.org/10.1016/j.sampre.2023.100053
3. Fernandez, A., Mills, E. N. C., Koning, F., & Moreno, F. J. (2021). Allergenicity assessment of novel food proteins: what should be improved? Trends In Biotechnology, 39(1), 4-8. doi:10.1016/j.tibtech.2020.05.011
4. Jixiang Tian, Minmei An, Xiaoang Zhao, Yun Wang,& Murtaza Hasan. (2023). Advances in Fluorescent Sensing Carbon Dots: An Account of Food Analysis. *ACS Omega 8* (10), 9031-9039. https://doi.org/10.1021/acsomega.2c07986

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Catering technology, molecular cuisine and functional foods**	
Name of the course in Polish: **Technologia gastronomiczna, kuchnia molekularna i żywność funkcjonalna**	
Unit providing the course (Department): **Department of Gastronomy Science and Functional Foods**	
Course leader: **prof. dr hab. Anna Gramza-Michałowska**	
Discipline: **Nutrition and food technology**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- exam	**1**
Total numer of hours:	**13**

OBJECTIVE OF THE COURSE:

To provide knowledge in the field of food formulation aimed at specific functional values and use in the nutrition of consumers. To consolidate the knowledge of different techniques of preservation, forming the nutritional value, safety and giving the suitable sensory characteristics of food.

TEACHING METHODS:

Lectures with multimedia presentation, discussion, exhibits, films - audiovisual methods.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -Knows the recent developments in the field of functional foods and the principles of its formulation. -Understands the need for the application of the latest scientific knowledge for the development of foods with defined functional qualities.	P8U_W1 P8U_W2
In the area of skills (PhD students know how to): - Is capable of independently designing a product formulation for defined consumer requirements.	P8U_U1
In the area of social competences (PhD students are capable to): - Is ready to undertake actions aiming at food formulation for better quality of life of the society.	P8U_K

Methods of evaluation of outcomes achievement:

Evaluation of the performance and active discussion during lectures. Exam.

TEACHING CONTENT:

Functional foods – innovation and trends. Sensory analysis in scientific research. Fats and oils, their processing technology, nutritional value and utilization in food gastronomy. Functional food with antidiabetic activity. Addressing safety threats in food production – HACCP. 3D printing for customized food production – innovation versus traditional foods. Molecular gastronomy – characteristics, food pairing, note by note, food additives as structural, gustatory and olfactory characteristics.

The course completion criteria and methods: A written exam on the subject area of the course. The exam will be held in written form (test). A positive grade will be given with at least 60% of total points. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Świderski F. (red.): Żywność wygodna i żywność funkcjonalna. WNT, Warszawa 2022; R. Wildman, Handbook of Nutraceuticals and Functional Foods, CRC Press, 2006; Editor(s): Maria Saarela, In Woodhead Publishing Series in Food Science, Technology and Nutrition, Functional Foods (Second Edition), Woodhead Publishing, 2011; Chukwuebuka Egbuna, Genevieve Dable Tupas Functional Foods and Nutraceuticals Bioactive Components, Formulations and Innovations, Springer 2020; Leah Coles Functional Foods The Connection Between Nutrition, Health, and Food Science, CRC Press 2013; GUO, Mingro. Functional foods: principles and technology. Elsevier, 2013; Journal's papers: Journal of Functional Foods; Food Research International; Critical Reviews in Food Science and Nutrition; Journal of Medicinal Foods. Building a Meal: From Molecular Gastronomy to Culinary Constructivism" Herve This, wyd. Columbia University Press, 2011; "Handbook of Molecular Gastronomy: Scientific Foundations and Culinary Applications" Burke, Kelly, Lavelle, This, CRC Press; 2021; Kitchen Mysteries" Herve This, wyd. Columbia University Press, 2010; Molecular Gastronomy: Scientific Cuisine Demystified" Jose Sanchez, wyd. John Wiley & Sons, 2015; Note-by-Note Cooking: The Future of Food" Herve This, wyd. Columbia University Press, 2016; "The Science of Cooking: Every Question Answered to Perfect your Cooking" Stuart Farrimond, wyd. Dorling Kindersley Ltd., 2017

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Workshops on a selected advanced method of food analysis (immunochemistry and differential scanning calorimetry)**	
Name of the course in Polish: **Warsztaty z wybranych metod analizy żywności (immunochemia i różnicowa kalorymetria skaningowa)**	
Unit providing the course (Department): **Katedra Biochemii i Analizy Żywności** **Katedra Technologii Żywności Pochodzenia Roślinnego**	
Course leader: **Prof. UPP dr hab. Dorota Kwiatkowska-Piasecka**	
Discipline: **Nutrition and food technology**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Practical classes	**12**
- Self-study	**4**
Total numer of hours:	**16**

OBJECTIVE OF THE COURSE:

The aim of the course is to have knowledge and be able to use immunological and thermal methods to assess the authenticity of various food products.

TEACHING METHODS:

Experimental learning based on hands-on exercises by using analytical equipment.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (graduates know and understand): 1. Global scientific achievements regarding the use of immunoassay and thermal analysis for specific food ingredients (fat, proteins, sugars) 2. Principles, possibilities and limitations of using the learned analytical methods	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 1. Use the acquired knowledge to apply learned methods (DSC, immunoassay) to solve own research problems 2. Solve research tasks required during the workshops, using the acquired knowledge of research methods and tools	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): 1. PhD students are ready to work constructively in a team 2. PhD students are ready to engage in discussions and present their point of view	P8U_K_4 P8U_K_2

Methods of evaluation of outcomes achievement:

- Laboratory exercises with discussion
- A report on the experiments performed, along with an analysis of the results obtained and conclusions.

TEACHING CONTENT:

Fundamentals of measurements using differential scanning calorimetry (DSC) and immunoassay (ELISA WesternVBlotting). Development of ELISA parameters using commercial antibodies. Interpretation of SlotBlotting and WesternBlotting results. Application of the DSC technique in the study of various thermodynamic phenomena in various food ingredients (fats, starch, proteins) and their application in assessing the authenticity of products. Factors influencing the obtained DSC curves and thermodynamic parameters. Factors influencing the repeatability of measurement using DSC techniques.

The course completion criteria and methods:	Percent of a final grade:
1. Assessment of PhD students' work during experimental work, independence in conducting the experiment, observance of health and safety regulations, proper use of equipment, participation in discussion.	20
2. Written reports completeness and correctness of elaboration including correctness of calculations and conclusions	30
3. Essays on the use of the DSC technique and immunoassay in own research	50
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Thomas L. C. Schmidt, S. J. 2017. Thermal Analysis. In: Food Analysis. S. Nielsen (ed.), Springer International Publishing,
2. Saldana M.D.A., Martinez-Monteagudo S.I. Oxidative Stability of Fats and Oils Measured by Differential Scanning Calorimetry for Food and Industrial Applications. IntechOpen; 2013. http://dx.doi.org/10.5772/54486
3. Islam M., Bełkowska L., Konieczny P. Fornal E., Tomaszewska-Gras J. 2022. Differential scanning calorimetry for authentication of edible fats and oils. What can we learn from the past to face the current challenges? Journal Of Food and Drug Analysis. https://doi.org/10.38212/2224-6614.3402
4. Application of Immunoassay Technology in Food Inspection. 2023. Ed. By Maojun Jin. Foods Special issue Reprint. MDPI St Alban-Anlage 66. Basel, Switzerland. https://doi.org/10.3390/books978-3-0365-8563-5
5. Application of Antibody and Immunoassay for Food Safety 2022. Ed. By Hongtao Lei, Zhanhui Wang, and Sergei E. Eremin. Printed Edition of the S precial Issue Published in Foods. MDPI St Alban-Anlage 66. Basel, Switzerland. https://doi.org/10.3390/books978-3-0365-3631-6

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Technologies for the production of plant-based food**	
Name of the course in Polish: **Technologie wytwarzania żywności pochodzenia roślinnego**	
Unit providing the course (Department): **Department of Food Technology of Plant Origin**	
Course leader: **Dr hab. Małgorzata Lasik-Kurdyś**	
Discipline: **Nutrition and food technology**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**9**
- Field trip	**3**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD studentswith the directions and specificity of food processing of plant origin, presenting the benefits and threats resulting from the use of specific technological solutions.

TEACHING METHODS:

lectures with multimedia presentations
activating method - discussion, brainstorming
field trip

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - current trends in plant food production in technological, consumer and nutritional aspects -benefits and risks resulting from the use of specific plant raw materials and technological solutions	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): -use knowledge and propose new, appropriately targeted technological solutions for the optimal and sustainable use of plant raw materials and propose an appropriate production method, -use the results of own research and others based on literature and transfer them to production practice in industrial plants, - propose solutions to current problems and modify and improve production processes	P8U_U_2 P8U_U_3
In the area of social competences (PhD students are capable to): -creatively taking up challenges in the professional and public sphere, in particular caring for the environment and the quality of food produced, taking into account their ethical dimension -initiating actions for the public interest, including, for example: encouraging and persuading the use of raw materials and technologies enabling an ecological and sustainable approach to high-quality food production processes	P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Observation of PhD students during discussions, Written exam

TEACHING CONTENT:

Modern technologies for producing food of plant origin in accordance with environmentally friendly principles of sustainable development. The specificity of the plant matrix as the basis for the manufactured product. Biofortification of plant foods to increase the concentration and bioavailability of important nutrients.
Current trends in the production of plant food in terms of consumer and nutritional aspects.
Microorganisms used in the processing of food of plant origin (spontaneous and directed processes).
Food fermentation as a trend in processing plant raw materials, increasing their nutritional value, extending shelf life and increasing sensory attractiveness.
Meat and dairy alternatives. Technological and nutritional implications of replacing animal products with plant-based alternatives.
Benefits and risks of eating plant products. Anti-nutritional substances found in raw materials and plant products.

The course completion criteria and methods:	Percent of a final grade:
A test containing multiple choice and open questions. To obtain a positive grade, the PhD students must obtain at least 60% of the total amount of points	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Jia H., Jia Y., Ren F., Liu H (2024) Enhancing bioactive compounds in plant-based foods: Influencing factors and technological advances. Food Chemistry, Volume 460, Part 3, 140744, ISSN 0308-8146, https://doi.org/10.1016/j.foodchem.2024.140744.

Penha C.B., De Paola Santos V., Speranza P., Kurozawa L.E., (2021) Plant-based beverages: Ecofriendly technologies in the production process, Innovative Food Science & Emerging Technologies, Volume 72, 102760, ISSN 1466-8564, https://doi.org/10.1016/j.ifset.2021.102760.

Silva A.R.A., Silva M.M.N., Ribeiro B.D., (2020) Health issues and technological aspects of plant-based alternative milk, Food Research International, Volume 131, 108972, ISSN 0963-9969, https://doi.org/10.1016/j.foodres.2019.108972.

Sridhar K., Bouhallab S., Croguennec T., Renard D., Lechevalier D (2023) Recent trends in design of healthier plant-based alternatives: nutritional profile, gastrointestinal digestion, and consumer perception, Critical Reviews in Food Science and Nutrition, 63:30, 10483-10498, DOI: 10.1080/10408398.2022.2081666

Tachie C., Nwachukwu I.D., Aryee, A.N.A. (2023) Trends and innovations in the formulation of plant-based foods. *Food Production, Processing and Nutrition* **5**, 16. https://doi.org/10.1186/s43014-023-00129-0

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Trends in the production of novel plant-based foods**	
Name of the course in Polish: **Trendy w produkcji żywności roślinnej nowej generacji**	
Unit providing the course (Department): **Department of Food Technology of Plant Origin**	
Course leader: **Dr hab. Małgorzata Lasik-Kurdyś**	
Discipline: **Nutrition and food technology**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**9**
- Field trip	**3**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize PhD students with the directions and specificity of novel plant food production, alternative and unconventional raw materials and technologies for producing food of plant origin.

TEACHING METHODS:

lectures with multimedia presentations
activating method - discussion, brainstorming
field trip

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -modern technologies and production processes used in the production of food of plant origin to increase its nutritional value, functionality and safety -possibilities of using unconventional and alternative plant raw materials allowing the creation of novel food	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): -propose and practically apply the use of unconventional plant raw materials and alternative sources of animal protein for the production of novel food -propose and practically apply modern food processing techniques, taking into account the need for circular economy production and sustainable development of the food industry	P8U_U_2
In the area of social competences (PhD students are capable to): -creatively taking up challenges in the professional and public sphere, in particular informing about technological and raw material possibilities of improving food quality, taking into account their ethical dimension -initiating activities for the public interest, including, for example: promoting new generation (novel) food, informing about its specificity and advantages	P8U_K_2 P8U_K_3

Methods of evaluation of outcomes achievement:

Observation of PhD students during

discussions, Test.

TEACHING CONTENT:

Modern technologies and production processes used in the production of food of plant origin to increase its nutritional value, functionality and safety.

The use of unconventional plant raw materials and alternative sources of animal protein - plant drinks, alternatives to meat and dairy products, fermented products.

Management of by-products from the processing of plant raw materials, use of their bioactive potential, especially in the aspect of preventing food waste, sustainable development, and circular economy production. The use of bioactive ingredients obtained from by-products and waste materials towards enrichment of novel food.

Valorization of fruit and vegetable processing pomace as a source of bioactive ingredients in the production of new generation food and in composing a matrix base for bioactive packaging materials.

Alternative variants of classic alcoholic beverages (organic-, biodynamic-, natural-, non-alcoholic wines, functional beers like: gluten-free, probiotic, isotonic, "gruit"), "non-alcoholic spirits".

The course completion criteria and methods:	Percent of a final grade:
A test containing multiple choice and open questions. To obtain a positive grade, the PhD students must obtain at least 51% of the total amount of points	100%
□ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

Lima Nascimento, L.G.; Odelli, D.; Fernandes de Carvalho, A.; Martins, E.; Delaplace, G.; Peres de sá Peixoto Júnior, P.; Nogueira Silva, N.F.; Casanova, F. Combination of Milk and Plant Proteins to Develop Novel Food Systems: What Are the Limits? *Foods* **2023**, *12*, 2385. https://doi.org/10.3390/foods12122385

Ebert, A.W. Sprouts and Microgreens—Novel Food Sources for Healthy Diets. *Plants* **2022**, *11*, 571. https://doi.org/10.3390/plants11040571

Hellwig, C.; Gmoser, R.; Lundin, M.; Taherzadeh, M.J.; Rousta, K. Fungi Burger from Stale Bread? A Case Study on Perceptions of a Novel Protein-Rich Food Product Made from an Edible Fungus. *Foods* **2020**, *9*, 1112. https://doi.org/10.3390/foods9081112

Siegrist, M., Hartmann, C. Consumer acceptance of novel food technologies. *Nature Food* **1**, 343–350 (2020). https://doi.org/10.1038/s43016-020-0094-x

Silva A.R.A., Silva M.M.N., Ribeiro B.D., (2020) Health issues and technological aspects of plant-based alternative milk, Food Research International, Volume 131, 108972, ISSN 0963-9969, https://doi.org/10.1016/j.foodres.2019.108972.

Zarbà, C.; Chinnici, G.; D'Amico, M. Novel Food: The Impact of Innovation on the Paths of the Traditional Food Chain. *Sustainability* **2020**, *12*, 555. https://doi.org/10.3390/su12020555

Gangopadhyay, N.; Hossain, M.B.; Rai, D.K.; Brunton, N.P. A Review of Extraction and Analysis of Bioactives in Oat and Barley and Scope for Use of Novel Food Processing Technologies. *Molecules* **2015**, *20*, 10884-10909. https://doi.org/10.3390/molecules200610884

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Modern meat technology. Standards and systems for food quality

Name of the course in Polish:
Nowoczesna technologia mięsa. Standardy i systemy jakości żywności

Unit providing the course (Department):
Department of Meat Technology, Department of Food Quality and Safety Management, Department of Food Technology of Plant Origin

Course leader:
prof. dr hab. Jolanta Tomaszewska-Gras

Discipline:	Semester:
Nutrition and food technology	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total number of hours:	**12**

OBJECTIVE OF THE COURSE:

Familiarization of PhD students with modern technologies of meat processing and production of meat products, including in vitro meat production, as well as with quality and safety systems used in food production and techniques of effective management and management of enterprise resources.

TEACHING METHODS:

Lectures with a multimedia presentation, instructional videos, and conversations.

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. The global scientific achievements concerning modern meat technologies and food quality standards and systems and the resulting implications for practice. 2. The latest theories and trends in the field of modern meat technologies and food quality standards and systems, which will facilitate the creation of original research concepts and their scientific interpretation.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 3. Creatively formulate their research problems related to meat technology and food quality standards. 4. Solve research tasks using independently acquired knowledge regarding modern meat technologies, standards and food quality systems. 5. Plan and transfer acquired knowledge regarding modern meat technologies, standards and food quality systems to the economic sphere.	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competencies (PhD students are capable to): 6. Independently plan research in the field of modern meat technologies, standards and quality systems and independently broaden existing scientific achievements. 7. Creatively take on challenges in the professional and public sphere, considering the ethical aspects of the meat industry. 8. Create research networks at the national and international levels.	P8U_K_1 P8U_K_2 P8U_K_5

Methods of evaluation of outcomes achievement:
Conversations, activity in discussions.

TEACHING CONTENT:

Meat – quality and consumption. Meat quality (chemical composition, sensory properties, strategic direction of EU action - „From farm to table"). Beneficial effect on human health - source of: microelements, vitamins, bioactive compounds. Objectionable substances: sodium nitrite, nitrosamines, cholesterol, antibiotics, dioxins, NaCl, fat.
In vitro meat production - biological, technological, regulatory and consumer acceptance challenges. Techniques for effective management and management of enterprise resources (natural and human resources, raw materials, products, machinery). Learning the methods and tools of systemic quality management. Introduction to ERP (Enterprise Resource Planning) systems. Learning about system verification methods and tools. Statistical Process Control (SPC) in the meat industry for ensuring consistent product quality and safety through systematic monitoring of processing parameters.

The course completion criteria and methods:	Percent of a final grade: 100%
Assessment of assays on the chosen topic □ **pass (Z)** ☒ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Neus González, Montse Marquès, Martí Nadal, José L. Domingo. 2020. Meat consumption: Which are the current global risks? A review of recent (2010–2020) evidences. Food Research International, vol. 137, 109341.
2. De Smet S., Els Vossen E. 2016. Meat: The balance between nutrition and health. A review. Meat Science, vol. 120, 145-156.
3. Paula Manuela De Castro Cardoso Pereira P. M., Ana Filipa dos Reis Baltazar Vicente. 2013. Meat nutritional composition and nutritive role in the human diet. Meat Science, 93, Issue 3, 586-592.
4. Leroy F., Smith N. W., Adesogan A. T., Beal T., Iannotti L., Moughan P. J., Mann N. 2023. The role of meat in the human diet: evolutionary aspects and nutritional value. Animal Frontiers, 13, Issue 2, 11–18.
5. Post, M, Levenberg, S, Kaplan, D, Genovese, N, Fu, J, Bryant, C, Negowetti, N, Verzijden, K & Moutsatsou, P 2020, 'Scientific, sustainability and regulatory challenges of cultured meat', Nature Food, vol. 1, no. 7, pp. 403- 415. https://doi.org/10.1038/s43016-020-0112-z
6. R. D. Warner. Review: Analysis of the process and drivers for cellular meat production. Animal (2019), 13:12, pp 3041–3058 doi:10.1017/S1751731119001897
7. H L Tuomisto. Environmental impact of in vitro meat. EMBO reports 20: e47395, 2019.
8. Chriki S and Hocquette J-F (2020) The Myth of Cultured Meat: A Review. Front. Nutr. 7:7. doi: 10.3389/fnut.2020.00007
9. Ramona Weinrich, Micha Strack, Felix Neugebauer. Consumer acceptance of cultured meat in Germany. Meat Science 162 (2020) 107924 https://doi.org/10.1016/j.meatsci.2019.107924
10. Bhamu J., Sangwan K. S. 2014. „Lean manufacturing: Literature review and research issues." International Journal of Operations and Production Management 34(7).
11. Burka I. 2020. „How managers in Poland use the principles and instruments of the kaizen philosophy in their personal lives – the personal kaizen approach." Quality Innovation Prosperity, 24(2).
12. Dombrowski U., Mielke, T. 2013. „Lean Leadership - Fundamental principles and their application." Procedia CIRP, 7.
13. Gasper L.,Mwenda B.B. 2023. „Quantitative analysis of Kaizen philosophy on productivity improvement." International Journal of Research in Business and Social Science, 12(3).
14. Isniah S., Hardi Purba H., Debora F. 2020. „Plan do check action (PDCA) method: literature review and research issues." Jurnal Sistem Dan Manajemen Industri 4(1).
15. Motarjemi Y., Lelieveld H. 2013. „Food Safety Management: A Practical Guide for the Food Industry." Academic Press.
16. Statistical Process Control for the Food Industry: A Guide for Practitioners and Managers. February 2019. Publisher: John Wiley & Sons LtdISBN: ISBN: 978-1-119-15200
17. Gilligan, R., Moran, R., & McDermott, O. (2023). Six Sigma application in an Irish meat processing plant to improve process yields. TQM Journal, 35(9), 210–230. https://doi.org/10.1108/TQM-02-2023-0040

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Dairy technology nutritional value and trends

Name of the course in Polish:
Technologia mleczarska wartość odżywcza i trendy

Unit providing the course (Department):
Department of Dairy and Process Engineering

Course leader:
Assoc. Prof. Dorota Cais-Sokolińska, PhD

Discipline:	Semester:
Nutrition and food technology	**6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**3**
- Exam	**1**
Total number of hours:	**16**

OBJECTIVE OF THE COURSE:

To acquire advanced knowledge of the technological processes used to produce milk and dairy products. To provide basic information on milk constituents and the nutritional aspects of these products and their impact on human health. To become familiar with modern methods and analytical techniques for quality control and evaluation of food products. To present issues related to the functional food market, particularly the analysis of global and local consumer trends, including the growing popularity of high protein, organic, lactose-free, and plant-based alternatives.

TEACHING METHODS:

Lecture with multimedia presentation, discussion panels, text analysis. The use of distance learning (online) systems and methods is acceptable.

Methods of evaluation of outcomes achievement:

In the area of knowledge (PhD students know and understand): E1.The technological suitability of raw materials containing bioactive components used in innovative technologies E 2. The principles of food testing at the stage of its production and storage and in the field of nutrition testing advanced analytical techniques of food testing at the stage of its production and storage and in the field of nutrition testing E 3. The importance of food ingredients in rational nutrition	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): E 4. Analyze and evaluate innovative technical and technological solutions in the field of food processing and human nutrition E 5. Follow and assimilate novelties in food science and nutrition E 6. Apply knowledge to the creative formulation of own research problems	P8U_U_1 P8U_U_2 P8U_U_3
In the area of social competencies (PhD students are capable to): E 7 Is prepared to assess the knowledge and skills gained in food production, as well as the significance of food ingredients in balanced nutrition. E 8. Is prepared to share information with the public about scientific and technological advancements in food production and human nutrition, and to engage in public interest activities guided by entrepreneurial principles.	P8U_K_1 P8U_K_2

TEACHING CONTENT

Characteristics of milk as a raw material. Technology for the production of dairy products. Nutritional value of milk and dairy products. Influence of technological processes on the nutritional value of dairy products. Sustainable production and technological innovations in the dairy industry. The growing importance of organic and 'free from' (lactose-free, GMO-free) products. Popularity of high-protein dairy products (whey protein isolates, protein drinks). Increased interest in plant-based alternatives to milk (plant-based drinks: soya, almond, oat). Analysis of global and local trends in the dairy market (Poland and the world). Standards and regulations in the dairy industry. Potential environmental and changing climate challenges for the dairy industry.

The course completion criteria and methods:	Percent of a final grade:
Examination assessment. The examination is conducted in the form of a written test containing closed-type questions and/or open questions. The exam will be held in written form (test). A positive grade will be given with at least 60% of total points.	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Quality Milk Production and Processing Technology, NIPA, 2012
Dairy Product Technology Recent Advances, Daya Publishing House, 2015 Handbook of Dairy Foods and Nutrition, CRC Press,2019

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures on human nutrition and dietetics**	
Name of the course in Polish: **Wykłady monograficzne z zakresu żywienia człowieka i dietetyki**	
Unit providing the course (Department): **Department of Human Nutrition and Dietetics**	
Course leader: **Prof. dr hab. Agata Chmurzyńska**	
Discipline: **Nutrition and food technology**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**5**
- Exam	**1**
Total numer of hours:	**18**

OBJECTIVE OF THE COURSE:

Getting knowledge on: 1) nutrients and nutrient metabolism; 2) using different methods and approaches to study human nutrition.

TEACHING METHODS:

lectures

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): -world scientific literature concerning nutrition and dietetics along with the resulting implications for practice -the latest theories and trends in nutrition and dietetics, thus facilitating creation of original research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - apply knowledge in the process of creative formulation of their research problems -innovatively solve research tasks using independently gained knowledge concerning nutrition and dietetics	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research in human nutrition and dietetics and independently broaden the existing body of scientific literature	P8U_K_1

Methods of evaluation of outcomes achievement:

Exam

TEACHING CONTENT:

Macro- and micronutrients. Regulation of nutrient metabolism. Nutritional epidemiology. Observation and intervention studies in human nutrition and dietetics. Food-drug interactions in nutrition research. Methods used in sports nutrition studies. The use of animal models in food and nutrition research.

The course completion criteria and methods:	Percent of a final grade:
The exam in the course area. A positive grade will be given with at least 60% of total points. □ **pass (Z)** □ **course credit with a grade** ☒ **examination**	100%

RECOMMENDED LITERATURE:

Biesalski H, Grimm P. Pocket atlas of nutrition. Thieme Geor Verlag,

2005. Kohlmeier M. Nutrient metabolism. Elsevier, 2015.

Kreider R.B. Essentials of exercise and sports nutrition: science to practice. Lulu Publishing Services,

2019. McCabe BJ, Frankel EH, Wolfe JJ. Handbook of food-drug interactions. CRC Press, Boca Raton

2003 Willet W. Nutritional epidemiology. Oxford University Press.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Monographic lectures: Chemistry and technology of lipids**	
Name of the course in Polish: **Wykłady monograficzne: Chemia i technologia tłuszczów**	
Unit providing the course (Department): **Department of Food Technology Plant Origin**	
Course leader: **Prof. dr hab. Magdalena Rudzińska**	
Discipline: **Nutrition and food technology**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Self-study	**3**
Total numer of hours:	**15**

OBJECTIVE OF THE COURSE:

Knowledge of chemical composition, production technology and qualitative analysis of dietary fats. Overview of the latest trends related to the role of edible fats in food and nutrition. Introduction to the analytical methods of the fat industry.

TEACHING METHODS:

Monographic lectures with the multimedia presentation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the advantages and disadvantages and properties of new unconventional sources of fats - knows the methods currently used to modify and stabilise edible fats -understands the need to reduce fat in fried products	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use knowledge of modern fat analysis methods and select an appropriate analytical technique for the research of selected fat components	P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research on edible fats	P8U_K_1

Methods of evaluation of outcomes achievement: Test

TEACHING CONTENT:

1. Unconventional sources of edible fat
2. Influence of seed treatment on oil quality
3. Methods of modification for edible fats
4. Bioactive substances in edible fats
5. Unfavourable substances arising from the production of fats – process impurities
6. Methods for stabilizing fats
7. Limitation of the fat content of fried products
8. Modern methods of fat analysis

The course completion criteria and methods: Credit for the course in the form of a test. A positive grade from the test with at least 60% of total amount of points. □ **pass (Z)** ☒**course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

1. Edible Oil Processing. Second edition. Ed. by Wolf Hamm, Richard J. Hamilton, Gijs Calliauw. Wiley-Blackwell 2013, ISBN 978-1-4443-3684-9
2. Lipids in nutrition and health: A reappraisal. Ed. by Michael I. Gurr. The Oily Press Bridgwater, 2009.
3. Food Lipids. Chemistry, Nutrition, and Biotechnology. Ed. by Casimir C. Akoh, David B. Min. CRC Press 2008.
4. Lipid Oxidation in Food and Biological Systems. A Physical Chemistry Perspective. Ed. by Carlos Bravo-Diaz, Springer Nature, 2022, https://doi.org/10.1007/978-3-030-87222-9
5. Lipid Oxidation. Challenges in Food Systems. Ed. by Amy Logan, Uwe Nienaber, Xiangqing (Shawn) Pan. AOCS Press, Urbana (IL), 2013.
6. The Technology of Fats and Oils. Vol. 3. Modification. Ed. by Michael Bockisch, Thomas Willner, DGF, Frankfurt, 2019.
7. Modifying Lipids for Use in Food. Ed. by Frank D. Gunstone. CRC Press 2006.
8. Deep Frying. Chemistry, Nutrition, and Practical Applications. Ed. by Michael D. Erickson, AOCS Press, Urbana (IL), 2nd edition 2007.
9. Multiple Biological Activities of unconventional seed oils. Ed. by Abdalbasit Adam Mariod, Elsevier Inc. Academic Press, 2022.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **External activities and study visits**	
Name of the course in Polish: **Zajęcia terenowe i wizyty studyjne**	
Unit providing the course (Department): **Department of Food Technology of Plant Origin** **Department of Human Nutrition and Dietetics**	
Course leader: **prof. dr hab. Magdalena Rudzińska**	
Discipline: **Nutrition and food technology**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Visit to edible oil plants - Study classes in the laboratory for the assessment of nutritional status	**10** **2**
- Self-study	**3**
Total numer of hours:	**15**

OBJECTIVE OF THE COURSE:

To gain knowledge of the chemical composition, production technology and quality analysis of food fats. To become familiar with the latest technological processes related to the production of edible fats. Familiarization with analytical methods used in the fat industry and nutritional status evaluation. Study classes in the laboratory for the assessment of nutritional statu

TEACHING METHODS:

Study visit and tour of Bunge fat plants in Kruszwica.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the advantages and disadvantages and properties of new unconventional sources of fats - knows the methods currently used to modify and stabilise edible fats -understands the need to reduce fat in fried products -is familiar with the principles and can use advanced instrumental techniques for assessment of the body nutritional status.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): - use knowledge of modern fat analysis methods and select an appropriate analytical technique for the research of selected fat components -Has the ability to select and use appropriate tools and methods to study nutritional status. -Has the ability to think creatively and work in a team based on conduct consistent with scientific ethics.	P8U_U_2
In the area of social competences (PhD students are capable to): - independently plan research on edible fats -Has the ability to skilfully solve scientific problems and participate in team discussions. -Recognizes the need for continuing education to ensure improvement in analytical skills and/or scientific research.	P8U_K_1

Methods of evaluation of outcomes achievement:

Written reports

TEACHING CONTENT:

1. Methods of preparing raw material for pressing
2. Technological processes used in heat oil pressing
3. Quality of the obtained pomace
4. The course of the fat extraction process and solvent recovery
5. The process of oil refining - defatting, neutralization, bleaching, deodorization
6. Bottling and distribution of edible oil
7. Methods of modification of fats

The course completion criteria and methods: written report. ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

1. Edible Oil Processing. Second edition. Ed. by Wolf Hamm, Richard J. Hamilton, Gijs Calliauw. Wiley-Blackwell 2013, ISBN 978-1-4443-3684-9
2. Lipids in nutrition and health: A reappraisal. Ed. by Michael I. Gurr. The Oily Press Bridgwater, 2009.
3. Food Lipids. Chemistry, Nutrition, and Biotechnology. Ed. by Casimir C. Akoh, David B. Min. CRC Press 2008.
4. Lipid Oxidation in Food and Biological Systems. A Physical Chemistry Perspective. Ed. by Carlos Bravo-Diaz, Springer Nature, 2022, https://doi.org/10.1007/978-3-030-87222-9
5. Lipid Oxidation. Challenges in Food Systems. Ed. by Amy Logan, Uwe Nienaber, Xiangqing (Shawn) Pan. AOCS Press, Urbana (IL), 2013.
6. The Technology of Fats and Oils. Vol. 3. Modification. Ed. by Michael Bockisch, Thomas Willner, DGF, Frankfurt, 2019.
7. Modifying Lipids for Use in Food. Ed. by Frank D. Gunstone. CRC Press 2006.
8. Deep Frying. Chemistry, Nutrition, and Practical Applications. Ed. by Michael D. Erickson, AOCS Press, Urbana (IL), 2nd edition 2007.
9. Multiple Biological Activities of unconventional seed oils. Ed. by Abdalbasit Adam Mariod, Elsevier Inc. Academic Press, 2022.
10. Willet W., Nutritional epidemiology, New York, Oxford University Press. 1998
11. Lee R., Nieman D. Nutritional Assessment, , McGraw-Hill Higher Education, 2013
12. Gibson R.S., Principles of nutritional assessment, New York, Oxford University Press. 1990
13. Human Body Composition: In Vivo Methods, Models, and Assessment (Basic Life Sciences): 9781489912701: Medicine & Health Science Books @ Amazon.com. (n.d.). Retrieved November 30, 2024, from https://www.amazon.com/Human-Body-Composition-Assessment-Sciences/dp/1489912703
14. Vescovi, J. D., Zimmerman, S. L., Miller, W. C., Hildebrandt, L., Hammer, R. L., & Fernhall, B. (2001). Evaluation of the BOD POD for estimating percentage body fat in a heterogeneous group of adult humans. European Journal of Applied Physiology, 85(3–4), 326–332. https://doi.org/10.1007/S004210100459
15. Body Composition Assessment in Children and Adolescents (Medicine & Sport Science): Jurimae, T., Hills, Andrew P.: 9783805571319: Amazon.com: Books. (n.d.). Retrieved November 30, 2024,
16. Human Body Composition: In Vivo Methods, Models, and Assessment (Basic Life Sciences): 9781489912701: Medicine & Health Science Books @ Amazon.com. (n.d.). Retrieved November 30, 2024, from https://www.amazon.com/Human-Body-Composition-Assessment-Sciences/dp/1489912703
17. McCrory, M. A., Gomez, T. D., Bernauer, E. M., & Molé, P. A. (1995). Evaluation of a new air displacement plethysmograph for measuring human body composition. Medicine and Science in Sports and Exercise, 27(12), 1686–1691. http://www.ncbi.nlm.nih.gov/pubmed/8614326

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Research methodology in veterinary medicine**	
Name of the course in Polish: **Metodologia badań w medycynie weterynaryjnej**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **prof. dr hab. Małgorzata Pomorska-Mól**	
Discipline: **Veterinary sciences**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**14**
- Practical classes	**3**
- Self-study	**10**
Total numer of hours:	**33**

OBJECTIVE OF THE COURSE:

The aim of the course is to introduce the basics of scientific research methodology, taking into account the specificities of veterinary medicine, and to provide the knowledge to plan and carry out scientific research projects. The aim is for doctoral students to acquire the skills necessary for scientific research in veterinary medicine, including searching and interpreting the content of articles; planning and carrying out research. To have the ability to the efficient and complete retrieval of correct information from the discipline of veterinary medicine and related disciplines. To become familiar with sources of scientific data, how to obtain and critically analyse them. To acquire the ability to plan and carry out a simple scientific project and to prepare the results for publication in scientific journals and presentation at conferences.

TEACHING METHODS:

Informative lecture, conversational lecture, discussion, analysis and interpretation of scientific texts, seminars, workshops.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the global scientific output on specific issues in veterinary medicine and the resulting implications for practice - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation,	P8U_W 1 P8U_W 2 P8U_W 3
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others - -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - independently plan research and independently augment existing scientific output.	P8U_K 1

Methods of evaluation of outcomes achievement: Methods of verifying learning: one-choice test, collection and review of literature on a given topic, project - preparation of a research project plan

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Lecture topics: Concept of knowledge, essence and principles of scientific research. Stages of the research process, research problems, objectives and hypotheses. Development of skills in research planning and interpretation of results. Types of research projects in medicine: experimental and non-experimental. Research methods and measurement in scientific research. Development, analysis and presentation of research results. To familiarise with the methodology of developing a systematic literature review/meta-analysis. To provide knowledge of the methodology of conducting research in veterinary medicine by good scientific practice and ethical principles, using state-of-the-art, validated research methods. To familiarise with the principles of preparing scientific publications. Scientific discussion, reviewing scientific papers.
Ethical and legal issues in scientific research.

Seminars: familiarisation with scientific medical databases (Pub med, EMBASE, Cochrane Library, PubMed Central, UpToDate); instruction in independent searching of biomedical data in scientific medical databases; critical review of retrieved research results and evaluation of their use in practice.

The course completion criteria and methods:	Percent of a final grade:
Exam - single-choice test	60%
Collection and review of literature on a given topic	20%
Project - preparation of a research project plan	20%

□ **pass (Z)** □ **course credit with a grade** ☒ **examination**

RECOMMENDED LITERATURE:

1.METODOLOGICZNE PODSTAWY BADAŃ NAUKOWYCH W MEDYCYNIE Z ELEMENTAMI OGÓLNEJ METODOLOGII NAUK
pod redakcją Adama JONKISZA i Lesława NIEBROJA. Copyright by Śląski Uniwersytet Medyczny w Katowicach, Katowice 2010
2.Gibbons PM, Anderson SL, Robertson S, Thurman FK, Hunt JA. Evaluation of an evidence-based veterinary medicine exercise for instruction in clinical year of veterinary medicine program. Vet Rec Open. 2021 Apr 8(1):e3. doi: 10.1002/vro2.3. PMID: 33981437; PMCID: PMC8110120.
3. John W. Creswell, Research Design. Qualitative, quantitative and mixed methods. Wydawnictwo Uniwersytetu Jagiellońskiego Kraków, 2013
4. Crowther M i wsp: Systematic review and meta-analysis methodology. Blood 2010;116:3140-3146.2.
5. Scientific research and review publications on the subject matter of ongoing or future projects.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **The Statistical Analysis of Research Data**	
Name of the course in Polish: **Statystyka w analizie danych badawczych**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **Arkadiusz Dors, DVM, PhD**	
Discipline: **Veterinary**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Seminar	**3**
Total numer of hours:	**7**

OBJECTIVE OF THE COURSE:

The aim of the course is for the PhD student to acquire the knowledge and skills necessary for analyzing quantitative and qualitative data, correctly interpreting the results of such analyses, and properly reporting them. Students will be introduced to the basics of mathematical statistics, mainly in the context of documenting research results and conducting empirical data analysis using various types of statistical tests.

TEACHING METHODS:

Lectures with multimedia presentations, data analysis using dedicated computer programs, problem-solving tasks, and discussions

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the field of veterinary medicine that enable the creation of original research concepts and their scientific interpretation	P8U_W_2
In the area of skills (PhD students know how to): - to apply knowledge to creatively formulate their own research problems - innovatively solves research-related tasks by applying independently acquired knowledge of the latest research methods and tools - -	P8U_U_1 P8U_U_2
In the area of social competences (PhD students are capable to): - independent planning of research and autonomously expanding existing scientific contributions	P8U_K_1

Methods of evaluation of outcomes achievement:

The course will be graded based on a data analysis project. The final exam will be in written form.

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TEACHING CONTENT:

Lectures:

1) Elementary and Descriptive Statistics: The subject of statistics applications; types and classifications of statistical data; data grouping (measurement scales, creating a frequency distribution); coding and data transformation. Statistical measures: characteristics of individual and grouped data; measures of central tendency (arithmetic mean, weighted mean, quantiles, median, mode); measures of dispersion (variance, standard deviation, coefficient of variation).
2) Hypothesis Testing: Procedure for hypothesis testing – null and alternative hypotheses, test significance level, critical region (rejection region), non-rejection region, Type I and Type II errors, power of a statistical test; defining the critical region for continuous random variables using the normal distribution; one-sided and two-sided tests.

Seminars:

1) Statistical Tests: Shapiro-Wilk test for normality, hypothesis testing for the difference between means in two populations – independent samples; Mann-Whitney U test, ANOVA, Kruskal-Wallis test, chi-square test, Yates' correction, correlation (Pearson's correlation coefficient and its interpretation, Spearman's rank correlation).

The course completion criteria and methods:	Percent of a final grade:
Exam	60%
Project	40%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1) Petrie, A., & Watson, P. (2013). Statistics for veterinary and animal science. John Wiley & Sons.
2) Łomnicki, A. (2003). Wprowadzenie do statystyki dla przyrodników (p. 260). Warszawa, Poland: Wydawnictwo Naukowe PWN.
3) Kala, R. (2009). Statystyka dla przyrodników [Statistics for naturalists]. Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Disciplinary seminar**	
Name of the course in Polish: **Seminarium dyscyplinowe**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **dr hab. Agnieszka Pękala-Safińska, prof. UPP**	
Discipline: **Veterinary sciences**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Practical classes	**6**
- Self-study	**4**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:

The aim of the seminar is for the doctoral student to acquire skills in planning scientific work as well as principles for presenting and publishing research results: articles, conferences, and multimedia presentations.

TEACHING METHODS:

Conversation, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation, - the conditions related to intellectual property and the principles of confidentiality associated with scientific and educational activities.	P8U_W 2 P8U_W 3 P8U_W 4
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - plan research independently and expand existing scientific output, - take up creative challenges in the professional and public sphere, taking into account their ethical dimension, - develop models of appropriate behaviour in teamwork.	P8U_K 1 P8U_K 2 P8U_K 4

Methods of evaluation of outcomes achievement: Evaluation of speeches and presentations during the classes will focus on the clear presentation of issues, formulation of research hypotheses and objectives, appropriate selection of forms for presenting topics, use of current subject literature and the latest multimedia techniques, as well as the ability to engage in discussion and argumentation.

TEACHING CONTENT:

Seminars: A review of the current state of knowledge in a given field, principles for dividing research into stages, presenting research results, rules for conducting scientific discussions, and the ability to argue and respond to questions. The ability of the doctoral student to present the assumptions and objectives of their doctoral work.

The course completion criteria and methods:	Percent of a final grade:
Final evaluation of the oral presentation ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

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RECOMMENDED LITERATURE:

1. References related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Animals in scientific research**	
Name of the course in Polish: **Zwierzęta w badaniach naukowych**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **Lidia Radko DVM, Sci.**	
Discipline: **Veterinary**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

The training goal is for the doctoral student to learn about the principles of using animals in experimentation. This includes acquiring information about EU and national legislation regarding animal research. The student should develop the ability to apply the 3Rs principle (Replacement, Reduction, Refinement) when planning and conducting experiments on laboratory, farm, and wild animals. The doctoral student will also acquire the skills necessary to prepare an application for approval from the Local Ethics Committee for conducting experiments on animals.

TEACHING METHODS:

Lectures

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand):	
Global scientific contributions related to specific issues in veterinary medicine and their implications for practice	P8U_W_1
The latest theories and trends in the field of veterinary medicine that enable the creation of original research concepts and their scientific interpretation	P8U_W_2
Principles of planning and funding scientific research and evaluating projects	P8U_W_3
Conditions regarding intellectual property and confidentiality related to scientific and educational activities	P8U_W_4
In the area of skills (PhD students know how to):	
Use knowledge to formulate personal research problems creatively	P8U_U_1
Innovatively solves research-related tasks by applying independently acquired knowledge of the latest research methods and tools	P8U_U_2
Transfer research findings to the business sector	P8U_U_3
Independently plans and implements one's scientific development, as well as inspires and organizes the development of others	P8U_U_4
Conducts educational activities and verifies the content delivered.	P8U_U_5
In the area of social competencies (PhD students are capable to):	
Independent planning of research and autonomously expanding existing scientific contributions	P8U_K_1
Creatively taking on challenges in professional and public spheres, considering their ethical dimensions	P8U_K_2
Initiating actions for the public interest	P8U_K_3
Shaping Models of proper Conduct in teamwork	P8U_K_4
Sustaining and developing the significance and role of creative environments in social life	P8U_K_5

Methods of evaluation of outcomes achievement:

Exam

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TEACHING CONTENT:

Applicable national regulations regarding the acquisition and breeding of animals, animal care, and the use of animals for scientific purposes, including genetically modified organisms. Control of the activities of breeders, suppliers, and users.
The role of the veterinarian in scientific research conducted on animals.
Principles for selecting animal species in planned scientific studies.
The impact of animal welfare (environmental enrichment) and nutrition on experimental outcomes.
The influence of anesthetics and analgesics on experimental results.
Planning procedures and experiments.
Principles for the early and humane termination of procedures.
Preparing an application to the local ethics committee for the approval of animal experiments, particularly specifying the scientific goals of the study, justifying the use of selected animal species, providing statistical justification for the number of animals used, and determining the categories of severity.
Preparing the information needed for retrospective assessment.

The course completion criteria and methods:	Percent of a final grade:
Exam	100%
☐ **pass** ☐ **course credit with a grade** ☒ **examination (E)**	

RECOMMENDED LITERATURE:

1. Fundamentals of Laboratory Animal Science, E Liu, J Fan, CRC Press, 2017 ISBN: 978-367573270
2. Animal models in experimental medicine, FQ. Alenzi, Bentham Books, 2024, ISBN: 978-981-5196-38-2
3. Advances in Swine in Biomedical Research, tom 1 I 2, ME. Tumbleson, Springer Sciences+ Business Media, 1997, ISBN: 9780306454950
4. Advances in Cattle Research, U. Singh, Satish Serial Publishing House, 2013, ISBN: 978-381226421
5. Guidelines for the Use of Fishes in Research, JA. Jenkins, American Fisheries Society, 2014, ISBN: 9781-934874-39-4
6. Laboratory Animals: Pathology and Use, J. Szarek, UWM Publishing House, Olsztyn, 2013, ISBN: 978-83-7299-811-8.
7. Current literature recommended by the course instructors regarding the topics discussed.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Diagnostic Methods in Veterinary Medicine and Scientific Research**	
Name of the course in Polish: **Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **Associate professor Agnieszka Pekala-Safinska**	
Discipline: **Veterinary**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- Seminar	**3**
- Self-study	**15**
Total numer of hours:	**30**

OBJECTIVE OF THE COURSE:

The aim of the education is for the doctoral student to acquire knowledge in the field of laboratory diagnostics and techniques used in veterinary medicine, as well as their validation.
The aim of the education is also for the doctoral student to gain knowledge in veterinary toxicological analytics applied in scientific research, develop the ability to select appropriate methods or analytical procedures depending on the type of sample and the kind of analytes, and acquire an understanding of the major research directions related to methodologies in toxicological analytics.
Additionally, the aim of the education is to familiarize the doctoral student with modern diagnostic methods used in veterinary parasitology, presenting their theoretical principles, practical applications, and recent innovations in the diagnosis of parasitic diseases in animals.

TEACHING METHODS:

Lectures conducted using audiovisual aids - multimedia presentations, PPT, PREZI.
Seminars

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): − the global scientific achievements related to specific issues in veterinary medicine and their implications for practice, − the latest theories and trends in the field of veterinary science that enable the creation of original research concepts and their scientific interpretation, − the principles of planning and financing scientific research as well as project evaluation, − the conditions related to intellectual property and the principles of confidentiality associated with scientific and educational activities.	P8U_W1 P8U_W2 P8U_W3 P8U_W4
In the area of skills (PhD students know how to): − utilize knowledge to creatively formulate their own research problems, − solve research-oriented tasks innovatively by independently applying knowledge of the latest research methods and tools, − transfer the results of research work to the economic sphere, − independently plan and carry out their own scientific development while inspiring and/or organizing the development of others, − conduct educational activities and verify the content being taught.	P8U_U1 P8U_U2 P8U_U3 P8U_U4 P8U_U5

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

In the area of social competences (PhD students are capable to): − independently plan research and contribute to the advancement of existing scientific achievements, − creatively address challenges in professional and public spheres, considering their ethical dimensions, − initiate actions in the interest of the public good, − shape models of appropriate behavior in teamwork, - sustain and enhance the significance and role of creative communities in social life.	P8U_K1 P8U_K2 P8U_K3 P8U_K4 P8U_K5

Methods of evaluation of outcomes achievement:
Final exam covering the entire material
Written assessment in a descriptive form based on acquired knowledge

TEACHING CONTENT:

Lectures:
- serology, immunology, and virology: review of immunology and virology. Indirect and direct diagnostic techniques used in laboratory diagnostics of viral infections. Types of serological tests. Techniques applied in immunological studies.
- toxicology: principles of planning scientific research using toxicological analysis methods. Selection and preparation of samples for toxicological analysis. Types of samples (gaseous, liquid, solid) and sampling methods. Characteristics of instrumental methods used in veterinary toxicology. Chemical characteristics of basic toxic substances and fundamental methods of their determination.
- parasitology: review of parasitology. Analysis of microscopic results: interpretation and diagnostic errors. Examples of molecular diagnostics in parasite identification. Interpretation of molecular diagnostics results. Use of serological tests in diagnosing parasitic diseases and result interpretation. Application of diagnostic methods in clinical practice: diagnostic procedures in suspected parasitic infections. The role of diagnostics in therapeutic decision-making. Ethical aspects of diagnosing parasitic diseases. Epidemiology and control of parasitic infections: Collecting and analyzing epidemiological data. Strategies for preventing and controlling parasitic infections. Collaboration with other institutions in combating parasitic diseases. Modern technologies in diagnostics: Use of mobile applications and information systems in parasitological diagnostics. Telemedicine and remote consultations in veterinary diagnostics.The future of diagnostics in parasitology: New research directions in parasite diagnostics. Innovative research methods and their application in veterinary practice.

Seminars:
- demonstration of ELISA tests used in serological studies;
- selection and preparation of samples for toxicological analyses;
- preparation techniques for materials used in parasitological studies: microscopic, molecular, and serological.

The course completion criteria and methods:	Percent of a final grade:
Exam	60%
Assessment	40%
□ pass (Z) **□ course credit with a grade** **☒ examination**	

RECOMMENDED LITERATURE:

Serology, immunology, virology:
1. Ian R. Tizard. Veterinary Immunology. 2017, ISBN 9780323523493
2. Selected references from the scientific literature

Toxicology:
1. Clinical Veterinary Toxicology, red. KH Plumlee, wyd. Mosby, 2003 ISBN: 978-0-323-01125-9
2. Veterinary Toxicology, red. RC Gupta, wyd. Elsevier, 2007 ISBN: 978-0-12-370467-2
3. Toxicology, red. GD Osweiler, wyd. Williams and Wilkins, 1996 ISBN: 978-0-683-06664-7
4. Small Animal Toxicology, red. ME Peterson, PA Talcott, 2006 ISBN: 978-0-7216-0639-2
5. Current literature recommended by the lector, related to the discussed topics

Parasitology:
1. Transmission of some species of internal parasites in horse foals born in 2013 in the same pasture on a farm in Central Kentucky Helminthologia, 2015
2. Biodiversity of strongylids (Nematoda: Strongylidae) communities in domestic horses from Poland and Ukraine Helminthologia, 2011
3. A survey of control strategies for equine small strongyles in Lithuania E. Dauparaitė, Helminthologia, 2021
4. Effectiveness of current anthelmintic treatment programs on reducing fecal egg counts in United States cow-calf operations Gasbarre, Louis C., Canadian Journal of Veterinary Research

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Diagnostic Methods in Veterinary Medicine and Scientific Research**	
Name of the course in Polish: **Metody diagnostyczne w medycynie weterynaryjnej i badaniach naukowych**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **Associate professor Agnieszka Pekala-Safinska**	
Discipline: **Veterinary**	Semester: **IV**

TYPE OF CLASSES:
(course load)

- Lectures	**18**
- Seminar	**3**
- Self-study	**15**
Total numer of hours:	**36**

OBJECTIVE OF THE COURSE:

The aim of the education is to familiarize the doctoral student and provide knowledge about the mechanisms of bacterial pathogenicity, methods of their isolation and identification, as well as the principles of antimicrobial therapy, including mechanisms of antimicrobial resistance.
The aim of the education is to familiarize the doctoral student and provide knowledge regarding the potential use and appropriate selection of histopathological studies in scientific research within the field of veterinary medicine; to consolidate skills in collecting, preserving, and transmitting material for histopathological examination; and to acquire the ability to interpret data obtained from additional studies.
The aim of the training is also to familiarize the doctoral student and provide knowledge about the potential use of molecular biology methods in the identification of animal pathogens. This includes acquiring information on collecting, preserving, and preparing material for molecular studies, as well as developing the ability to interpret the results of these studies.
The aim of training in animal genetic diagnostics is to present the current possibilities of using cytogenetic and molecular (including genomic) methods to identify chromosomal abnormalities and pathogenic DNA variants responsible for congenital developmental defects and hereditary diseases in livestock. Particular attention will be paid to the rationale for conducting specific genetic analyses, the principles of material collection and storage for testing, and the interpretation of diagnostic analysis results.

TEACHING METHODS:

Lectures conducted using audiovisual aids - multimedia presentations, PPT, PREZI.
Seminars

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): − the global scientific achievements related to specific issues in veterinary medicine and their implications for practice, − the latest theories and trends in the field of veterinary science that enable the creation of original research concepts and their scientific interpretation, − the principles of planning and financing scientific research as well as project evaluation, − the conditions related to intellectual property and the principles of confidentiality associated with scientific and educational activities.	P8U_W1 P8U_W2 P8U_W3 P8U_W4
In the area of skills (PhD students know how to): − utilize knowledge to creatively formulate their own research problems, − solve research-oriented tasks innovatively by independently applying knowledge of the latest research methods and tools, − independently plan and carry out their own scientific development while inspiring and/or organizing the development of others, − conduct educational activities and verify the content being taught.	P8U_U1 P8U_U2 P8U_U4 P8U_U5

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

In the area of social competences (PhD students are capable to): − independently plan research and contribute to the advancement of existing scientific achievements, − creatively address challenges in professional and public spheres, considering their ethical dimensions, − initiate actions in the interest of the public good, − shape models of appropriate behavior in teamwork, - sustain and enhance the significance and role of creative communities in social life.	P8U_K1 P8U_K2 P8U_K3 P8U_K4 P8U_K5

Methods of evaluation of outcomes achievement:
Final exam covering the entire material
Written assessment in a descriptive form based on acquired knowledge

TEACHING CONTENT:

Lectures:

- bacteriology: knowledge of the infectious and pathogenic properties of microorganisms, methods of their diagnostics, and therapies, including mechanisms of bacterial antimicrobial resistance;
- histopathology: knowledge in selecting methods (including additional techniques) used in histopathology for scientific research, understanding the possibilities and limitations of histopathological studies, and interpretation of histopathological study results;
- molecular biology: application of available molecular methods (involving the detection of nucleic acids and proteins) in scientific research in veterinary medicine, with attention to emerging limitations in their use;
- genetic diagnostics: identification of premises justifying the need for genetic diagnostics, an overview of cytogenetic techniques (e.g., preparation of cytogenetic samples, chromosome banding, fluorescence in situ hybridization) and molecular techniques (e.g., DNA isolation, PCR and its variants, DNA sequencing, SNP microarrays) used in genetic diagnostics of animals, interpretation of diagnostic analysis results, and the scope of genetic diagnostics in modern veterinary medicine and animal breeding.

Seminars:

- methods of bacterial isolation and identification, including antibiograms. Principles of interpreting test results;
- principles of planning scientific research regarding the collection and use of animal tissues for histopathological studies; methods of tissue sampling and preservation for analysis;
- standards for collecting, preserving, and preparing material from animals for molecular studies. Principles of interpreting the obtained test results.

The course completion criteria and methods:	Percent of a final grade:
Exam	60%
Assessment	40%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Bacteriology:

1. Markey B., Leonard F., Archambault M., Cullinane A., Maguire D.: Clinical Veterinary Microbiology, Mosby Elsevier, 2013.
2. Qiunn P.J., Markey B.K., Leonard F.C., FitzPatrick E.S., Fanning S., Hartigan P.J.: Veterinary microbiology and microbial disease. Wiley-Blackwell, 2011

Histopathology:

1. Pathologic Basis of Veterinary Disease (Mosby, James F. Zachary, M. Donald McGavin), 2016
2. Pathology of Laboratory Rodents and Rabbits, (Stephen W. Barthold, Stephen M. Griffey, Dean H. Percy), 4th Edition
3. American College of Laboratory Animal Me Nonhuman Primates in Biomedical Research: Diseases Volume 2, Book 2, (Academic Press; Christian R Abee)

Molecular biology:

1. Genetyka ogólna i weterynaryjna. Marek Świtoński. Wydawnictwo Naukowe PWN, 2023
2. Biologa molekularna bakterii. Jadwiga Baj, Zdzisław Markiewicz. Wydawnictwo Naukowe PWN, 2016
3. Podstawy wirusologii molekularnej. Andrzej Piekarowicz. Wydawnictwo Naukowe PWN, 2016
4. Diagnostyka laboratoryjna w weterynarii. Meyer Denny, J. Harvey John. Elsevier, 2013

Genetic diagnostics:

1. Świtoński M. (red. pracy zbiorowej). Genetyka ogólna i weterynaryjna. Wydawnictwo Naukowe PWN Warszawa, 2023.
2. Świtoński M., Słota E., Jaszczak K. Diagnostyka cytogenetyczna zwierząt domowych. Wydawnictwo Akademii Rolniczej w Poznaniu, 2006.
3. Szczerbal I, Świtonski M. Chromosome abnormalities in domestic animals as causes of disorders of sex development or impaired fertility, w: Animal Reproduction (pod red. R. Payen-Careira), InTech, Chorwacja, 2016.
   https://www.intechopen.com/chapters/49736
4. Gershony L., Clark A.C. (redakcja naukowa wydania polskiego – Świtoński M.). Omówienie obecnego stanu testów genetycznych psów, 2023. https://www.pslwmz.pl/content/get-file/181934

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Disciplinary seminar

Name of the course in Polish:
Seminarium dyscyplinowe

Unit providing the course (Department):
Department of Preclinical Sciences and Infectious Diseases

Course leader:
dr hab. Agnieszka Pękala-Safińska, prof. UPP

Discipline:	Semester:
Veterinary sciences	**IV**

TYPE OF CLASSES:
(course load)

- Practical classes	**6**
- Self-study	**4**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:
The aim of the seminar is for the doctoral student to acquire skills in planning scientific work as well as principles for presenting and publishing research results: articles, conferences, and multimedia presentations.

TEACHING METHODS:
Conversation, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation, - the conditions related to intellectual property and the principles of confidentiality associated with scientific and educational activities.	P8U_W 2 P8U_W 3 P8U_W 4
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - plan research independently and expand existing scientific output, - take up creative challenges in the professional and public sphere, taking into account their ethical dimension, - develop models of appropriate behaviour in teamwork.	P8U_K 1 P8U_K 2 P8U_K 4

Methods of evaluation of outcomes achievement: Evaluation of speeches and presentations during the classes will focus on the clear presentation of issues, formulation of research hypotheses and objectives, appropriate selection of forms for presenting topics, use of current subject literature and the latest multimedia techniques, as well as the ability to engage in discussion and argumentation.

TEACHING CONTENT:
Seminars: A review of the current state of knowledge in a given field, principles for dividing research into stages, presenting research results, rules for conducting scientific discussions, and the ability to argue and respond to questions. The ability of the doctoral student to present the assumptions and objectives of their doctoral work.

The course completion criteria and methods:	Percent of a final grade:
Final evaluation of the oral presentation ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

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RECOMMENDED LITERATURE:

1. References related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Food Safety Management Systems

Name of the course in Polish:
Systemy zapewnienia bezpieczeństwa żywności

Unit providing the course (Department):
Department of Animal Breeding and Product Quality Assessment,
Department of Preclinical Sciences and Infectious Diseases,

Course leader:
dr Przemysław Racewicz, dr hab. Mirosław Różycki,

Discipline:	Semester:
Veterinary medicine	**V**

TYPE OF CLASSES:
(course load)

- Lectures	**43**
- Self-study	**10**
Total numer of hours:	**53**

OBJECTIVE OF THE COURSE:

The aim of the training is for the doctoral student to acquire knowledge in the field of public health protection by familiarizing themselves with the latest scientific research findings on food health quality, including food safety throughout the entire food chain (from farm to table), both internationally and locally.

TEACHING METHODS:
Lectures: conducted with the use of audiovisual means - multimedia presentation, PPT, PREZI

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In terms of knowledge (PhD students know and understand):	
- the global scientific achievements concerning specific issues related to veterinary medicine and their implications for practice	P8U_W 1
- the latest theories and trends in the field of veterinary science, enabling the creation of original research concepts and their scientific interpretation	P8U_W 2
- the principles of planning and funding scientific research as well as project evaluation	P8U_W 3
- the conditions related to intellectual property and confidentiality rules associated with scientific and teaching activities	P8U_W 4
In terms of skills (PhD students know how to):	
- use knowledge to creatively formulate their own research problems	P8U_U 1
- solve research-oriented tasks innovatively by independently applying knowledge of the latest research methods and tools	P8U_U 2
- transfer research findings to the economic sector	P8U_U 3
- independently plan and carry out their own scientific development and inspire and/or organize the development of others.	P8U_U 4
In terms of social competencies (PhD students are capable to):	
- independently plan and expand the existing body of scientific work	P8U_K 1
- creatively undertake challenges in the professional and public spheres, considering their ethical dimensions	P8U_K 2
- initiate actions in the public interest	P8U_K 3
- shape standards of proper conduct in professional work.	P8U_K 4

Methods of evaluation of outcomes achievement:

Final exam covering the entire material

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

Lectures:

Food safety systems. Food safety incidents and their impact on public health. Food hazards. Risk analysis and risk management in the food chain. European and national food safety regulations. Food Safety Management Systems. Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP). HACCP System (Hazard Analysis and Critical Control Points). Overview of HACCP principles. Verification and validation of the HACCP system. Auditing and improving the HACCP system. Implementation of HACCP in the food production process. Other food safety management systems. Structure and requirements of ISO 22000. New threats and future trends, predictive microbiology. Climate change and its impact on food safety. New food products and food processing technologies. Food fraud and food defence

The course completion criteria and methods:	Percent of a final grade:
Final exam covering entire material	100%
☐ **pass (Z)** ☐ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

• Racewicz P. (2019) E-book: Weterynaryjna Ochrona Zdrowia Publicznego. Poznań. Wydawnictwo UPP.
• Prawo żywnościowe. Spis aktów prawnych: http://eur-lex.europa.eu/homepage.html oraz strona internetowa GIW.
• Wilson W. G. (2005).: Wilson's Practical Meat Inspection. VII Edition, Blackwell Publishing.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Resulting seminar**	
Name of the course in Polish: **Seminarium wynikowe**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **prof. dr hab. Małgorzata Pomorska-Mól**	
Discipline: **Veterinary sciences**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Practical classes	**5**
- Self-study	**4**
Total numer of hours:	**9**

OBJECTIVE OF THE COURSE:

The aim of the seminar is to familiarise the doctoral student with the principles of presenting research results, the principles of scientific discussion and the ability to argue and answer questions, and to verify the advancement of the dissertation.

TEACHING METHODS:

Conversation, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation.	P8U_W 2 P8U_W 3
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - plan research independently and expand existing scientific output. - take up creative challenges in the professional and public sphere, taking into account their ethical dimension, - develop models of appropriate behaviour in teamwork,	P8U_K 1 P8U_K 2 P8U_K 4

Methods of evaluation of outcomes achievement: Evaluation of the speeches and presentations in class in terms of comprehensible presentation of issues, formulation of research hypotheses and the purpose of research, appropriate choice of presentation of the forms of issues raised, use of current literature on the subject and the latest multimedia techniques, ability to discuss and argue.

TEACHING CONTENT:

Seminars: principles of presenting research results, principles of scientific discussion and the ability to argue and answer questions, and verification of the advancement of the dissertation, practical classes: presentation by the doctoral student of the assumptions and objectives of the dissertation in progress. Discussion of methodology and possible results.

The course completion criteria and methods:	Percent of a final grade:
Final evaluation of the oral presentation ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

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RECOMMENDED LITERATURE:

1. References related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Disciplinary seminar**	
Name of the course in Polish: **Seminarium dyscyplinowe**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **dr hab. Agnieszka Pękala-Safińska, prof. UPP**	
Discipline: **Veterinary sciences**	Semester: **VI**

TYPE OF CLASSES:
(course load)

- Practical classes	**6**
- Self-study	**4**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:

The aim of the seminar is for the doctoral student to acquire skills in planning scientific work as well as principles for presenting and publishing research results: articles, conferences, and multimedia presentations.

TEACHING METHODS:

Conversation, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation, - the conditions related to intellectual property and the principles of confidentiality associated with scientific and educational activities.	P8U_W 2 P8U_W 3 P8U_W 4
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - plan research independently and expand existing scientific output, - take up creative challenges in the professional and public sphere, taking into account their ethical dimension, - develop models of appropriate behaviour in teamwork.	P8U_K 1 P8U_K 2 P8U_K 4

Methods of evaluation of outcomes achievement: Evaluation of speeches and presentations during the classes will focus on the clear presentation of issues, formulation of research hypotheses and objectives, appropriate selection of forms for presenting topics, use of current subject literature and the latest multimedia techniques, as well as the ability to engage in discussion and argumentation.

TEACHING CONTENT:

Seminars: A review of the current state of knowledge in a given field, principles for dividing research into stages, presenting research results, rules for conducting scientific discussions, and the ability to argue and respond to questions. The ability of the doctoral student to present the assumptions and objectives of their doctoral work.

The course completion criteria and methods:	Percent of a final grade:
Final evaluation of the oral presentation ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

1. References related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **One Health concept**	
Name of the course in Polish: **Koncepcja „One Health"**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **PhD Arkadiusz Dors**	
Discipline: **Veterinary**	Semester: **VII**

TYPE OF CLASSES:
(course load)

- Lectures	**36**
- Self-study	**10**
Total numer of hours:	**46**

OBJECTIVE OF THE COURSE:

The aim of the education is for the doctoral student to acquire knowledge and skills related to interdisciplinary cooperation and communication in all aspects of healthcare for humans, animals, and the environment, including the following areas: animal welfare; antimicrobial resistance in veterinary medicine; residues in food products; food hygiene; environment-animal-human interactions; zoonoses.

TEACHING METHODS:

Lectures conducted using audiovisual aids – multimedia presentation, PPT, PREZI.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In terms of knowledge (PhD students know and understand): - the global scientific achievements concerning specific issues related to veterinary medicine and their implications for practice - the latest theories and trends in the field of veterinary science, enabling the creation of original research concepts and their scientific interpretation	P8U_W 1 P8U_W 2
In terms of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - solve research-oriented tasks innovatively by independently applying knowledge of the latest research methods and tools - transfer research findings to the economic sector - independently plan and carry out their own scientific development and inspire and/or organize the development of others.	P8U_U 1 P8U_U 2 P8U_U 3 P8U_U 4
In terms of social competencies (PhD students are capable to): - independently plan and expand the existing body of scientific work - creatively undertake challenges in the professional and public spheres, considering their ethical dimensions - initiate actions in the public interest - shape standards of proper conduct in professional work, - sustaining and enhancing the significance and role of creative communities in social life.	P8U_K 1 P8U_K 2 P8U_K 3 P8U_K 4 P8U_K5

Methods of evaluation of outcomes achievement:
The final exam will be in written form.

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

TEACHING CONTENT:

1) The importance of animal welfare in livestock farming and breeding. Ethical aspects of animal welfare. Pain and suffering in animals. The impact of welfare on "human-animal" interactions. Current welfare requirements in the breeding and farming of various livestock species and selected aspects of companion animal welfare. The impact of welfare on the health and productivity of livestock.
2) Mechanisms of chemotherapeutic action. The phenomenon of bacterial resistance to antibiotics: types of resistance and mechanisms of development. Presentation of methods for determining microorganism susceptibility to chemotherapeutics: diffusion-disc method, E-test, MIC. Critical points/limitations of the methods.
3) Legislative acts regulating monitoring of residual contaminants in food and feed. National program for monitoring residuals. Methods for determining maximum residue levels (MRL) of contaminants (e.g., heavy metals, pesticides, mycotoxins, veterinary drugs, radioactive contamination, dioxins, furans). Methods for sample collection, securing, and transport for monitoring studies. Cover letter. Characterization of principles and diagnostic methods used in laboratory diagnostics for monitoring studies.
4) Food Hygiene. The importance of hygiene in food production. Overview of basic legal acts concerning food safety. Food safety hazards: biological, chemical, and physical factors. Cases of food poisoning and their causes. Food safety management systems: Introduction to HACCP, GMP, and GHP. Application of systems in industrial practice.
5) Environment – animal – human Interactions and their impact on public health. Epidemiology of zoonotic diseases and their links to environmental factors. Analysis of the impact of the environment on the health of animals and humans. Animal-borne diseases and their impact on public health. Public health protection strategies in the context of environmental interactions. Cooperation with institutions and organizations in health protection.
6) Discussion of major zoonoses associated with livestock, companion, and wild animals. Viral, bacterial, parasitic, and fungal zoonoses that have posed significant threats in recent years. Definitions and national regulations. Diagnostics, monitoring, and control.

The course completion criteria and methods:

Exam

□ pass (Z) **□ course credit with a grade** **☒ examination**

Percent of a final grade:

100%

RECOMMENDED LITERATURE:

1) Bintsis, T. (2017). Food Safety: Managing the HACCP System. Springer.
2) Forsythe, S. J. (2020). The Microbiology of Safe Food (3rd ed.). Wiley-Blackwell.
3) Motarjemi, Y. & Lelieveld, H. (2013). Food Safety Management: A Practical Guide for the Food Industry. Elsevier.
4) Jay, J. M., Loessner, M. J., & Golden, D. A. (2005). Modern Food Microbiology (7th ed.). Springer.
5) Zinsstag, J., et al. (2011). One Health: The Theory and Practice of Integrated Health Approaches. Springer.
6) Cleaveland, S., et al. (2007). The Role of Wildlife in Infectious Disease Epidemiology: A One Health Perspective. In: Infectious Disease in a Changing Environment, Wiley.
7) WHO (World Health Organization). (2018). One Health: A Concept for the 21st Century.
8) Häsler, B., et al. (2014). One Health: A New Approach to Addressing Global Health Challenges. Public Health.
9) McEwen, S. A., & Collignon, P. J. (2018). Antimicrobial Resistance: A One Health Perspective. In: Antimicrobial Resistance in Bacteria from Livestock and Companion Animals. Wiley.
10) RC Gupta (2007) Veterinary Toxicology, Elsevier.
11) GD Osweiler (1996) Toxicology, Williams and Wilkins
12) World Animal Health Information System https://wahis.woah.org/
13) Webster, J., & Margerison, J. (Eds.). (2022). Management and welfare of farm animals: the UFAW farm handbook. John Wiley & Sons.
14) Mench, J. (Ed.). (2017). Advances in agricultural animal welfare: Science and practice.
15) Standards, directives, and EU regulations regarding animal welfare and the impact of agricultural buildings on the environment.

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Disciplinary seminar**	
Name of the course in Polish: **Seminarium dyscyplinowe**	
Unit providing the course (Department): **Department of Preclinical Sciences and Infectious Diseases**	
Course leader: **dr hab. Agnieszka Pękala-Safińska, prof. UPP**	
Discipline: **Veterinary sciences**	Semester: **VIII**

TYPE OF CLASSES:
(course load)

- Practical classes	**6**
- Self-study	**4**
Total numer of hours:	**10**

OBJECTIVE OF THE COURSE:

The aim of the seminar is to verify the advancement of the dissertation and the preparation of the doctoral student for the defence of the dissertation

TEACHING METHODS:

Conversation, discussion, analysis and interpretation

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - the latest theories and trends in the discipline of veterinary medicine to create original research concepts and their scientific interpretation - principles of research planning and funding and project evaluation.	P8U_W 2 P8U_W 3
In the area of skills (PhD students know how to): - use knowledge to creatively formulate their own research problems - independently plan and carry out their own scientific development and inspire and/or organise the development of others -	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - plan research independently and expand existing scientific output, - take up creative challenges in the professional and public sphere, taking into account their ethical dimension, - develop models of appropriate behaviour in teamwork.	P8U_K 1 P8U_K 2 P8U_K 4

Methods of evaluation of outcomes achievement: Evaluation of speeches and presentations in class in terms of comprehensible presentation of issues, formulation of research hypotheses and the purpose of research, appropriate choice of presentation of the forms of issues raised, use of current literature on the subject and the latest multimedia techniques, ability to discuss and argue

TEACHING CONTENT:

Seminars: principles of presenting research results, principles of scientific discussion and the ability to argue and answer questions, and verification of the advancement of the dissertation, practical classes: presentation by the doctoral student of the assumptions and objectives of the dissertation in progress. Discussion of methodology and results. Verification of the graphical and factual presentation of the results.

The course completion criteria and methods:	Percent of a final grade:
Final evaluation of the oral presentation ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

1. References related to the topic of the doctoral thesis

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Animal production part 1.**	
Name of the course in Polish: **Produkcja zwierzęca część 1.**	
Unit providing the course (Department): **Department of Animal Nutrition**	
Course leader: **Prof. dr hab. Adam Cieslak**	
Discipline: **Animal science and fisheries**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Present the current state of knowledge regarding the latest trends and procedures in nutritional and genetic methods aimed at reducing the negative impact of animal production on the environment.
Familiarization with the practical application of methane measurement methods and animal welfare verification procedures.
Identification of characteristics related to animal neglect and welfare concerns.

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion Analysis of case studies
Respiratory chambers experiments
Completion of animal welfare protocols based on visual materials

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) The global scientific literature on nutrition, environmental impact, and welfare, including the implications for practical applications in nutrition, genetics, welfare, and environmental sustainability 2) The latest theories and trends in nutrition, genetics, and welfare research, as well as their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 3) Apply knowledge creatively in the formulation of their research problems. 4) Innovatively solve research tasks using independently acquired knowledge of state-of-the-art methods and research tools.	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): 5) Independently plan research and disseminate findings within the existing body of scientific literature. 6) Promote effective teamwork models. 7) Uphold and advocate for the importance and role of the intellectual community in social life.	P8U_K_1 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effects no 1, 2, 5
Projects (practical knowledge): effects no 3,4,5,6,7

TEACHING CONTENT:

Review of current topics in nutritional and genetic methods, as well as welfare verification, aimed at reducing the negative impact of animal production on the environment.

Methane measurement methods (e.g., gas chromatography, respiratory chambers).

Breeding programs and key animal breeding concepts focused on reducing animal production's environmental impact.

Current methods for verifying animal welfare.

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

RECOMMENDED LITERATURE:

1. Deitmers, J. H., Hartinger, T., Gresner, N., & Südekum, K. H. (2024). Comparison of ruminal fermentation characteristics of two common forages using a coupled in vivo-in situ approach and the in vitro rumen simulation technique RUSITEC. *Animal Feed Science and Technology*, 115900.
2. Larsen, M. L., Wang, M., & Norton, T. (2021). Information technologies for welfare monitoring in pigs and their relation to
   Welfare Quality®. *Sustainability*, *13*(2), 692.
3. Lassen, J., Difford, G.F. (2020). Review: Genetic and genomic selection as a methane mitigation strategy in dairy cattle. *Animal*, 14:S3, 473-483
4. Levrault, C. M., Difford, G. F., Steinheim, G., Koerkamp, P. W. G., & Ogink, N. W. (2023). Validation of the methane production measurement accuracy and ranking capacity of portable accumulation chambers for use with small ruminants. *Biosystems Engineering*, *236*, 201-211.
5. Ludwiczak, Agnieszka, Małgorzata Kasprowicz-Potocka, Anita Zaworska-Zakrzewska, Joanna Składanowska-Baryza, Vicente Rodriguez-Estevez, Santos Sanz-Fernandez, Cipriano Diaz-Gaona et al. "Husbandry practices associated with extensification in European pig production and their effects on pork quality." *Meat Science* (2023): 109339.
6. Marchewka, J., Sztandarski, P., Solka, M., Louton, H., Rath, K., Vogt, L., ... & Horbańczuk, J. O. (2023). Linking key husbandry
   factors to the intrinsic quality of broiler meat. *Poultry science*, *102*(2), 102384.
7. Meuwissen, T., Hayes, B., & Goddard, M. (2016). Genomic selection: A paradigm shift in animal breeding. *Animal Frontiers*, 6(1), 1-17
8. Patra, A. K., & Puchala, R. (2023). Methane mitigation in ruminants with structural analogs and other chemical compounds targeting archaeal methanogenesis pathways. *Biotechnology Advances*, 108268.
9. Sypniewski, M., Strabel, T., Cieslak, A., Szumacher-Strabel, M., & Pszczola, M. (2019). Interchangeability and comparison of methane measurements in dairy cows with 2 noninvasive infrared systems. *Journal of Dairy Science*, *102*(10), 9512-9517.
10. Web sites:
    - https://www.welfarequalitynetwork.net/en-us/home/
    - https://meatquality.eu/

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Experiments and data analysis in Animal Sciences**	
Name of the course in Polish: **Doświadczenia i analiza danych w naukach o zwierzętach**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **dr hab. Ewa Sell-Kubiak**	
Discipline: **Animal science and fisheries**	Semester: **II**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**3**
Total number of hours:	**15**

OBJECTIVE OF THE COURSE:

The aim of the course is to familiarize Ph.D. students with the principles of planning experiments and the selection of analytical methods, when analyzing the outcomes of experiments in animal sciences.

TEACHING METHODS:

Practical classes in the computer room with the use of statistical package R and freely available databases.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice 2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating the creation of original research concepts and their scientific interpretation	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): 3) apply knowledge in the process of creative formulation of their research problems 4) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	(P8U_U_1) (P8U_U_2)
In the area of social competencies (PhD students are capable to): 5) independently plan research and independently broaden the existing body of scientific literature 6) creatively solve challenges in professional and public life, considering their ethical aspects	(P8U_K_1) (P8U_K_2)

Methods of evaluation of outcomes achievement:

Active participation, presence, and overall performance during classes. Final exam. - effects no 1,2,3,4,5,6

TEACHING CONTENT:

- data handling,
- data visualization,
- experimental design:
  - number of animals/samples/replicates,
  - research designs examples vs. observational
  - study,
  - power analysis.
- principal statistical analyses/basics of hypothesis testing.

The course completion criteria and methods:	Percent of a final grade:
Exam	100%

□ **pass (Z)**	□ **course credit with a grade**	☒ **examination**	

RECOMMENDED LITERATURE:

Quick M. John, Statistical Analysis with R, Packt Publishing, 2010

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **Prof. dr hab. Dorota Cieślak**	
Discipline: **Animal science and fisheries**	Semester: **2**

TYPE OF CLASSES:
(course load)

- seminar; journal club	**6**
- Self-study	**2**
Total number of hours:	**8**

OBJECTIVE OF THE COURSE:

Getting acquainted with the Faculty, education within the discipline, NCN grant application

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) principles of planning and financing of research projects	(P8U_W_3)
In the area of skills (PhD students know how to): 2) independently plan and realize their scientific development, as well as inspire and/or organize the development of others	(P8U_U_4)
In the area of social competencies (PhD students are capable to): 3) promote appropriate models of teamwork 4) maintain and promote the importance and role of the intellectual community in social life	(P8U_K_4)

Methods of evaluation of outcomes achievement:
Written test (theoretical knowledge): effects no 1, 2,5 Projects (practical knowledge): effects no 3,4,5,6

TEACHING CONTENT:

Presentation of the Faculty of Veterinary Medicine and Anima Sciences Principles of education (discipline zootechnics and fisheries) Introduction to NCN (national Science Centre); PRELUDIUM program Introduction to the doctoral theses

The course completion criteria and methods:	Percent of a final grade:
Activity during classes ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Web sites :
https://www.ncn.gov.pl/en
https://puls.edu.pl/en/
https://wwz.up.poznan.pl/pl
https://puls.edu.pl/en/doctoral-school

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Animal production, part 2**	
Name of the course in Polish: **Produkcja zwierzęca, część 2**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding**	
Course leader: **Prof. dr hab. Dorota Cieślak**	
Discipline: **Animal science and fisheries**	Semester: **3**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Present the current state of knowledge on procedures in assisted reproduction (ART) and genomic selection. Familiarization with the practical implementation of procedures in cattle breeding.

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion Analysis of case studies
Computer lab

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. The global scientific literature on ART technologies, breeding programs, and genomic selection, along with their implications for animal production. 2. The latest theories and trends in these three areas of animal production supporting the development of original research concepts and scientific interpretations.	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): 3. Utilize acquired knowledge to formulate research problems. 4. Solve research problems using acquired knowledge of state-of-the-art methods and research tools.	(P8U_U_1) (P8U_U_2)
In the area of social competencies (PhD students are capable to): 5. Independently plan research and contribute to the dissemination of the existing body of scientific literature. 6. Maintain and promote the importance and role of the intellectual community in social life.	(P8U_K_1) (P8U_K_5)

Methods of evaluation of outcomes achievement: Written test (theoretical knowledge): effects no 1, 2,5 Projects (practical knowledge): effects no 3,4,5,6

TEACHING CONTENT:

Assisted reproductive procedures in animal breeding (ET, OPU): protocols, efficiency, scope of application in dairy and beef cattle, advantages over standard reproduction programs, and the role of preimplantation embryos in genomic selection.

Breeding programs: key concepts of animal breeding and their implementation in breeding practices.

Genomic selection in cattle breeding: key elements of the procedure and its application in breeding programs.

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Bouquet J, Juga J (2013) Integrating genomic selection into dairy cattle breeding programs: a review. Animal 7(5):705-13
2. Hasler JF (2014) Forty years of embryo transfer in cattle: a review focusing on the journal Theriogenology, the growth of the industry in North America, and personal reminisces. Theriogenology 81(1):152-169
3. Lopez LR (2020) Ovum pick-up OPU) in cattle – an update. In: Gardon JC (ed) Biotechnologies Applied to Animal Reproduction. Current trends and practical applications for reproductive management. Apple Academic Press ISBN 9781774639016
4. Oliveira CS et al (2023) Embryo biopsies for genomic selection in tropical dairy cattle. Animal Reproduction 20(2):e20230064

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Animal models in scientific experiments.**	
Name of the course in Polish: **Modele zwierzęce w eksperymentach naukowych.**	
Unit providing the course (Department): **Department of Animal Physiology, Biochemistry and Biostructure**	
Course leader: **dr hab., prof. PULS Katarzyna Szkudelska**	
Discipline: **Animal Science and fisheries**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Laboratory and farm animal models characteristics; legal regulations; Local Ethics Committee

TEACHING METHODS:

lectures, practical workshops, journal club – multimedia presentation with discussion

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. world scientific literature concerning the animal models and ethical approach of the use of animals in scientific experiments and implications for practice; 2. the latest ethical rules as well as new methods and trends in research involving animals, thus facilitating the creation of original approaches, new concepts, and their scientific interpretation.	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 3. apply knowledge in the process of creative formulation of their research problems; 4. innovatively solve research tasks using independently gained knowledge concerning ethical and methodological aspects of the use of laboratory animals in scientific research.	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): 5. independently plan research and independently broaden the existing body of scientific literature; 6. promote appropriate models of teamwork.	P8U_K_1 P8U_K_4

Methods of evaluation of outcomes achievement:

Exam (lectures) - effects no: 1,2,3,4
Activity during workshop and discussions – effects no: 1,2,3,4,5,6

TEACHING CONTENT:

- rules regulating the use of animals in research;
- conditions of keeping and rules for handling animals;
- purposes, types of studies, and principles of planning experiments using animals;
- research models of animals;
- *in vitro* methods developed based on lab animals' cells and tissues (examples of experiments);
- work with scientific literature related to the subject - presentation of a selected article and discussion;
- workshop – examples of the use of animals in scientific research.

The course completion criteria and methods:	Percent of a final grade:
Exam (lectures)	50%
Activity during workshop and discussions	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

Hubrecht R., Kirkwood J.: "*The UFAW Handbook of the Care and Management of Laboratory and other Research Animals"*. eight edition, Wiley-Blackwell, 2010

"*Best practice methodology in the use of animals for scientific purposes*." National Health and Medical Research Council (NHMRC) 2017, Australian Government

„*Fundamentals of Laboratory Animal Science*" Enqi Liu, Jianglin Fan**,** 2017, VetBooks, Taylor&Francis

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Animal Production - part 3**	
Name of the course in Polish: **Produkcja zwierzęca - część 3**	
Unit providing the course (Department): **Department of Animal Nutrition**	
Course leader: **Prof. dr hab. Włodzimierz Nowak**	
Discipline: **Animal science and fisheries**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**8**
- Practical classes	**4**
- Self-study	**12**
Total number of hours:	**24**

OBJECTIVE OF THE COURSE:

Course is deigned to present actual scientific and practical data focused on management practices includes diagnosis and prevention of metabolic disorders in dairy cattle and pigs and relation between nutrition and fertility.

TEACHING METHODS:

Lectures, exercises, discussions, preparing reports.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1.world scientific literature concerning diagnosis and prevention of hypocalcemia, ketosis and subclinical rumen acidosis in dairy cows 2.the latest theories and trends in relation between nutrition and dairy cows and pigs` fertility.	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): 3. apply knowledge in the process of creative formulation of their research problems 4. transfer research results to practice with the economic analyses	(P8U_U_1) (P8U_U_3)
In the area of social competencies (PhD students are capable to): 5. initiate actions for the public good 6. promote appropriate models of teamwork -	(P8U_K_3) (P8U_K_4)

Methods of evaluation of outcomes achievement:

Projects (team work) -practical knowledge: effects no 1,2

and 6. Written test: effects no: 3,4 and 5

TEACHING CONTENT:

Content of lectures

Dairy cows: diagnostic tools to estimate dairy cow nutrition behavior - rumination, locomotion index, body condition score BCS, physical characteristics of dairy cow diets (fe-NDF), manure analysis (pH, manure scanner), fertility and blood indices interpretation, hypocalcemia, SARA, ketosis (mode of action) -diagnosis and prevention

Pigs –practical feeding piglets and weaners, diseases caused by feeding, welfare–methods of evaluation, bird welfare, environmental requirements, key management points, requirements for males and females during rearing, water quality, hygiene management,

Content of exercises (labs) -milk composition as a mirror of metabolic status of dairy cows, interpretation of monthly report from PFHBiPM , metabolic status – blood analyses – results interpretation,
NIRS spectroscopy as a modern technique of feed analysis (practical lab work), welfare definition EU legislation and standards characteristic of pigs behavior, sampling of biological material (tissues and blood) for microbiological and histological analyses

The course completion criteria and methods:	**Percent of a final grade:**
Written report	30%
Written test	70%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

Following actual literature (original papers in the best scientific magazines:
-Journal of Dairy Science
-Animal Feed Sciences and Technology
-Animal

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Experimental methods in zootechnics and fisheries part 1.**	
Name of the course in Polish: **Metody doświadczalne w zootechnice i rybactwie część 1.**	
Unit providing the course (Department): **Department of Animal Nutrition**	
Course leader: **Dr hab. prof. PULS Małgorzata Kasprowicz-Potocka**	
Discipline: **Animal science and fisheries**	Semester: **4**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Presentation of the current status of knowledge about the actual trends and procedures of digestibility testing methods for nonruminants and ruminants.
Getting acquainted with the practical implementation of the procedures of digestibility determination of feeds with different methods.

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion Analysis of case studies
Laboratory experiments

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1)world scientific literature concerning nutrition, feed applications and digestibility of feed components along with the resulting implications for nutrition in practice and environmental status 2)the latest theories and trends in the area of nutrition research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 3) apply knowledge in the process of creative formulation of their research problems 4) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): 5) independently planning of research 6) promote appropriate models of teamwork 7) maintain and promote the importance and role of the intellectual community in social life	P8U_K_1 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effects no 1, 2, 5 Projects (practical knowledge): effects no 3,4,5,6,7

TEACHING CONTENT:

Review of current topics of nutritional research based on the - actual trends and methods (cows, poultry, pigs).
Digestibility testing methods – nonruminants (indicator methods, differential methods, cannulated animals, principles of digesta and feces collection, freeze-drying, intestinal and total digestibility coefficients, apparent and true digestibility) and ruminants (in vitro, in Sacco, cannulated animals). Ruminants - physical methods of separating feces from urine, a classic method of determining digestibility; analysis of biological material and calculation of digestibility coefficients, participation in collection of biological material.
Chemical analysis on feces in labor (marker method).

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Adeola, O. (2000). Digestion and balance techniques in pigs. In *Swine nutrition* (pp. 923-936). CRC press.
2. Bedford, Michael & Masey O'Neill, Helen & Pesti, Gene & Patience, John & Lindsay, David & Alhotan, Rashed & Costa, MJ & Billard, L & Choct, Mingan. (2016). Nutrition Experiments in Pigs and Poultry: A Practical Guide. 10.1079/9781780647005.0000.
3. Cherian G. (2020). A Guide to the Principles of Animal Nutrition. XX. Measurement of Feed and Nutrient Utilization in Food- Producing Animals.
4. Deitmers, J. H., Hartinger, T., Gresner, N., & Südekum, K. H. (2024). Comparison of ruminal fermentation characteristics of two common forages using a coupled in vivo-in situ approach and the in vitro rumen simulation technique RUSITEC. Animal Feed Science and Technology, 115900.
5. Kleyn, Rick. (2022). Chicken Nutrition: A guide for nutritionists and poultry professionals.
6. López, S. (2005) In Vitro and In Situ Techniques for Estimating Digestibility CSIC Digital https://digital.csic.es › bitstream.
7. Zewdie, A. K. (2019). The different methods of measuring feed digestibility: A review. *EC Nutr*, *14*(1), 68-74.
8. Zhang, F., Adeola, O. (2017). Techniques for evaluating digestibility of energy, amino acids, phosphorus, and calcium in feed ingredients for pigs. *Animal Nutrition*, *3*(4), 344-352.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Animal Nutrition**	
Course leader: **dr hab., prof. PULS Małgorzata Kasprowicz-Potocka**	
Discipline: **Animal science and fisheries**	Semester: **4**

TYPE OF CLASSES:
(course load)

- seminar; journal club	**6**
- Self-study	**2**
Total number of hours:	**8**

OBJECTIVE OF THE COURSE:

Publication system, Independently plan realization, mid-term evaluation

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) publication system, predator journals	(P8U_W_3)
In the area of skills (PhD students know how to): 2) independently plan realization analysis - preparing to Mid-Term Evaluation	(P8U_U_4)
In the area of social competencies (PhD students are capable to): 3)promote appropriate models of teamwork 4)maintain and promote the importance and role of the intellectual community in social life	(P8U_K_4)

Methods of evaluation of outcomes achievement:

Presentation: effects no 1,2,3,4

TEACHING CONTENT:

Doctoral School Documents analysis

The course completion criteria and methods: Activity during classes ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Web sites :
https://www.ncn.gov.pl/en
https://puls.edu.pl/en/
https://wwz.up.poznan.pl/pl
https://puls.edu.pl/en/doctoral-school

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Animal production, part 4**	
Name of the course in Polish: **Produkcja zwierzęca, część 4**	
Unit providing the course (Department): **Department of Zoology, Laboratory of Inland Fisheries and Aquaculture Department of Animal Nutrition Department of Animal Breeding and Product Quality Assessment**	
Course leader: **dr hab. prof. PULS Jan Mazurkiewicz**	
Discipline: **Animal science and fisheries**	Semester: **5**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Aquaculture systems and economics, experimental designs for sustainable fish production. Poultry production systems and economics, experimental designs for sustainable poultry production. Perception of aquaculture and poultry production and their impact on the environment. Biosecurity in aquaculture and poultry production.

TEACHING METHODS:

Multimedia presentations. Analysis of case studies. Practical classes in experimental units.

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. world scientific literature concerning technologies in aquaculture and poultry production, breeding programs, and genomic selection with the resulting implications for animal production 2. the latest theories and trends in aquaculture and poultry production 3. principles of planning and financing of research and evaluation of projects in aquaculture and poultry production	P8U_W_1 P8U_W_2 P8U_W_3
In the area of skills (PhD students know how to): 4. utilize the acquired knowledge to formulate research problems 5. solve research problems with the acquired knowledge concerning state-of-the art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): 6. independent planning of research and dissemination of the existing body of scientific literature 7. maintaining and promoting the importance and role of the intellectual community in social life	P8U_K_1 P8U_K_5

Methods of evaluation of outcomes achievement: Written test: effects no 1 – 7.

TEACHING CONTENT:

- Global aquaculture production systems and their impact on the environment and economics.
- Modern trends in experimental and sustainable aquaculture.
- The development and application of experimental designs in aquaculture.
- Knowledge and perception of aquaculture in science and society.
- Poultry production and their impact on the environment.
- Modern trends in experimental on poultry.
- The development and application of experimental designs in poultry.
- Biosecurity in poultry production.

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Webster, C. D., & Lim, C. (Eds.). (2002). *Nutrient requirements and feeding of finfish for aquaculture*. CABI publishing.
2. Williot, P., Nonnotte, G., & Chebanov, M. (Eds.). (2018). *The Siberian Sturgeon (Acipenser baerii, Brandt, 1869) Volume 2-Farming*. Springer International Publishing.
3. Williot, P., Nonnotte, G., & Chebanov, M. (Eds.). (2018). *The Siberian Sturgeon (Acipenser baerii, Brandt, 1869) Volume 1-Biology*. Springer International Publishing.
4. Reza Hoshmand A., (2006). Design of Experiments for Agriculture and the Natural Sciences.
5. Gillespie J. R. and Flanders F.B. (2009) Modern Livestock and Poultry Production
6. Bedford M.R., Choct M., Masey O Neill H., (2016). Nutrition experiments in pigs and poultry.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Experimental methods in zootechnics and fisheries part 2 - Molecular genetics; biochemistry**	
Name of the course in Polish: **Metody eksperymentalne w zootechnice i rybactwie, część 2 – Genetyka Molekularna i Biochemia.**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding and Department of Animal Biochemistry, Physiology and Biostructure**	
Course leader: **dr hab. Zofia E. Madeja** Tutors**:** **dr Tatiana Wojciechowicz and dr hab., Prof. UPP Marek Skrzypski**	
Discipline: **Animal science and fisheries**	Semester: **V**

TYPE OF CLASSES: (course load)	
- Lectures	**4**
- Practical classes	**8**
- Self-study	**1**
Total number of hours:	**13**

OBJECTIVE OF THE COURSE:

To understand the basic methods of quantitative and qualitative analysis in molecular biology and biochemistry:

Part 1: Molecular Biology methods – DNA (cDNA) analysis: introduction to quantitative real-time PCR (Q-PCR) technique;
Part 2: Biochemical methods of protein analysis: quantitative measurement of proteins (molecular analysis), protein extraction, quality and quantity evaluation (Western Blot).

TEACHING METHODS:

Multimedia presentations, laboratory work related to cDNA/DNA preparation for Q-PCR, primer design, product validation, quantitative analysis (methods of data calculation), laboratory work dedicated to the applications of protein analysis (Western Blot technique).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. how to find relevant literature 2.how to design an experiment related to quantitative DNA/cDNA and protein analysis that would allow to create original research concepts and implement interpretation of scientific data. 3.how to critically analyse the data	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 4.apply knowledge in the process of creative formulation of the research problem, that include preparing of biological specimens for molecular biology and biochemical studies 5.apply different staining methods depending on the biological material 6.being able to plan an experiment (solving research tasks)	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competencies (PhD students are capable to): 7. proper data interpretation, including critical thinking 8.independent planning of research and broadening the existing knowledge (that includes reading scientific literature) 9.creative solving of challenges in professional and public life, considering their ethical aspect	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Evaluation will be based on student's knowledge after completing the course, this will be done on the basis of student's activity
during classes, short project related to data interpretation and on the exam – effects no: 1-9

TEACHING CONTENT:

Lecture 1: Biochemistry and detection of proteins: basic summary of protein structure, preparing proteins samples using various laboratory techniques, quantitative measurement of proteins, quality and quantity evaluation of proteins using Western Blot method.

Lecture 2: Molecular biology: principles of qualitative and quantitative PCR reactions (reagents, reaction conditions, reaction dynamics), reaction template preparation (DNA/cDNA), Q-PCR detection methods (SYBR vs molecular probes) data interpretation and troubleshooting, applications in science and diagnostics.

Practical classes 1: laboratory work: protein concentration measurement, Western Blot analysis (PAGE electrophoresis and semi- dry transfer of proteins onto the membrane, chemiluminescent detection of target protein using antibody-based detection assay.

Practical classes 2: laboratory work, preparing Q-PCR reaction, running the experiment, data analysis and interpretation.

The course completion criteria and methods:	Percent of a final grade:
Activities during class	10%
Project related to data analysis	30%
Exam	60%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Genetyka ogólna i weterynaryjna, pod redakcją naukową Prof. Marka Świtońskiego, wydawnictwo PWN, 2023r.ISBN: 987-83-01-23167-5.
2. Analiza DNA. Teoria i praktyka, pod redakcją Prof. Ryszarda Słomskiego, 2011 rok, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, ISBN: 978-83-7160-607-6.
3. Real-Time PCR, by M. Tevfik Dorak, ISBN-13: 9780415377348.
4. The MIQE guidelines: minimum information for publication of quantitative real-time PCR experiments. Bustin SA, Benes V, Garson JA, Hellemans J, Huggett J, Kubista M, Mueller R, Nolan T, Pfaffl MW, Shipley GL, Vandesompele J, Wittwer CT. Clin Chem. 2009;55(4):611-22. doi: 10.1373/clinchem.2008.112797.
5. Biochemia, Lubert Stryer, Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Wydawnictwo Naukowe PWN or the English version of this book: Biochemistry
6. Western Blot: Technique, Theory, and Trouble Shooting, Tahrin Mahmood and Ping-Chang Yang N Am J Med Sci. 2012 Sep; 4(9): 429–434. doi: 10.4103/1947-2714.100998
7. Pubmed and Google Schoolar.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Food products of animal origin**	
Name of the course in Polish: **Produkty spożywcze pochodzenia zwierzęcego**	
Unit providing the course (Department): **Department of Animal Breeding and Product Quality Assessment**	
Course leader: **Prof. dr hab. Piotr Ślósarz**	
Discipline: **Animal science and fisheries**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

The objective of the course is to characterize the most important traits of animal-origin food products defining their nutritional value and safety. The PhD students are going to learn to point the major factors determining the quality of food products of animal origin during the food supply chain (‘from farm to fork’).

TEACHING METHODS:

Power point presentations
Discussion on available research results
Laboratory practice

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1)world scientific literature concerning animal-origin food products quality and the factors that define it with the resulting implications for animal production and food processing 2)the latest theories and trends in the areas of animal production and food processing that facilitate the creation of original research concepts and scientific interpretation	(P8U_W_1) (P8U_W_2)
In the area of skills (PhD students know how to): 3) apply the acquired knowledge to formulate research problems 4) solve research problems with the acquired knowledge concerning state-of-the-art methods and research tools	(P8U_U_1) (P8U_U_2)
In the area of social competencies (PhD students are capable to): 5) independent planning of research and dissemination of the existing body of scientific literature 6) maintaining and promoting the importance and role of the intellectual community in social life	(P8U_K_1) (P8U_K_5)

Methods of evaluation of outcomes achievement:
Written test (theoretical knowledge): effects no 1, 2,5
Projects (practical knowledge): effects no 3,4,5,6

TEACHING CONTENT:

- most important traits of animal-origin food products from the perspective of the consumer
- factors affecting the nutritional value and safety of animal-origin food products
- novel methods of animal-origin food processing
- sustainability animal-origin food production

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50 %
Activity during practical classes	50 %
☐ **pass (Z)** ☐ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Dinh, T. T. N., To, K. V., & Schilling, M. W. (2021). Fatty Acid Composition of Meat Animals as Flavor Precursors. Meat and Muscle Biology, 5(1). doi: 10.22175/mmb.12251
2. Feiner, G. (2006). 4 – Definitions of terms used in meat science and technology. Gerhard Feiner, In Woodhead Publishing Series in Food Science, Technology and Nutrition, Meat Products Handbook, Woodhead Publishing.
3. Honikel, K. O. (1998). Reference methods for the assessment of physical characteristics of meat. Meat Science, 49(4), 447-457. doi: https://doi.org/10.1016/S0309-1740(98)00034-5
4. Lebret, B., & ˇCandek-Potokar, M. (2022). Review: Pork quality attributes from farm to fork. Part I. carcass and fresh meat. Animal, 16. https://doi.org/10.1016/j.animal.2021.100402
5. Rosenvold, K., & Andersen, H. J. (2003). Factors of significance for pork quality-a review. Meat Sci, 64(3), 219-237. doi: 10.1016/S0309-1740(02)00186-9
6. Wojtasik, M., Raj, S., Skiba, G., Weremko, D., & Czauderna, M. (2012). The effects of diets enriched in omega-3 fatty acids on carcass characteristics and the fatty acid profile of intramuscular and subcutaneous fat in pigs. Journal of Animal and Feed Sciences, 21(4), 635-647. doi: 10.22358/jafs/66137/2012
7. Wood, J. D., Richardson, R. I., Nute, G. R., Fisher, A. V., Campo, M. M., Kasapidou, E., …Enser, M. (2004). Effects of fatty
   acids on meat quality: A review. Meat Science, 66(1), 21–32. https://doi.org/10.1016/S0309-1740(03)00022-6
8. Xia, J. Q., Liu, D. Y., Liu, J., Jiang, X. P., Wang, L., Yang, S., & Liu, D. (2023). Sex effects on carcass characteristics, meat quality traits and meat amino acid and fatty acid compositions in a novel Duroc line pig. J Anim Physiol Anim Nutr (Berl), 107(1), 129-135. doi: 10.1111/jpn.13680

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Experimental methods in zootechnics and fisheries part 3. Histology; Microbiology**	
Name of the course in Polish: **Metody eksperymentalne w zootechnice i rybactwie. Cześć 3: histologia; mikrobiologia**	
Unit providing the course (Department): **Laboratory of Histology and Embryology in Dept of Physiology, Biochemistry and Biostructure of Animals**	
Course leader: **dr hab. Kinga Skieresz-Szewczyk**	
Discipline: **Animal science and fisheries**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

The course introduces principles for modern methods of light (LM) and scanning (SEM)- and transmission (TEM) electron microscopy with practical preparation of biological and non-biological samples for 2D and 3D visualization and interpretation.

The practical course includes sampling biological materials from nonruminant animals, applying commonly used in-field microbiological methods, and evaluating obtained results with an emphasis on the characterization of gastrointestinal tract microbiota of monogastric livestock.

TEACHING METHODS:

Lectures- multimedia presentation
Practical exercises in LM, SEM lab, and computer lab with “Virtual microscopy” e-learning -platform
And in the microbiological laboratory.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. how to find literature sources related to microscopic imaging, and 2D and 3D imaging, and gastrointestinal tract microbiota of various animal species. 2. understand the principles of modern microscopy – including the method of LM SEM, TEM electron microscopy (TEM and SEM), as well as in-field microbiological methods (classical microbiology and McMaster method) to know the quality and sort of gathered information 3. the latest trends in microscopic visualisation allowed the creation of original research concepts and	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 4. apply knowledge in the process of creative formulation of the research problem, which include preparing of biological specimens for microscopic observations 5. apply staining methods depending on the biological material or preparing microbiological samples depending on the gut segment - being able to plan an experiment (solving research tasks)	P8U_U_1 P8U_U_2 P8U_U_4

In the area of social competencies (PhD students are capable to): 6. proper data interpretation, including critical thinking 7. independent planning of research and broadening the existing knowledge (that includes reading scientific literature) 8. creative solving of challenges in professional and public life, considering their ethical aspect	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effect no 2,3,5,6
Evaluation of practical preparation of microscopical samples (practical knowledge) : effect no 1,4. 6,7, 8
Evaluation of practical preparation of microbiological samples (practical knowledge): effect no 1-8

TEACHING CONTENT:

Histology:
- the introduction to the preparation of biological and non-biological samples for analyses in light microscopy with special emphasis on histochemistry, immunohistochemistry, and autoradiography.
- The application of scanning and transmission electron microscopy and microtomography methods for 2D and 3D imaging of microscopic structures of animal and plant samples

Microbiology:
- Collection of biological material from non-ruminant animals for microbiological analysis
- Commonly used field methods applied in microbial analysis

The course completion criteria and methods:	Percent of a final grade:
Exam Activity during practical classes	50% 50%
Criteria: • Attendance at least 80% • Active participation in the class (participation in the discussion, asking questions)	
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Goldstein, J. I., Newbury, D. E., Michael, J. R., Ritchie, N - . W., Scott, J. H. J., & Joy, D. C. Scanning electron microscopy and X-ray microanalysis. Springer, 2017.
2. Hayat, M.A. Eric. Basic techniques for transmission electron microscopy. Elsevier, 2012.
3. Haug, A., Williams, R. B., & Larsen, S. (2006). Counting coccidial oocysts in chicken faeces: a comparative study of a standard McMaster technique and a new rapid method. Veterinary parasitology, 136(3-4), 233- 242.
4. Kogut, M. H. (2022). Role of diet-microbiota interactions in precision nutrition of the chicken: facts, gaps, and new concepts. Poultry Science, 101(3), 101673.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Animal Nutrition**	
Course leader: **dr hab., prof. PULS Małgorzata Kasprowicz-Potocka**	
Discipline: **Animal science and fisheries**	Semester: **6**

TYPE OF CLASSES:
(course load)

- seminar; journal club	**6**
- Self-study	**2**
Total number of hours:	**8**

OBJECTIVE OF THE COURSE:

Independent research plan evaluation, publication plan, documents actualization

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) evaluation of projects	(P8U_W_3)
In the area of skills (PhD students know how to): 2) independently plan and realize their scientific development, as well as inspire and/or organize the development of others	(P8U_U_4)
In the area of social competencies (PhD students are capable to): 3) promote appropriate models of teamwork 4) maintain and promote the importance and role of the intellectual community in social life	(P8U_K_4)

Methods of evaluation of outcomes achievement:
Presentation: effects no 1,2,3,4

TEACHING CONTENT:

Doctoral School Documents analysis

The course completion criteria and methods:	Percent of a final grade:
Activity during classes ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

Web sites :
https://www.ncn.gov.pl/en
https://puls.edu.pl/en/
https://wwz.up.poznan.pl/pl
https://puls.edu.pl/en/doctoral-school

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Functional food**	
Name of the course in Polish: **Funkcjonalna żywność**	
Unit providing the course (Department): **Department of Animal Nutrition**	
Course leader: **Prof. dr hab. Adam Cieślak**	
Discipline: **Animal science and fisheries**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Presentation of the current status of knowledge about the development of functional foods, their mechanism of action in humans, and regulatory framework.
Getting acquainted with the practical implementation of the methods of verifying factors influencing functional food The current information about functional food market size, share, trends & forecast

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion Analysis of case studies
The practical presentation of chromatographic techniques used in food analyses

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) world scientific literature concerning functional foods and their mechanism of action in humans 2) the latest theories and trends in the area of functional foods research concepts and their scientific interpretation	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 3) apply knowledge in the process of creative formulation of their research problems 4) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools	P8U_U_1 P8U_U_2
In the area of social competencies (PhD students are capable to): 5) independent planning of research and dissemination of the existing body of scientific literature 6) promote appropriate models of teamwork 7) maintain and promote the importance and role of the intellectual community in social life	P8U_K_1 P8U_K_4 P8U_K_5

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effects no 1, 2, 5
Projects (practical knowledge): effects no 3,4,5,6,7

TEACHING CONTENT:

Review of current topics of functional foods and their mechanism of action in humans

Fatty acids and amino acids measurement methods (e.g. gas chromatography, liquid chromatography)
Meat alternatives and substitutes – modern trends, consumer acceptance, advanced production technologies, regulatory framework. Meat and meat products – how to implement functionality while saving the sensory qualities and technological quality. Functional food additives and their role in the manufacturing process (pigments, preservatives, antioxidants, acidifiers, thickeners, gelling agents, sweeteners, and flavorings).

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%
☐ **pass (Z)** ☐ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

1. Pang, G., Xie, J., Chen, Q., & Hu, Z. (2012). How functional foods play critical roles in human health. *Food Science and human wellness*, *1*(1), 26-60.
2. Alongi, M., & Anese, M. (2021). Re-thinking functional food development through a holistic approach. *Journal of Functional Foods*, *81*, 104466.
3. Maqsood, S., Adiamo, O., Ahmad, M., & Mudgil, P. (2020). Bioactive compounds from date fruit and seed as potential nutraceutical and functional food ingredients. *Food chemistry*, *308*, 125522.
4. Siciliano, R. A., Reale, A., Mazzeo, M. F., Morandi, S., Silvetti, T., & Brasca, M. (2021). Paraprobiotics: A new perspective for functional foods and nutraceuticals. *Nutrients*, *13*(4), 1225.
5. Gao, M., Cieślak, A., Huang, H., Gogulski, M., Petrič, D., Ruska, D., ... & Szumacher-Strabel, M. (2023). Effects of raw and fermented rapeseed cake on ruminal fermentation, methane emission, and milk production in lactating dairy cows. *Animal Feed Science and Technology*, *300*, 115644.
6. Yanza, Y. R., Szumacher-Strabel, M., Lechniak, D., Ślusarczyk, S., Kolodziejski, P., Patra, A. K., ... & Cieslak, A. (2022). Dietary Coleus amboinicus Lour. decreases ruminal methanogenesis and biohydrogenation, and improves meat quality and fatty acid composition in longissimus thoracis muscle of lambs. *Journal of Animal Science and Biotechnology*, *13*, 1-19.
7. Web sites: https://meatquality.eu/
8. Macho-González, A., Bastida, S., Garcimartín, A., López-Oliva, M. E., González, P., Benedí, J., González-Muñoz, M. J., & Sánchez- Muniz, F. J. (2021). Functional Meat Products as Oxidative Stress Modulators: A Review. Advances in nutrition (Bethesda, Md.), 12(4), 1514–1539. https://doi.org/10.1093/advances/nmaa182
9. Vallikkadan, M.S., Dhanapal, L., Dutta, S. et al. Meat Alternatives: Evolution, Structuring Techniques, Trends, and Challenges. Food Eng Rev 15, 329–359 (2023). https://doi.org/10.1007/s12393-023-09332-8

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Biostatistics and bioinformatics in data analysis**	
Name of the course in Polish: **Biostatystyka i bioinformatyka w analizie danych**	
Unit providing the course (Department): **Department of Mathematical and Statistical Methods**	
Course leader: **dr Alicja Szabelska-Beręsewicz**	
Discipline: **Animal science and fisheries**	Semester: **7**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

Familiarization with the Ensembl database and the types of genomic annotation available in it. Practical exercises for processing annotations of selected animals with the tidyverse ecosystem in R.

TEACHING METHODS:

Multimedia presentations
Computer lab
Analysis of case studies

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) comprehensive understanding of genomic databases like Ensembl, that offer annotations spanning diverse species, elucidating gene locations, protein-coding regions, non-coding RNAs, and regulatory elements. 2)knowledge about the latest tools that can be used in analysis of genomic data that facilitate verification of original research concepts and scientific interpretation	(P8U_W_2) (P8U_W_3)
In the area of skills (PhD students know how to): 3)utilize the acquired knowledge to formulate research problems focused on leveraging Ensembl's genomic database annotations to investigate intricate biological phenomena across species 4)solve research problems with the acquired knowledge concerning state-of-the-art methods and research tool	(P8U_U_1) (P8U_U_2)
In the area of social competencies (PhD students are capable to): 5) independent planning of research and dissemination of the existing body of scientific literature 6) promote appropriate models of teamwork 7) maintaining and promoting the importance and role of the intellectual community in social life	(P8U_K_1) (P8U_K_4) (P8U_K_5)

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effects no 1, 2, 5
Projects (practical knowledge): effects no 3, 4, 5, 6, 7

TEACHING CONTENT:

Overview of Ensembl genomic database that provides annotations for various species.
Overview of information about available types of genomic annotation, such as gene locations, protein-coding regions, non-coding RNAs, and regulatory elements.
Introduction to tidyverse ecosystem in R.
Processing and analysis of genomic annotations for selected animals.

The course completion criteria and methods:	Percent of a final grade:
Written test (lectures)	50%
Activity during practical classes	50%

☒ **pass (Z)** □ **course credit with a grade** □ **examination**

RECOMMENDED LITERATURE:

1. Birney, E., Andrews, T. D., Bevan, P., Caccamo, M., Chen, Y., Clarke, L., ... & Clamp, M. (2004). An overview of Ensembl. Genome research, 14(5), 925-928.
2. Cunningham, F., Allen, J. E., Allen, J., Alvarez-Jarreta, J., Amode, M. R., Armean, I. M., ... & Flicek, P. (2022). Ensembl 2022. Nucleic acids research, 50(D1), D988-D995.
3. Wickham, H., Çetinkaya-Rundel, M., & Grolemund, G. (2023). R for data science. " O'Reilly Media, Inc.". https://r4ds.hadley.nz/

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Renewable energy sources in the animal production sector**	
Name of the course in Polish: **Odnawialne źródła energii w sektorze produkcji zwierzęcej**	
Unit providing the course (Department): **Department of Biosystems Engineering**	
Course leader: **Prof. Jacek Dach**	
Discipline: **Animal science and fisheries**	Semester: **8**

TYPE OF CLASSES:
(course load)

- Lectures	**6**
- Practical classes	**6**
Total number of hours:	**12**

OBJECTIVE OF THE COURSE:

To increase the theoretical and practical knowledge about RES implementation in animal production.
To show the practical solutions for the reduction of environmental impact from the animal sector (study cases in the experimental farms of PULS).

TEACHING METHODS:

- Lectures
- Study tour
- Discussion about study cases

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1.world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice 2.the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating the creation of original research concepts and their scientific interpretation 3.principles of planning and financing of research and evaluation of projects	(P8U_W_1) (P8U_W_2) (P8U_W_3)
In the area of skills (PhD students know how to): 4.innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools 5.independently plan and realize their scientific development, as well as inspire and/or organize the development of others	(P8U_U_2) (P8U_U_4)
In the area of social competencies (PhD students are capable to): 6. creatively solve challenges in professional and public life, considering their ethical aspects - initiate actions for the public good	(P8U_K_2) (P8U_K_3)

Methods of evaluation of outcomes achievement:

Oral presentations and discussion. – effects no: 1-6

TEACHING CONTENT:

Renewable energy installations (biogas plant, PV, windmill, hybrid systems) – Prof. Jacek Dach
Animal manures as a way for bioenergy production and carbon footprint reduction – Prof. Jacek Dach Animal production and bioenergy installation: study tour – Prof. Jacek Dach
Properties of biomass and waste – Prof. Wojciech Czekała
Management of biomass and waste – Prof. Wojciech Czekała

The course completion criteria and methods:	Percent of a final grade:
Oral presentations	70 %
Discussion	30%
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	

RECOMMENDED LITERATURE:

1. Czekala W. (2023) Biological Treatment of Waste and By-Products from Food Industry. Springer Link
2. Czekala W, Stevens CV. (2023) Biogas Plants - Waste Management, Energy Production, and Carbon Footprint Reduction. John Wiley & Sons. Springer Nature
3. Lund H. (2014) Renewable Energy Systems - A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions. Academic Press.

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Seminar**	
Name of the course in Polish: **Seminarium**	
Unit providing the course (Department): **Animal Nutrition**	
Course leader: **dr hab., prof. PULS Małgorzata Kasprowicz-Potocka**	
Discipline: **Animal science and fisheries**	Semester: **8**

TYPE OF CLASSES:
(course load)

- seminar; journal club	**6**
- Self-study	**2**
Total number of hours:	**8**

OBJECTIVE OF THE COURSE:

Doctoral thesis preparing, doctoral defence analysis, presentation of data

TEACHING METHODS:

Multimedia presentations
Journal club – selecting data for discussion

EDUCATION OUTCOMES	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1) how to prepare doctoral thesis	(P8U_W_3)
In the area of skills (PhD students know how to): 2) independently plan and realize their scientific development,	(P8U_U_4)
In the area of social competencies (PhD students are capable to): 3) promote appropriate models of teamwork 4) maintain and promote the importance and role of the intellectual community in social life	(P8U_K_4)

Methods of evaluation of outcomes achievement:

Presentation: effects no 1,2,3,4

TEACHING CONTENT:

Doctoral School Documents analysis

The course completion criteria and methods: Activity during classes ☒ **pass (Z)** □ **course credit with a grade** □ **examination**	Percent of a final grade: 100%

RECOMMENDED LITERATURE:

Web sites :
https://www.ncn.gov.pl/en
https://puls.edu.pl/en/
https://wwz.up.poznan.pl/pl
https://puls.edu.pl/en/doctoral-school

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): Interdisciplinary seminar	
Name of the course in Polish: Seminarium interdyscyplinarne	
Unit providing the course (Department): Civil Engineering and Geoengineering	
Course leader: Prof. dr hab Janusz Olejnik	
Discipline: all disciplines	Semester: all semesters 1 to 8

TYPE OF CLASSES:
(course load)

- Lectures	**-**
- Practical classes	**-**
- Seminar	**60**
- Self-study	**20**
Total number of hours:	**80**

OBJECTIVE OF THE COURSE:

The aim of the seminar is to:
- develop work planning skills to implement an Individual Research Programme
- acquire or expand skills in presenting research results
- become familiar with the latest scientific achievements in various selected disciplines
- share the benefits of group work
- familiarise doctoral students with the principles of scientific discussion
- verify the progress of doctoral students' work on their doctoral dissertations.

TEACHING METHODS:

Seminars conducted using audiovisual aids – multimedia presentations led by all doctoral students. All discussions are moderated by the seminar leader.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
-in the area of knowledge (PhD students know and understand): - the latest theories and trends in many disciplines, which will enable the development of original research concepts and their scientific interpretation, - principles of research planning and financing, and project evaluation,	P8U_W2 P8U_W 3
In the area of skills (PhD students know how to): - use knowledge to creatively formulate one's own research problems - independently plan and implement one's own scientific development and inspire and/or organize the development of others	P8U_U 1 P8U_U 4
In the area of social competences (PhD students are capable to): - independent research planning and expanding existing scientific achievements. - taking on challenges in the professional and public spheres, taking into account their ethical dimensions, - shaping models of appropriate conduct in teamwork,	P8U_K 1 P8U_K 2 8U_K 4

Methods of evaluation of outcomes achievement:

Assessment by the lecturer of the quality and attractiveness of the doctoral students' presentations with commentary after each presentation, active participation of doctoral students in the discussion, attendance at seminars.

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TEACHING CONTENT:

The seminar content throughout the four-year period includes:
1 - introductory seminar: self-presentation (year 1, winter semester)
2 - devoted to the concept of a doctoral dissertation and adherence to the presentation timeline (year 1, summer semester)
3 - regarding Individual Research Plans (year 2, winter semester)
4 - assistance in preparing doctoral students' presentations at the mid-term evaluation (year 2, summer semester)
5 - discussion of mid-term evaluation results and an interdisciplinary discussion (year 3, winter semester)
6 - devoted to scientific achievements in selected disciplines - led by invited guests (year 3, summer semester)
7 - concerning research advancement and the implementation of doctoral dissertations (year 4, winter semester)
8 - concerning the implementation of doctoral dissertations and procedures for completing education at the Doctoral School (year 4, summer semester)

The course completion criteria and methods:	Percent of a final grade:
course credit based on the presentations prepared by the doctoral student and his/her activity in discussions	100%
☒ **pass (Z)** ☐ **course credit with a grade** ☐ **examination**	

RECOMMENDED LITERATURE:

The seminar is an original teaching process and the literature that appears results from the topics of the doctoral dissertations being carried out.

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
PEDAGOGY AND THE ETHICS OF TEACHING

Name of the course in Polish:
PEDAGOGIKA Z ELEMENTAMI ETYKI

Unit providing the course (Department):
DEPARTMENT OF LAW AND ENTERPRISE MANAGEMENT IN AGRIBUSINESS

Course leader:
OLGA GRABOWSKA-CHENCZKE, PhD

Other lecturers:

Discipline:	Semester:
Doctoral School (all disciplines)	**1**

TYPE OF CLASSES:
(course load)

- Lectures	**12**
- tutoring during duty hours	**2**
- Self-study	**6**
Total numer of hours:	**20**

OBJECTIVE OF THE COURSE:

The main objectives of the course are: to present the theory and practice in the field of teacher education, to promote ethical aspects of teaching practice, to present techniques of effective learning, to present methods of coping with difficult situations that may occur in the teaching process, to improve the skills of effective communication and building interpersonal relationships, especially teacher-student relationships in the academic environment.

TEACHING METHODS:

explaining, demonstrating, cooperating, observing, controlling and evaluating

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
E1: the graduate knows the basic concepts of learning and teaching processes, understands the diverse conditions of these processes, including the special role of interpersonal communication	P8U_W_1
E2: the graduate has structured knowledge of ethical principles in the work of a teacher	P8U_W_4
E3: the graduate is able to observe and interpret social phenomena; is able to assess the usefulness of methods and good practices for performing tasks in the work of a teacher, is able to motivate, inspire and/or organize the development of other people	P8U_U_4
E4: the graduate is able to conduct didactic classes and verify the content provided	P8U_U_5
E5: the graduate is able to creatively take up challenges in the sphere of didactic work, taking into account their ethical dimension	P8U_K_2
E6: the graduate is able to shape patterns of proper conduct in teamwork and build an atmosphere of creative education in cooperation with students	P8U_K_4

Methods of evaluation of outcomes achievement:

Final written exam

TEACHING CONTENT:

Key aspects of the learning and teaching process (conditions, opportunities and challenges). Teaching techniques and lesson planning. Ethics for teachers – the role of commitment and responsibility. Interpersonal communication in teaching. Difficult situations in teaching practice and methods of coping. Creativity in education. Teamwork.

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The course completion criteria and methods:	Percent of a final grade:
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	
Written Final Exam	100%
Class Attendance	100%

RECOMMENDED LITERATURE:

Benassi, V., Overson, C.E., and Hakala, C., (Eds.) (2014). Applying science of learning in education: Infusing psychological science into the curriculum. Retrieved from http://teachpsych.org/ebooks/asle2014/index.php

Brown, P. C., Roediger, H. L. III, & McDaniel, M. A. (2014). Make it stick: The science of successful learning. The Belknap Press of Harvard University Press.

Bullough, R. V., (2011). Ethical and moral matters in teaching and teacher education. Teaching and Teacher Education, 27(1), 21–28.

Fry, H., Ketteridge, S, and Marshall, S. (Eds.) (2009). A Handbook for Teaching and Learning in Higher Education (3rd Edition). London: Routledge.

Saha, L. J., Dworkin, A. G., (Eds.) (2009). International Handbook of Research on Teachers and Teaching. New York: Springer.

Townsend, T., Bates, R., (Eds.) (2007). Handbook of teacher education. Globalisation, Standards, and Professionalism in Times of Change. Netherlands: Springer.

Wiggins, G. P., McTighe, J., (Eds.) (2005). Understanding by design (2nd ed.). Pearson.

Ostatnia aktualizacja: 07.07.2025

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Methodology, organization and financing of research**	
Name of the course in Polish: **Metodologia, organizacja i finansowanie badań**	
Unit providing the course (Department): **Katedra Ekologii i Ochrony Środowiska / Katedra Inżynierii Wodnej i Sanitarnej**	
Course leader: **prof. dr hab. inż. Krzysztof Szoszkiewicz** Other lecturers: **prof. UPP dr hab. inż. Tomasz Dysarz**	
Discipline: **Doctoral School (all disciplines)**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**14**
Total numer of hours:	**14**

OBJECTIVE OF THE COURSE:

Ph.D. students' preparation to conduction of research investigations including proper methodology, plan of the research and financing.

TEACHING METHODS:

Lectures.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge graduates know and understands:	
● aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.	P8U_W_4
● principles of planning and financing of research and evaluation of projects.	P8U_W_3
In the area of skills graduates know how to:	
● apply knowledge in the process of creative formulation of their research problems,	P8U_U_1
● innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools,	P8U_U_2
● independently plan and realise their scientific development, as well as inspire and/or organise the development of others.	P8U_U_4
In the area of social competences graduates are capable to:	
● independently plan research and independently broaden the existing body of scientific literature,	P8U_K_1
● creatively solve challenges in the professional and public life, considering their ethical aspects.	P8U_K_2

Methods of evaluation of outcomes achievement:

Evaluation of lectures on the basis of two projects covering methodology and financing.

TEACHING CONTENT:

Types of research: basic vs. applied, exploratory vs. explanatory, inductive vs. deductive, primary vs. secondary, qualitative vs. quantitative, descriptive vs. experimental; Elements of investigation: identification of the scientific problem, formulation of the problem, steps in scientific investigation, subject of the investigations, examples of formulations; Research ethics: basic definitions, authorship, intensification of scientific publishing, systematic manipulation in scientific publishing, impact of modern technologies; Financing of the research

The course completion criteria and methods:	Percent of a final grade:
■ pass (Z) **□ course credit with a grade** **□ examination**	100%

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

RECOMMENDED LITERATURE:

Thomas, C.G, 2021. Research Methodology and Scientific Writing, Second Edition, Springer, ISBN 978-3-030-64864-0, https://doi.org/10.1007/978-3-030-64865-7
Ciro Rodríguez Rodríguez, Jorge Luis Breña Oré, Doris Esenarro Vargas, 2021. Las Variables en la metodología de la investigación científica, Ingeniería y Tecnología, 3ciencias, ISBN: 978-84-123872-2-3
Hilary Glasman-Deal, 2021. Science Research Writing for native and non-native speakers of English, World Scietific Publishing Europe Ltd., ISBN 9781786348340
Sabina Alam, Laura Wilson, Fulu Akinduro-Aje, Rebecca Barber, 2024. Systematic manipulation of publishing process, Taylor & Francis Group Webinars
Marcelo Trovati, 2024. Implications of AI to research and publishing, Taylor & Francis Group, webinar

Ostatnia aktualizacja:

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Research tools (Internet of Things)**	
Name of the course in Polish: **Narzędzia badawcze (Internet rzeczy)**	
Unit providing the course (Department): **Department of Construction and Geoengineering, Lab. of Meteorology**	
Course leader: Other lecturers: **Prof. UPP dr hab. inż. Marek Urbaniak**	
Discipline: **Environmental engineering, mining and energy**	Semester: **2**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**8**
Total numer of hours:	**12**

OBJECTIVE OF THE COURSE:

Designing and developin a measurement network based on the Internet of Things (IoT) technology. Introduce to the basics of microcontroller programming, data acquisition systems and sharing measured data.

TEACHING METHODS:

Practical classes and individual consultations.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): PhD student is familiar with modern solutions for the automation of environmental measurements. PhD student understands the need for and the possibilities of optimizing financial investments in research equipment in the context of the characteristics of research within the represented discipline.	P8U_W_1 P8U_W_3
In the area of skills (PhD students know how to): PhD student is able to identify and adapt technical solutions for automating data acquisition to suit their own needs.	P8U_U_2
In the area of social competences (PhD students are capable to): PhD student is ready to publish his/her own projects and measurement data using online tools	P8U_K_2

Methods of evaluation of outcomes achievement:

Assessment of the design and operation of the device.

TEACHING CONTENT:

1. Definition, applications and architecture of the Internet of Things.
2. Developing actuators, connecting electronic components.
3. Programming microcontrollers in the ArduinoIDE environment.
4. Connecting network nodes with the cloud environment on the example of Thingsboard.io
5. Data sharing in the form of graphs in the browser and export from the cloud to a file.

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The course completion criteria and methods:	Percent of a final grade:
☒ **pass (Z)** □ **course credit with a grade** □ **examination**	100%

RECOMMENDED LITERATURE:

https://www.arduino.cc

https://thingsboard.io

https://www.postscapes.com/internet-of-things-protocols/

Ostatnia aktualizacja: 2025-06-10

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme): **Scientific writing**	
Name of the course in Polish: **Pisanie prac naukowych**	
Unit providing the course (Department): **Department of Animal Genetics and Animal Breeding**	
Course leader: **Prof. dr hab. Marek Świtoński** Other lecturers:	
Discipline: **Doctoral School (all disciplines)**	Semester: **III**

TYPE OF CLASSES:
(course load)

- Lectures	**3**
- Practical classes	**3**
- Self-study	**2**
Total numer of hours:	**8**

OBJECTIVE OF THE COURSE:
Presentation of the general principles of so-called "good practices" in preparing scientific publications.

TEACHING METHODS:
Lecture on bibliographic databases, scientometric indicators, and the structure of scientific papers, taking into account the type of publication (original article, review article, scientific communication, case report). Workshop on the analysis of published abstracts of original papers in the context of the research hypothesis and objectives, as well as the adequacy of the paper's title.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
Learning outcomes in terms of knowledge:	
Understanding the scope of information contained in global bibliographic databases (such as Web of Science, Scopus, Google Scholar, etc.)	P8U_W_1
Gaining knowledge of selected scientometric indicators (e.g., Impact Factor, quartiles, SNIP, CiteScore, Hirsch index, etc.)	P8U_W_1
Discussing the so-called "good practices" in scientific writing, including principles of co-authorship attribution, author order, issues of plagiarism, etc.)	P8U_W_4
Learning outcomes in terms of skills: Mastering the basic principles of preparing manuscripts of original research papers, with particular emphasis on: the title, abstract, keywords, introduction culminating in the research hypothesis and objective, description of research material and methodology, presentation and discussion of research results, formulation of final conclusions, as well as review articles.	P8U_U_1

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Learning outcomes in terms of social competences:	
Ability to work collaboratively in a team on the analysis of scientific papers and the formulation of agreed evaluations.	P8U_K_4

Methods of evaluation of outcomes achievement:

Evaluation will focus on the effectiveness of collaboration within the group, the quality of analysis of scientific papers, the ability to formulate coherent and well-argued assessments, participation in lecture and workshop, and active participation in discussions.

TEACHING CONTENT:

Lecture:
Bibliographic databases (Web of Science, Scopus, ResearchGate, Google Scholar), methods of calculating scientometric indicators (Impact Factor, CiteScore, SNIP, quartiles, Hirsch index), their interpretation, and use in evaluating scientific journals and researchers' academic output. Discussion of the key components of a scientific publication (title, abstract, keywords, introduction with the hypothesis and research objective, presentation and discussion of results, and conclusions referring to the stated research goals). Plagiarism and so-called “paper mills” – their identification and consequences for authors.

Workshop:
Analysis of several published scientific abstracts by teams of 2–3 students working within a similar research area (the same abstract is analyzed by 3–4 different teams). The goal is to assess the adequacy of the publication title in the context of the stated hypothesis, research objectives, and obtained results.

The course completion criteria and methods:			Percent of a final grade:
☒ **pass (Z)**	□ **course credit with a grade**	□ **examination**	100%

RECOMMENDED LITERATURE:

Access via the Main Library:
Web of Science: https://www-1webofscience-1com-1f9f9sspq2264.han.up.poznan.pl/wos/woscc/basic-search
Scopus: https://www-1scopus-1com-100000cpq2266.han.up.poznan.pl/search/form.uri?display=basic#basic

Open access:
Google Scholar: https://scholar.google.com/

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SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Research tools - Statistics

Name of the course in Polish:
Narzędzia naukowe - Statystyka

Unit providing the course (Department):
Department of Mathematical and Statistical Methods

Course leader:
Dr Joanna Zyprych-Walczak

Discipline:	Semester: **3-4**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**10**
- Self-study	**26**
Total number of hours:	**40**

OBJECTIVE OF THE COURSE:

Acquiring knowledge and skills in the field of statistics using R software for effective data evaluation, detection and verification.

TEACHING METHODS:

Lectures with multimedia presentation and using RStudio. Students get familiar with elements of theoretical aspects of statistical analysis as well as perform calculations using R software, analyze the problem, discuss the causes, verifies them, proposes solutions. Classes are supported by multimedia presentations, they oblige to discussion and analytical thinking.

Methods of evaluation of outcomes achievement:

• Tests and open question assignments that require analysis and interpretation of experimental data.
• Oral verification of knowledge during the exercises.
• Assessment of involvement in work and discussion.
• Discussion of the statistical results presented in literature and data analysis collected in the course of own work.

TEACHING CONTENT:

- The R language and environment, RStudio server
- Measurement scales
- Describing one group (or set) of data
- Comparing 2 independent groups
- Comparing 2 dependent groups
- Comparing 3 or more independent groups
- Comparing 3 or more dependent groups
- Quantification of relationship between 2 variables
- Principal Components Analysis (PCA)
- Linear Models (fitting, examining the fit, extracting results)

The course completion criteria and methods:	Percent of a final grade:
Assessment of lectures and classes - the test with usage of R software	100%
□ **pass (Z)** □ **course credit with a grade** ☒ **examination**	

RECOMMENDED LITERATURE:

The textbooks for statistics and data analysis with R:

1. Logan, Murray. *Biostatistical design and analysis using R: a practical guide*. John Wiley & Sons, 2011.
2. Hothorn, Torsten, and Brian S. Everitt. *A Handbook of Statistical Analyses Using R*. Third Edition. Boca Raton, FL: CRC Press, 2014.
3. Wickham, Hadley, and Garrett Grolemund. *R for data science: import, tidy, transform, visualize, and model data*. " O'Reilly Media, Inc.", 2016. (https://r4ds.had.co.nz)

The electronic textbooks for introduction to R:

1. https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf;
2. http://data.princeton.edu/R/introducingR.pdf;

załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Global Environmental Problems

Name of the course in Polish:
Globalne problemy środowiskowe

Unit providing the course (Department):
Meteorology Laboratory, Department of Civil Engineering and Geoengineering, WIŚiIM (subject manager)

Course leader:
Prof. dr hab. Janusz Olejnik – 6h
Other lecturers:
Prof. UPP dr hab. Dariusz Pieńkowski – 4h
Prof. UPP dr hab. Arkadiusz Sadowski – 4h
Prof. dr hab. Maciej Skorupski – 4h
Prof. dr hab. Piotr Tryjanowski– 4h
Dr inż. Klaudia Ziemblińska– 4h (egzaminer)

Discipline:	Semester:
Doctoral School (all disciplines)	**3, 4, 5, 6**

TYPE OF CLASSES:
(course load)

- Lectures	**22**
- Practical classes	**4**
- Self-study	**10**
Total numer of hours:	**36**

OBJECTIVE OF THE COURSE:

The main objective of the course is to present and expand knowledge on global environmental problems related to various disciplines, such as meteorology and climatology, forestry, zoology, economics, environmental engineering and ecology, taking into account the socio-economic and political conditions of global changes. The result of the course is to raise awareness among doctoral students on current issues that affect the fields of science they deal with. The consequences of climate change are discussed from various perspectives, including: energy and water balance, the consequences of extreme weather phenomena, changes in fauna and flora of forest and agricultural areas, the biodiversity crisis and demographic changes, as well as issues of international relations, including in relation to the agricultural sector.

TEACHING METHODS:

Lectures, multimedia presentations, simulation games and discussions supplemented with practical classes (in the third year of the Doctoral School) - classes, partly outdoors

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): - advanced knowledge of the principles governing climate change, its causes and effects, including extreme weather phenomena - the global body of scientific literature on specific issues related to the socio-economic and political determinants of global environmental problems and their implications for practice - the latest theories and trends related to demographic transformation and the role of socio-economic and cultural factors in this process - the scale of challenges facing the agricultural sector in terms of achieving nutritional and environmental goals - spatial (in relation to countries and their types) differentiation of the scale of agricultural production and agricultural greenhouse gas emissions - the importance of natural and anthropogenic factors in differentiating the size of agricultural production and its impact on the environment - cases of deforestation resulting from faulty environmental management - the effects and environmental consequences of incorrect decisions in forest management, e.g. withdrawal of the rabies vaccine - what elements of managing populations of large herbivorous mammals are necessary to reduce human-wildlife conflicts - knowledge on monitoring and assessing changes in the environment	P8U_W_1 P8U_W_2 P8U_W_3

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In the area of skills (PhD students know how to): - odróżniać naturalne skutki zmiany klimatu od antropogenicznych oraz mity od faktów, a także stosować te wiedzę we własnych badaniach - wykorzystywać wiedzę do twórczego formułowania własnych problemów badawczych - analizować konflikt człowiek-środowisko, wskazywać jego przyczyny, sposoby jego rozwiązania - prowadzić dyskusję i przeprowadzać wywiad z ekspertem - wykorzystać kompetencje społeczne, ocenić sytuację w przypadku kryzysu środowiskowego oraz wybrać skuteczne narzędzie do rozwiązania danego konfliktu środowiskowego - wykorzystać specjalistyczną literaturę i wiedzę teoretyczną do przeprowadzania eksperymentów w naturze - zastosować odpowiednie rozwiązania zadań badawczych dotyczące nowoczesnych metod i narzędzi w ochronie środowiska	P8U_U_1 P8U_U_2 P8U_U_3 P8U_U_4 P8U_U_5
In the area of social competences (PhD students are capable to): understand the importance of social responsibility for the environment and be ready to take part in an open discussion on climate change and its consequences, as well as to act to mitigate them - acquire the ability to creatively address challenges in the professional and public spheres, taking into account their ethical dimension - be able to initiate actions for the public interest and shape models of proper conduct in teamwork - be ready to take into account economic and environmental issues in their own scientific research and independently study issues relating to the basic dilemmas of the modern economy and society - acquire the ability to independently plan research and expand existing resources of scientific literature on the impact of climate on biodiversity - be ready to creatively solve challenges in professional and public life, taking into account their environmental aspects	P8U_K_2 P8U_K_3 P8U_K_4

Methods of evaluation of outcomes achievement:

Written exam in the form of a test

TEACHING CONTENT:

Because the course is designed to provide knowledge from multiple disciplines, each instructor decides what current issues to cover, which may change slightly over time. Nevertheless, the general content will be maintained and will include the following topics:
- basic knowledge of meteorology and climatology
- the greenhouse effect
- the increase in global temperature and its landscape consequences
- extreme weather phenomena and their consequences,
- facts and myths about climate change
- human activity to mitigate climate change
- global environmental problems from the perspective of international relations
- the U Thant report, RIO, Kyoto protocol
- the global demonstration effect, the rich North and the poor South
- demographic and resource problems from the perspective of the classical school of economics
- different theoretical approaches to demographic transformation
- problems related to political negotiations and climate agreements
- the concept of degrowth and steady state
- the importance of research on the relationship between agricultural production and its environmental impact
- the methodology of researching the phenomena discussed in the subject
- global trends in the relationship between agriculture and greenhouse gas emissions
- typology of countries according to the intensity of agricultural production and the size of greenhouse gas emissions
- examples deforestation resulting from failure to protect forests in protected areas.
- the impact of rabies control in foxes on the dynamics of game populations in Poland and the development of zoonoses.
- basic elements of managing populations of large herbivores - large-area inventory.
- the place of biodiversity in global problems, energy, birds

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

The course completion criteria and methods:			Percent of a final grade:
□ **pass (Z)**	□ **course credit with a grade**	☒ **examination**	100% exam result

RECOMMENDED LITERATURE:

Each PhD student will receive a complete set of all presentations in PDF format
Additional literature:

1. *Olejnik, J., Małek, S. (red.). (2020).* Rola lasu w pochłanianiu dwutlenku węgla z atmosfery. *Poznań: Monografia, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu. ISBN:* 978-83-7160-971-8H. 398 stron
2. *Charonis, G-K., 2021. Degrowth, steady state and circular economies: alternative discourses to economic growth. Society Register, 5(3): 75-94.*
3. *Sadowski A. (2017): Wyżywieniowe i środowiskowe funkcje światowego rolnictwa – analiza ostatniego półwiecza. Wyd. Uniwersytetu Przyrodniczego w Poznaniu*
4. *Sadowski A., Baer-Nawrocka A. (2018): Food and environmental function in world agriculture—Interdependence or competition? Land Use Policy 71, p. 578-583. https://doi.org/10.1016/j.landusepol.2017.11.005*
5. *Stereńczak K., Mielcarek M., Kamińska K., Kraszewski B., Piasecka Ż., Miścicki M., Heurich M.2020. Influence of selected habitat and stand factors on bark beetle Ips typographus (L.) outbreak in the Białowieża Forest. Forest Ecology and Management, 459 (117826):1–11.DOI:10.1016/j.foreco.2019.117826.*
6. *Kamieniarz R., Jakubowski M., Dyderski M. K., Górecki G., Nasiadka P., Okarma H., Pudełko M., Skubis J., Tomek A., Wajdzik M., Mederski P., Skorupski M. 2023. Application of the tyraliera counting method to the large-scale inventory of red deer Cervus elaphus in the northern part of Western Pomerania, Poland. Ann. For. Res., 66 (2), 33-44*
7. *Visseren-Hamakers, I. J., & Kok, M. T. (Eds.). (2022). Transforming biodiversity governance. Cambridge University Press.*
8. *Sharma, R., Watve, A., & Pandey, A. (Eds.). (2020). Corporate Biodiversity Management for Sustainable Growth: Assessment of Policies and Action Plans (Vol. 59). Springer Nature*

Ostatnia aktualizacja: 21.05.2025

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załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved programme):
Research tools (R package operation)

Name of the course in Polish:
Narzędzia badawcze (obsługa pakietu R)

Unit providing the course (Department):
Department of Construction and Geoengineering, Meteorology Lab.

Course leader: **Dr inż. Klaudia Ziemblińska**
Other lecturers: -

Discipline:	Semester:
Doctoral School (all disciplines)	**I**

TYPE OF CLASSES:
(course load)

- Lectures	
- Practical classes	**20**
- Other with instructor (consultations)	**10**
- Self-study (preparation of the assignment and its defense)	**10**
Total number of hours:	**40**

OBJECTIVE OF THE COURSE:

The main aim of the course is to gain basic skills regarding R software usage to switch from previously used tools (e.g. Excel, Statistica) for data processing, visualization, and statistical analysis to complex R software. PhD students will learn how to install, operate, and perform basic analysis in R, create useful graphs, and above all get familiar with R syntax.

TEACHING METHODS:

Practical classes and individual consultations. In both cases, the use of remote teaching tools and techniques is permitted.

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
1. The PhD student knows the syntax, basic objects, and structures in the R language, as well as basic functions. 2. They know where to find information about the latest functions and packages and how to obtain them.	P8U_W_2
3. They are able to use the provided scripts to perform simple tasks and calculations. 4. They can apply the acquired skills to analyze other simple data, graphically represent the results, and describe these processes.	P8U_U_2
5. They recognize the usefulness of R packages for exploring topics and applying them in their own scientific fields.	P8U_K_1

Methods of evaluation of outcomes achievement:

Practical classes and individual consultations.

TEACHING CONTENT:

Basic knowledge of R software operation:
1. Where to find and how to install R? What's R Studio and how to navigate it?
2. Some "tricks" and useful shortcuts
3. What are "packages" and "library", how to download and use them, and how to get to data already embedded in packages
4. Basic objects and structures used in this language.
5. Downloading data from and writing to .csv files
6. How to visualize the data?- basic graph types, functions, and their parameters

The final assignment will be based on an R script prepared by the teacher containing several tasks to be solved.

The course completion criteria and methods:	Percent of a final grade:
Assessment of individual PhD student's assignment	70%
PhD student's presence during the course	30%

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RECOMMENDED LITERATURE:

1. *R Software*. Pierre Lafaye de Micheaux. Springer-Verlag New York Inc., 2014. ISBN: 1461490197
2. *R for Beginners.* Emmanuel Paradis. 2005 (https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf).
3. *Rtips. Revival 2014!*. Paul E. Johnson. 2014 (https://pj.freefaculty.org/R/Rtips.pdf)

Last update: 09.06.2025

QUALIFICATIONS OF ACADEMIC TEACHERS AT PULS DS

The selection of academic teachers in disciplinary programme is based on essential teaching experience. In the case of applied topics, the instructor's experience in solving problems in specific environments and the academic achievements of the academic teachers are taken into account. Both their academic achievements and their research interests must be consistent with the discipline and subject matter of the course. Instructors should hold at least a doctoral degree, but those with the title of professor or a postdoctoral degree are preferred.

To enhance their qualifications, the academic teachers have consistently and comprehensively expanded their competencies through active participation in numerous courses, workshops and training sessions. They have also completed training internships at leading national and international research centers. The PULS academic staff conduct numerous national research projects and are highly active in international collaborations. They are valued experts who participate in numerous teams and working groups.

The research conducted by PULS academic teachers is of a high standard, as evidenced by the publication of their results in renowned, highly ranked journals from the JCR database. They also expand their activity nationally and internationally through active participation in numerous scientific conferences. Furthermore, to enhance their teaching competences, teachers who teach have frequently taken advantage of Erasmus+ study abroad opportunities.

It is also worth noting that teachers who receive grants carry out research projects and commissioned work, often including PhD students in their research work.

In the report are attached surveys from 5 academic teachers in each discipline.

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Attachment to Resolution no. 302/2019
of the PULS Senate

THE REGULATIONS

of the Doctoral School,

the Poznań University of Life Sciences

I. General provisions

§ 1

1. PhD students are educated at the Doctoral School, hereinafter referred to as *The School*, to meet the requirements for the PhD degree.

2. The Regulations of *the School* of the Poznań University of Life Sciences, hereinafter referred to as *the University*, specify particularly the organisational structure of *the School*, the course of the PhD programme, principles regulating recruitment to *the School* as well as rights and obligations of PhD students.

3. The legal basis for the operation of *the School* is provided by:

   1) the Act of 20 July 2018 - the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2018, item 1668 with later amendments), hereinafter referred to as *the Act*;

   2) the Statute of the Poznań University of Life Sciences;

   3) the Regulations of the Doctoral School, the Poznań University of Life Sciences, hereinafter referred to as *the Regulations*.

II. Organisation of t*he School*

§ 2

1. *The School* is an organised form of education in nine disciplines: *forestry sciences; agriculture and horticulture; food technology and nutrition; veterinary medicine; animal science and aquaculture; mechanical engineering; environmental engineering, mining engineering and power engineering; life sciences; economics and finances*, which have been awarded minimum B+ scientific category.

2. *The School* offers education for Polish citizens and foreigners.

§ 3

1. *The School* is established and closed by the Rector.

2. *The School* is headed by the Director of the Doctoral School appointed and dismissed by the Rector.

3. Administrative services for *the School* are provided by organisational units of the university administration as specified by the Rector.

§ 4

Responsibilities of the Director of the Doctoral School include particularly:

1) chairing the recruitment committee and issuing administrative decisions on the refusal of admission to the School, based on the power of attorney granted by the Rector;

2) making public announcements on the specific procedures of recruitment (competition) to *The School* within deadlines indicated in the resolution on recruitment to *the School* passed by the Senate and the study programme of *the School* pursuant to § 7 and § 10 of these Regulations;

3) organising the execution of the study programme at *the School*;

4) evaluating the execution of the study programme at *the School*, including the progress in research conducted by PhD students;

5) confirming that PhD students have passed successive semesters and years of studies, including granting a conditional credit;

6) at the request of the PhD student and after consulting with the dissertation supervisor or supervisors granting an extension of the period of studies at *the School,* while simultaneously excusing the PhD student from the obligation to attend courses, for a joint period of maximum two years, in cases justified by the need to conduct long-term research or to take scientific stays in other institutions;

7) at the request of the PhD student granting an extension of the period of education at *the School*, while simultaneously excusing the PhD student from the obligation to attend courses, jointly for no longer than 1 year, particularly in cases justified by:

   a) disease-related PhD student's temporal inability to study,

   b) personal care provided by the PhD student for a diseased family member,

   c) the PhD student serving as a legal guardian for a child less than 4 years old or a child with a medical disability certificate,

d) the PhD student having a medical disability certificate;

8) extending, at the request of the PhD student, the period of studies at *the School* for the duration corresponding to their maternal leave, an additional maternal leave, a leave equivalent to maternal leave, an additional leave equivalent to maternal leave, a paternal leave, as well as a parental leave, specified in separate regulations, while simultaneously excusing the PhD student from the obligation to attend courses;

9) granting notification of excused short-term absence of the PhD student in classes, based on a medical certification or a written notification by the PhD student explaining the causes of this absence submitted along with the information provided by the dissertation supervisor or supervisors;

10) issuing administrative decisions on discontinuation for PhD students, who do not fulfill their obligations or resign from doctoral studies at *the School*, particularly pursuant to § 16.1 and 2 of these Regulations, based on the power of attorney granted by the Rector;

11) at a request of the PhD student issuing certificates of enrolment at *the School*, based on the power of attorney granted by the Rector;

12) issuing certificates of the course of studies at *the School* at the request of the individual who has not graduated from *the School*, based on the power of attorney granted by the Rector;

13) presenting the Rector with reports from the operation of *the School* and reporting to the School Council and respective councils of scientific disciplines on significant issues concerning the operation of *the School*;

14) supervision over storage, preparation and submitting documentation of *the School* to the University archives, provided that the documentation of PhD students is archived after 1 year since graduation of discontinuation of the PhD student;

15) issuing decisions, at the request of PhD students having a medical disability certificate, to adapt the study conditions at *the School*, in order to facilitate complete execution of the study programme, in accordance with the principles stipulated in § 29 of these Regulations*;*

16) cooperation with the Committee for Evaluation of Scientific Units (KEJN) during evaluation of quality of education at *the School* and with other institutions authorised to conduct inspections of *the School*, particularly by providing explanations and preparing documentation for the needs of such evaluation and inspections;

17) timely implementation, updating and removal of data concerning *the School* and PhD students in the Integrated System of Information on Science and Higher Education POL-on, based on the power of attorney granted by the Rector.

§ 5

1. PhD students have the right to file a justified, written objection to the decision of the Director of the Doctoral School, specified in § 4 points 4 and 5 of *The Regulations*, and submit it to the Rector within 14 days from the date they received the decision.

2. The Rector considers the objection specified in point 1 within 14 days since its receipt, following the presentation of an opinion of the Director of the Doctoral School. The written decision of the Rector will be promptly presented to the PhD student and the Director of the Doctoral School; this decision is final.

§ 6

1. The Rector appoints and dismisses members of the School Council. The scope of activity of the School Council is specified in separate Regulations approved by the Rector.

2. The School Council is composed of the Director of the Doctoral School and the chairmen of individual Committees of Disciplines, appointed in the disciplines specified in § 2.1 of these Regulations.

3. The Committees specified in point 2 are composed of maximum 8 representatives of the scientific specialisations in the disciplines, proposed by the respective scientific councils for these disciplines.

4. The Chairman of the School Council and the Chairmen of individual Committees of individual disciplines are appointed and dismissed by the Rector.

III. Recruitment to *the School*

§ 7

1. Recruitment to *the School* is based on a competition, which results are public.

2. The principles of recruitment specifying the manner and conditions of the recruitment procedure are passed by the Senate. The resolution on recruitment is presented to the public on the University website under the tab *The Doctoral School* not later than 31 January of the calendar year, in which the academic year commences, subject to § 30.1.

3. The proposal of conditions and the mode of recruitment to *the School* in the next academic year is prepared by the School Council and it is submitted to the Senate for approval.

4. The School Council constitutes the Recruitment Committee, hereinafter referred to as *the Committee*, which is chaired by the Director of the Doctoral School.

5. The *School* recruitment framework regulations constitute Attachment 1 to these Regulations.

6. The date of the competition, specified in point 1, is announced annually by the Director of the Doctoral School on the University website under the tab *The Doctoral School*, not later than 5 months prior to the beginning of the recruitment procedure.

7. The recruitment procedure to *the School* is to be completed by 30 September of the calendar year, in which the studies at *the School* are started.

8. Admission to the School results in the enrolment of PhD students.

9. Refusal of admission to the School is based on an administrative decision issued by the Rector. The candidate has the right to appeal from the decision within 14 days from its receipt by submitting a request to the Rector for reconsideration of the decision. The decision issued after the reconsideration of the initial decision is final.

10. Administrative decisions, specified in point 9, may be issued by the Director of the Doctoral School based on a respective power of attorney granted by the Rector.

§ 8

1. Candidates for admission to the School need to be holders of a Master's degree [magister], a Master's degree following the Bachelor of Science (B.Sc.) degree [magister inżynier] or equivalent, or be a person specified in art. 186.2 of the *Act* and meet the recruitment conditions approved by the Senate in its resolution.

2. Foreigners may enrol at *the School* when they have qualifications specified in point 1 or an *apostille* stamped diploma or another document confirming their graduation from a university abroad, considered, in accordance with the regulations concerning validation of diplomas confirming the completion of higher education studies obtained abroad or on the basis of an international agreement, as equivalent to a respective Polish diploma confirming the completion of second-cycle (graduate) studies or long-term Master’s degree studies.

IV. Education of PhD students

§ 9

1. *The School* offers full-time studies lasting 8 semesters.
2. Studies at *the School* are free of charge and are completed at the submission of a PhD dissertation.
3. Studies are provided based on the study programme at the Doctoral School, which constitutes Attachment 2 to these Regulations, as well as an individual research programme.
4. In the case of Polish citizens the language of instruction is Polish. PhD students are also required to participate in selected courses given in English.
5. In the case of foreigners the language of instruction is English. PhD students are also required to participate in selected courses given in Polish.
6. Within 3 months since the date of the commencement of studies at *the School* the Committee of the respective discipline appoints the dissertation supervisor and the auxiliary supervisor, on a motion by the PhD student submitted to the Director of the Doctoral School in the course of the recruitment procedure.

§ 10

1. The School Council supervises the study programme at the School.
2. The study programme at the School needs to be consulted with the Self-government of PhD students based on the principles stipulated in *the Act* and *the Statute*.
3. The study programme at the School specifies:
    1) obligatory and optional courses and internships/placements;
    2) the schedule for the execution of tasks required to complete the PhD dissertation and specified in the individual research programme;
    3) the number of class periods in general courses required for all PhD students;
    4) the number of class periods in courses specified in the framework programme for a given.
4. The study programme at the School makes it possible to realise the learning outcomes specified in Attachment 3 to these Regulations.

5. The study programme of the School is announced by the Director of the Doctoral School by posting it on the University website under the tab *The Doctoral School* not later than 5 months before the beginning of the recruitment procedure.

6. The study programme at the School includes a placement programme consisting in teaching classes (from the 1st to the 4th year of studies) in the total load of 60 class periods in a given academic year.

7. The execution of the study programme at the School requires the PhD students to be present at the organisational units of the University and includes classes and research involving the direct participation of academic teachers or dissertation supervisors and auxiliary supervisors, as well as PhD students.

8. Teaching of classes by PhD students as part of their placement needs to be arranged with the head of a respective organisational unit and may be partly conducted outside the unit employing the dissertation supervisor. The PhD student submits an application in this respect, together with the opinion of their scientific supervisor or supervisors, to the Director of the Doctoral School.

§ 11

1. The study programme at the School is realised within the academic year from the 1st of October to the 30th of September.

2. The semester is an academic period to be passed at the School. The condition required of the PhD student to pass the semester is to fulfill all the obligations specified in the study programme and the individual research programme. The PhD student is required to submit a written report within the deadline specified by the Director of the Doctoral School.

3. The semester is credited to the degree programme by the Director of the Doctoral School based on the report submitted by the PhD student, taking into consideration the results of taken examinations and progress in research related to the PhD dissertation, as well as the opinion and evaluation by the scientific supervisor or supervisors. The semester is credited based on the respective entry in the transcript of records at the Virtual Dean's Office [Wirtualny Dziekanat].

§ 12

1. Obligatory and optional courses, internships/placements and seminars passed by the PhD student are credited in the transcripts at the Virtual Dean's Office [Wirtualny Dziekanat].

2. The following marks (grades) are applicable for examinations and course credits:

1) Very good 5.0 (A)

2) Good plus 4.5 (B)
3) Good 4.0 (C)
4) Satisfactory plus 3.5 (D)
5) Satisfactory 3.0 (D)
1) Unsatisfactory 2.0 (F).

3. The Director of the Doctoral School makes decisions on all issues connected with crediting the PhD students with individual semesters and academic years.

4. Based on the decision of the Rector, following the consent of the scientific supervisor or supervisors, the Director of the Doctoral School and the Committee of the respective discipline, the PhD student may participate in scientific stays/internships and conduct research at Polish or foreign scientific institutions. The duration of the internship/scientific stay is credited to the period of studies at the School.

§ 13

1. The realisation of the study programme by the PhD student may be suspended for the period corresponding to the duration of:

   1) a maternal leave;

   2) a leave equivalent to maternal leave;

   3) a paternal leave;

   4) a parental leave;

   specified in the Act of 26 June 1974 - the Labour Code (the unified text in the Journal of Laws Dziennik Ustaw of 2018 item 917 with later amendments).

2. Such a suspension, as specified in point 1, is granted based on a written and documented request by the PhD student submitted to the Director of the Doctoral School.

§ 14

1. An individual research programme is prepared by the PhD student in consultation with the dissertation supervisor or supervisors. In the case when an auxiliary dissertation supervisor is appointed his/her opinion is also required. The individual research programme, after being evaluated by the Committee of the respective discipline, is submitted for approval to The School Council within 12 months since the commencement of studies at the School.

2. Realisation of the individual research programme is subject to mid-term evaluation taking place in the middle of the study period specified in the study programme. The date of the mid-term evaluation and the members of the evaluating Committee, including the Chairman, are specified and appointed by the Committee of the respective discipline.

3. Prior to the date of the mid-term evaluation PhD students present to the Committee of the respective discipline a report on the execution of the individual research programme approved by their scientific supervisor or supervisors, including information:

   1) information on the progress in the execution of research tasks related to the PhD dissertation,

   2) information on the fulfillment of the schedule of tasks presented in the individual research programme.

4. The Committee conducting the mid-term evaluation confers with the PhD students, as well as the dissertation supervisor or dissertation supervisors on the report specified in point 3. The above-mentioned Committee decides on the mid-term evaluation, which is completed with the positive or negative note. The result of the evaluation together with its justification is public.

§ 15

1. The individual research programme specifies the deadline for the submission of the PhD dissertation.

2. The date of submission of the PhD dissertation may be extended for maximum 2 years in the following situations:

   1) accidents connected with the conducted research;

   2) documented disease of the PhD student ;

   3) a maternal leave;

   4) a leave equivalent to a maternal leave;

   5) a paternal leave;

   6) other important, documented circumstances.

3. The decision on the extension of the deadline for the submission of the PhD dissertation is made by the Director of the Doctoral School, at the written request of the PhD student presented along with the opinion of the Committee of the respective discipline.

4. The Director of the Doctoral School, at a request of the PhD student, makes a decision on granting the individual educational pathway at the School, which consists in arrangement of individual schedules for the teaching load (i.e. classes, examinations, completions of courses, internships/placements, etc.) resulting from the study programme at the School.

§ 16

1. The PhD student may be discontinued in the case of:

   1) unsatisfactory progress in the preparation of the PhD dissertation;

   2) failure to meet their obligations resulting from the provisions of these Regulations, failure to execute the study programme or the individual research programme.

2. The PhD student is discontinued in the case of:

   1) a negative mid-term evaluation;

   2) failure to submit the PhD dissertation within the deadline specified in the individual research programme;

   3) resignation from studies at the School.

3. The motion on discontinuation may be submitted to the Director of the Doctoral School by the scientific supervisor or supervisors, or by the Committee of the respective discipline in the case of the circumstances specified in points 1 and 2.

4. Discontinuation is effective based on the administrative decision of the Rector. The PhD student is entitled to request a reconsideration of the decision by the Rector, which needs to be submitted within 14 days from the receipt of that decision. The decision issued after the reconsideration is final.

5. Administrative decisions specified in point 4 may be issued by the Director of the Doctoral School based on the respective power of attorney granted by the Rector.

6. An individual, who was a PhD student and resigned from studies at the School *or* was discontinued may be admitted to *the School* again in the competition procedure.

V. Dissertation supervisor, auxiliary supervisor

§ 17

1. The function of a dissertation supervisor for a PhD student may be served by an academic teacher being a holder of a scientific title of Professor or Assistant Professor [doktor habilitowany] in the respective or related field of science.

2. The function of a dissertation supervisor may also be served by an employee of a foreign university or research institution, who does not meet the requirements specified in point 1, if the Committee of the respective discipline decides that the person is an outstanding expert in the field of the doctoral dissertation with the publication record from the period of the last 5 years.

3. The function of an auxiliary supervisor in the PhD degree conferral procedure, who plays an important auxiliary supervisory function in relation to the PhD student, particularly in the process of research planning, execution and analysis of results, may be served by a holder of the PhD degree in the respective or related discipline and having no authority to serve the function of dissertation supervisor in the PhD conferral degree.

§ 18

1. In the case of an accident, adequately justified resignation or death of the dissertation supervisor or auxiliary supervisor, the Committee of the respective discipline appoints another dissertation supervisor or auxiliary supervisors within 2 months since the said event.

2. When appointing the next dissertation supervisor or auxiliary supervisor criteria specified in § 17.1-3 of these Regulations apply.

§ 19

The function of a dissertation supervisor may not be served by a person, who within the last 5 years:

1) has been a dissertation supervisor for four PhD students, who were discontinued due to the negative mid-term evaluation,

2) has supervised preparation of a PhD dissertation by at least two PhD candidates, who did not receive positive reviews of their prepared PhD dissertations.

VI. Obligations and rights of PhD students

§ 20

The PhD student is obliged particularly to:

1) respect the obligations of the oath of academic and professional conduct and the rules of these Regulations, diligently realise the study programme at the School and conduct research;

2) respect the Ethics Code of PhD students;

3) follow the regulations binding at the University;

4) follow the provisions of the currently binding *Regulations* concerning intellectual property rights and related rights, industrial property rights and principles of commercialisation of intellectual property generated at The University;

5) respect the decisions of the Rector and the Director of the Doctoral School in matters within their competence;

6) submit reports from their studies at the School, specified in § 11 points 2 and 3 of these Regulations;

7) complete the internship/placement, as specified in § 10.6 of these Regulations;

8) conduct independent research under the direction of the scientific supervisor or supervisors and the auxiliary supervisor, if such was appointed, in accordance with the approved schedule of the individual research programme;

9) indicate the date of submission for their PhD dissertation, while in justified cases this date, upon receiving consent of the Director of the Doctoral School and the Committee of the respective discipline, may be extended by not more than a year;

10) prepare the PhD dissertation, take the PhD examinations as well as defend the PhD dissertation, in accordance with separate regulations, within deadlines specified by the scientific council for the respective discipline;

11) update their personal data by notifying the Director of the Doctoral School of any such changes;

12) follow the rules and fire as well as occupational safety regulations.

§ 21

1. PhD students are entitled to holiday in the maximum limit of 8 weeks within a year.

2. PhD students have the right particularly to:

   1) obtain research supervision;

   2) extend the length of their studies at the School as stipulated in *these Regulations*;

   3) to a justified change, particularly in the case of a situation described in § 18.1 of these Regulations, of their dissertation supervisor or auxiliary supervisor, if the latter was appointed;

   4) social insurance and common health insurance as specified in separate regulations;

5) use the library and reading room at the University based on the regulations for University employees;

6) use research apparatus and teaching facilities as well as laboratory and technical equipment of the University based on regulations binding in a given organisational unit of the University;

7) take vocational placements and scientific internships in the form approved by the dissertation supervisor or dissertation supervisors and the Director of the Doctoral School;

8) an electronic PhD student identity card, which entitles to the rights granted to PhD students;

9) actively participate in the work of the Self-government of PhD students;

10) join PhD students' associations;

11) organise - upon receiving prior consent of the Rector - public gatherings at the University campus, in accordance with the principles specified in the Statute;

12) obtain a conditional credit for a semester or year based on the principles specified by the Director of the Doctoral School;

13) studies following the individual educational pathway at the School;

14) awards and distinctions.

§ 22

1. The rights and obligations of the PhD student expire on the day of graduation from the *School* or in the case of discontinuation, on the first day of the calendar month following the month, in which the decision on discontinuation became final.

2. PhD students are held disciplinarily responsible for breaching the regulations binding at the University and for demeaning actions inconsistent with the integrity of PhD students. The regulations of the Act and the Statute apply to matters concerning the disciplinary responsibility of PhD students.

§ 23

PhD students have the right to use the funds of their organisational unit for the execution of their PhD dissertation, provided it was approved by the head of that unit.

§ 24

1. PhD students may be employed as an academic teacher or a research worker only:

   1) in order to realise a research project organised by the Polish National Agency for Scientific Exchange, the National Centre for Research and Development, the National Science Centre or being a result of an international competition;

   2) for the duration of a research or teaching project financed from EU funds or another entity financing the grant;

   3) after a positive mid-term evaluation;

   4) when the PhD student does not receive a PhD scholarship.

1. PhD student employed as an academic teacher and giving classes at the University are relieved from the obligation to take a teaching placement.

§ 25

1. PhD students of the *School* run by the University form the Self-government of PhD students.

2. PhD students elect organs of the Self-government of PhD students in accordance with the provisions specified in the separate Regulations of the Self-government of PhD students at the Poznań University of Life Sciences.

3. Representatives of the Self-government of PhD students participate in meetings of scientific councils of respective disciplines, the Senate and the School Council, in accordance with the provisions specified in *the Statute* and in *the Regulations* of the School Council.

VII. Scholarships for PhD students

§ 26

1. Issues concerning the period, for which a PhD scholarship is granted as well as its minimum amount, are regulated by the *Act*.

2. The amount of the PhD scholarship may be increased in the case of outstanding accomplishments of the PhD student. The decision in this respect is made by the Rector at the motion of the Director of the Doctoral School and evaluated by the Committee of the respective discipline.

§ 27

1. PhD students may apply for the Minister's scholarship for outstanding young researchers granted to PhD students by the minister for higher education and science in accordance with the rules specified in the Act. Such an application by the PhD student should receive a positive opinion by the scientific council of the respective discipline.

2. PhD students may be granted scholarships by local government units in accordance with the rules specified in the Act.

3. PhD students may be granted scientific scholarships by physical or legal persons not being state or local government entities in accordance with the rules specified in the Act.

§ 28

Discontinuation or completion of studies at the School results in the withdrawal of allowance specified in § 26.1 of these Regulations, on the first day of the month following the month, in which the decision on discontinuation became final, subject to § 27 point 1 of these Regulations and in cases specified in the Act.

VIII. PhD students with a medical disability certificate

§ 29

1. The University undertakes actions aiming at providing equal opportunities to realise the study programme at the School by PhD students with a medical disability certificate, at the same time taking into consideration particularly:

   1) the degree and character of their disability,

   2) specific character of *the School* by adapting classes to individual needs of PhD students with locomotor impairments.

2. PhD students with a medical disability certificate stating its degree submit a written application to the Director of the Doctoral School for permission to adapt to their own needs the form, dates and period required to obtain course credits and to take examinations, as well as application of other alternative solutions for these students during their studies at the School.

3. The application should be submitted before the beginning of the new academic year not later than 14 days before it commences or, in the case of new circumstances, within 14 days of their emergence.

4. Depending on the degree of disability the Director of the Doctoral School may:

   1) establish an individual educational pathway at the School;

   2) grant permission to use audiovisual devices facilitating recording of classes, after submission of a written declaration on inviolability of copyright to works generated during such classes and utilisation of recorded material for private use;

   3) grant permission to use specialist equipment ensuring the PhD student's full participation in the education process;

   4) change the manner, in which examinations are taken and courses are credited, e.g. by extending their deadlines, changing their form, place, etc.;

   5) appoint a supervisor to the PhD student e.g. while the PhD student:

      a) gives classes as part of their internship/placement,

      b) conducts research using laboratories of the University,

      c) participates in classes within the study programme at the School.

IX. Transitional and final provisions

§ 30

1. The first principles of recruitment to *the School* for the academic year 2019/2020 and the first study programme at *the School* will be made public on the University website under the tab *The Doctoral School* by 31 May 2019.

2. Until 31 December 2023 the Self-government of PhD students at the University is formed by PhD students educated at the School and PhD students educated within the PULS PhD Studies.

3. Any changes in *these Regulations* may only be made in a manner appropriate for their passing.

4. In matters not regulated by *these Regulations* commonly binding regulations apply, particularly provisions of the *Act*, as well as internal regulations binding at the University.

Attachment 1
to *The Regulations of the Doctoral School at the Poznań University of Life Sciences*

FRAMEWORK RULES for RECRUITMENT
to *The Doctoral School, The Poznań University of Life Sciences*

§ 1

Limits of admissions

At the request of the Director of the Doctoral School the Rector specifies the annual limits of admissions to *the School*, divided into disciplines with minimum B+ scientific category.

§ 2

Recruitment time frame

1. The recruitment procedure is held in July of the year, in which the academic year commences and if needed, the additional recruitment procedure takes place in September of the same year.

2. A detailed schedule for the procedure is established and announced annually by the Director of the Doctoral School.

§ 3

General provisions and recruitment mode

1. The recruitment procedure executed by the committee is transparent and it adheres to the principles of equal opportunities and non-discrimination, including equal access to education for individuals with disabilities.

2. Candidates submit the following documents, which specimens are given on the University website:

    1) an application for admission to the School,

    2) a CV,

    3) 2 photographs,

4) a copy of a university graduation diploma,

5) A declaration of their choice of a modern language or language certificates,

6) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis),

7) a medical examination certificate, stating a lack of objections to undertake studies at the School within a given discipline,

8) a description and documentation of scientific activity as well as a description of research plans, which will be realised within the prospective PhD dissertation,

9) an application for the appointment of a scientific supervisor or supervisors,

10) a declaration of consent to processing of one's personal data for the purpose of recruitment and education at the School.

3. The School Council constitutes the Recruitment Committee, hereinafter referred to as *the Committee*, with the Director of the Doctoral School as its Chairman.

4. *The Committee* evaluates the candidates applying a scoring system and settles issues not regulated by the Recruitment Regulations.

5. *The Committee* may disqualify a candidate with no evalution procedure performed if justified doubts are raised concerning the validity of documents submitted by the candidate, medical containdications for studies are observed or when the documentation submitted by the candidate shows beyond reasonable doubt that the planned research of scientific supervision may not be reasonably executed.

6. Candidates may be enrolled to *the School* when they have received min. 50% total score specified in § 4.1 of this Attachment.

7. Admission to the School depends on the position of the candidate on the ranking list for the respective discipline, based on the score awarded within the recruitment procedure.

§ 4

Scoring systems for accomplishments of candidates

1. *The Committee* evaluates accomplishments of candidates during their studies (max. 10 points), their documented scientific activity (max. 30 points), language skills related to a given modern language (max. 20 points) and an interview (max. 40 points).

2. Accomplishments in studies are evaluated based on a diploma confirming graduation from second-cycle or long-cycle Master's studies.

3. Scientific activity of candidates is evaluated based on documented acitvity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments.

4. Candidates take an examination verifying their proficiency in a selected modern or submit an international exam-based certificate confirming their language skills in that language.

5. The language certificate in a selected modern language may not be older than 2 years and should document the level of proficiency of the candidate as minimum B2 according to the Common European Framework of Reference for Languages. The documented language proficiency of the candidate at the B2 level is granted a score of 15 points, while at C1 and C2 it is 20 points, in accordance with the rules specified in point 1.

6. The examination of proficiency in a modern language is conducted by a language teacher appointed by the Director of the Doctoral School.

7. The interview concerns the represented discipline and the future PhD dissertation. It is held in Polish or English.

§ 5

Additional recruitment connected with research projects

1. In order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship for a period of minimum of 36 months, an additional recruitment is held.

2. Additional recruitment may exceed the limit of admissions specified in §1.1 of this Attachment.

3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of the Doctoral School in coordination with the head of the research project.

4. Upon the consent of *the Committee* the head of the research project has the right to establish additional preferential criteria for this recruitment.

5. The head of the research project or his/her appointed representative participates in the proceedings of the *Committee*, particularly the interview, and takes part in the process of candidate evaluation following the same regulations as those concerning the *Committee* members.

Attachment 2
to *The Regulations of the Doctoral School at the Poznań University of Life Sciences*

FRAMEWORK STUDY PROGRAMME
of *the Doctoral School at the Poznań University of Life Sciences*

for the academic year of 2019/2020

Classes will be held in 1-, 2- or 3-week modules.

I. 1st year (semesters 1 and 2)

1. General courses (for all PhD students):

1)	*Pedagogics*	2 h x 3 days/2 weeks = 12 h	Examination
2)	*Philosophy of Nature*	2 h x 3 days/2 weeks = 12 h	Examination
3)	Methodology of empirical sciences	2 h x 3 days/2 weeks = 12 h	Examination
4)	*Statistics*	2 h x 5 days/2 weeks = 20 h	Examination
5)	*Interdisciplinary seminar*	2 h x 2 days/2 weeks = 8 h	Course credit
6)	*Occupational health and safety instruction*	4 h x 1 day	Course credit

Total 68 h/year

2. *Teaching placement* — 60 h/year — Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

II. 2nd year (semesters 3 and 4)

1. General courses (for all PhD students):

1)	*Scientific Writing*	2 h x 2 days/2 weeks = 8 h Course credit
2)	*Organisation and financing of research*	2 h x 2 days/2 weeks = 8 h Course credit
3)	*R package operation:*	2 h x 4 days/2 weeks = 16 h Examination

4) *Global environmental problems* 2 h x 3 days/2 weeks = 12 h Examination

5) *Internet of Things* 2 h x 3 days/2 weeks = 12 h Course credit

6) *Interdisciplinary seminar* 2 h x 2 days/2 weeks = 8 h Course credit

Total 64 h/year

2. *Teaching placement* 60 h/year Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

III. III year (semesters 5 and 6)

1. *Teaching placement* 60 h/year Course credit
2. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

IV. IV year (semestery 7 and 8)

1. *Teaching placement* 60 h/year Course credit

Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, maximum load of 60 h/year

Attachment 3
to *The Regulations of the Doctoral School at the Poznań University of Life Sciences*

EDUCATION OUTCOMES
of *the Doctoral School at the Poznań University of Life Sciences*

Graduates from the Doctoral School at the Poznań University of Life Sciences, after completion of the specified study programme and receiving their PhD degree diploma, will have attained the following education outcomes in the area of knowledge, skills and social competences.

1. In the area of knowledge graduates (P8U_W) know and understands:

1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice,
2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation,
3) principles of planning and financing of research and evaluation of projects,
4) aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.

2. In the area of skills graduates (P8U_U) known how to:

1) apply knowledge in the process of creative formulation of their research problems,
2) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools,
3) transfer research results to the economic sphere,
4) independently plan and realise their scientific development, as well as inspire and/or organise the development of others,
5) give classes and lectures and verify taught content.

3. In the area of social competences graduates (P8U_K) are capable to:

1) independently plan research and independently broaden the existing body of scientific literature,

2) creatively solve challenges in the professional and public life, considering their ethical aspects,

3) initiate actions for the public good,

4) promote appropriate models of team work,

5) maintain and promote the importance and role of the intellectual community in social life.

Attachment to Resolution no. 405/2020
of the PULS Senate

THE REGULATIONS
of the Poznań University of Life Sciences
Doctoral School

I. General provisions

§ 1

1. PhD students are educated at the Doctoral School, hereinafter referred to as *The School*, to meet the requirements for the PhD degree.
2. The Regulations of *the School* of the Poznań University of Life Sciences, hereinafter referred to as *the University*, specify particularly the organisational structure of *the School*, the course of the PhD programme, principles regulating recruitment to *the School* as well as rights and obligations of PhD students.
3. The legal basis for the operation of *the School* is provided by:
   1) the Act of 20 July 2018 - the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2020, item 85 with later amendments), hereinafter referred to as *the Act*;
   2) the Statute of the Poznań University of Life Sciences;
   3) the Regulations of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as *the Regulations*.

II. Organisation of t*he School*

§ 2

1. *The School* is an organised form of education in nine disciplines: *forestry sciences; agriculture and horticulture; food technology and nutrition; veterinary medicine; animal science and aquaculture; mechanical engineering; environmental engineering, mining engineering and power engineering; life sciences; economics and finances*, which have been awarded minimum B+ scientific category.
2. *The School* offers education for Polish citizens and foreigners.
3. Principles regulating recruitment to the *School* constitute Attachment 1 to these Regulations.

§ 3

1. *The School* is established and closed by the Rector.
2. *The School* is headed by the Director of the Doctoral School appointed and dismissed by the Rector.
3. Administrative services for *the School* are provided by organisational units of the university administration as specified by the Rector.

§ 4

Responsibilities of the Director of the Doctoral School include particularly:

1) chairing the recruitment committee and issuing administrative decisions on the refusal of admission to the School, based on the power of attorney granted by the Rector;
2) making public announcements on the specific procedures of recruitment to *The School* within deadlines indicated in the resolution on recruitment to *the School* passed by the Senate and the study programme of *the School*;
3) organising the execution of the study programme at *the School*;
4) evaluating the execution of the study programme at *the School*, including the progress in research conducted by PhD students;
5) confirming that PhD students have passed successive semesters and years of studies, including granting a conditional credit;
6) at the request of the PhD student and after consulting with the dissertation supervisor or supervisors granting an extension of the period of studies at *the School*, while simultaneously excusing the PhD student from the obligation to attend courses, for a joint period of maximum two years, in cases justified by the need to conduct long-term research or to take scientific stays in other institutions;
7) at the request of the PhD student granting an extension of the period of education at *the School*, while simultaneously excusing the PhD student from the obligation to attend courses, jointly for no longer than 1 year, particularly in cases justified by:
   a) disease-related PhD student's temporal inability to study,
   b) personal care provided by the PhD student for a diseased family member,
   c) the PhD student serving as a legal guardian for a child less than 4 years old or a child with a medical disability certificate,
   d) the PhD student having a medical disability certificate;
8) extending, at the request of the PhD student, the period of studies at *the School* for the duration corresponding to their maternal leave, an additional maternal leave, a leave equivalent to maternal leave, an additional leave equivalent to maternal leave, a paternal

leave, as well as a parental leave, specified in separate regulations, while simultaneously excusing the PhD student from the obligation to attend courses;

9) granting notification of excused short-term absence of the PhD student in classes, based on a medical certification or a written notification by the PhD student explaining the causes of this absence submitted along with the information provided by the dissertation supervisor or supervisors;
10) issuing administrative decisions on discontinuation for PhD students, who do not fulfill their obligations or resign from doctoral studies at *the School*, particularly pursuant to § 15.1 and 2 of these Regulations, based on the power of attorney granted by the Rector;
11) at a request of the PhD student issuing certificates of enrolment at *the School*, based on the power of attorney granted by the Rector;
12) issuing certificates of the course of studies at *the School* at the request of the individual who has not graduated from *the School*, based on the power of attorney granted by the Rector;
13) presenting the Rector with reports from the operation of *the School* and reporting to the School Council and respective councils of scientific disciplines on significant issues concerning the operation of *the School*;
14) supervision over storage, preparation and submitting documentation of *the School* to the University archives, provided that the documentation of PhD students is archived after 1 year since graduation or discontinuation of the PhD student;
15) issuing decisions, at the request of PhD students having a medical disability certificate, to adapt the study conditions at *the School*, in order to facilitate complete execution of the study programme, in accordance with the principles stipulated in § 27 of these Regulations*;*
16) cooperation with the Committee for Evaluation of Scientific Units (KEN) during evaluation of quality of education at *the School* and with other institutions authorised to conduct inspections of *the School*, particularly by providing explanations and preparing documentation for the needs of such evaluation and inspections;
17) timely implementation, updating and removal of data concerning *the School* and PhD students in the Integrated System of Information on Science and Higher Education POL-on, based on the power of attorney granted by the Rector.

1. PhD students have the right to file a justified, written objection to the decision of the Director of the Doctoral School, specified in § 4 points 4 and 5 of *The Regulations*, and submit it to the Rector within 14 days from the date they received the decision.
2. The Rector considers the objection specified in point 1 within 14 days since its receipt, following the presentation of an opinion of the Director of the Doctoral School. The written decision of the Rector will be promptly presented to the PhD student and the Director of the Doctoral School; this decision is final.

III. The Doctoral School Council

§ 6

1. The Rector appoints and dismisses members of the School Council. The School Council is an advisory and consultative body operating within the School structure.
2. The School Council is composed of the Director of the Doctoral School and the chairmen of individual Committees of Disciplines, appointed in the disciplines specified in § 2.1 of these Regulations.
3. The Committees specified in point 2 are composed of maximum 8 representatives of the scientific specialisations in the disciplines, proposed by the respective scientific councils for these disciplines, while at least half of the committee members should be the members of the scientific council of a given discipline.
4. The Chairman of the School Council and the Chairmen of individual Committees of individual disciplines are appointed and dismissed by the Rector.
5. Representatives of the Self-government of PhD students participate in the Council meetings in an advisory capacity.

§ 7

1. Responsibilities of the School Council include:

1) Supervision over the operation of the *School*,
2) Supervision over PhD studies initiated before the academic year 2019/2020 until the 31st December 2023.
3) Assurance of the high standard of the education process and doctoral dissertations prepared by PhD students,
4) Preparation of a draft of the School Regulations,
5) Providing opinions on the number of admissions to the *School*;

6) Specification of the conditions and manner of recruitment to the *School*,
7) participation in the process of recruitment to the *School* (the School Council constitutes the Recruitment Committee, which is headed by the Director of the Doctoral School),
8) preparation of the study programme at the *School* and providing opinions on the qualifications of academic teachers involved in the education process at the *School*,
9) providing guidelines and principles for the preparation of individual research plans of PhD students, as well as the manner of their confirmation,
10) specification of the principles for mid-term evaluations,
11) participation in the preparation of materials for the evaluation of the *School*.

2. The Chairman organises and coordinates the work of the School Council, particularly:
1) Cooperates with the Director of the Doctoral School,
2) Presides over the work of the School Council,
3) Convenes its meetings, specifies the agenda and chairs these meetings,
4) Signs the School Council resolutions.

3. Meetings of the School Council are held in a manner ensuring timely execution of the Council tasks, at least once quarterly.
4. The Chairman convenes a meeting on his initiative, at the request of the Director of the Doctoral School or at the motion of minimum 1/5 of all School Council members, specifying the date, venue, the time when the meeting starts and the proposed agenda.
5. The Chairman may invite individuals other than Council members to attend a School Council meeting in an advisory capacity.

IV. Education of PhD students

§ 8

1. *The School* offers full-time studies lasting 8 semesters.
2. Studies at *the School* are free of charge and are completed at the submission of a PhD dissertation.
3. Studies are provided based on the study programme at the School, which constitutes Attachment 2 to these Regulations, as well as an individual research programme.
4. In the case of Polish citizens the language of instruction is Polish or English.
5. In the case of foreigners the language of instruction is English.

6. Within 3 months since the date of the commencement of studies at *the School* the Committee of the respective discipline appoints the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, on a motion by the PhD student submitted to the Director of the Doctoral School in the course of the recruitment procedure.
7. In justified cases at the motion of the PhD student submitted to the Director of the Doctoral School, the auxiliary supervisor may be appointed within 12 months since the the date of the commencement of studies at *the School*.

§ 9

1. The study programme at the School needs to be consulted with the Self-government of PhD students based on the principles stipulated in *the Act* and *the Statute*.
2. The study programme at the School specifies:
   1) obligatory and optional courses and internships/placements;
   2) the schedule for the execution of tasks required to complete the PhD dissertation and specified in the individual research programme;
   3) the number of class periods in general courses required for all PhD students;
   4) the number of class periods in courses specified in the framework programme for a given discipline of science.
3. The study programme at the School makes it possible to realise the learning outcomes specified in Attachment 3 to these Regulations.
4. The study programme of the School is announced by the Director of the Doctoral School by posting it on the University website under the tab *The Doctoral School* not later than 5 months before the beginning of the recruitment procedure.
5. The study programme at the School includes a placement programme consisting in teaching classes (from the 1st to the 4th year of studies) in the total load of 60 class periods in a given academic year.
6. The execution of the study programme at the School requires the PhD students to be present at the organisational units of the University and includes classes and research involving the direct participation of academic teachers or dissertation supervisors and auxiliary supervisors, as well as PhD students.
7. Teaching of classes by PhD students as part of their placement needs to be arranged with the head of a respective organisational unit and may be partly conducted outside the unit employing the dissertation supervisor. The PhD student submits an application in this

respect, together with the opinion of their scientific supervisor or supervisors, to the Director of the Doctoral School.

§ 10

1. The study programme at the School is realised within the academic year from the 1st of October to the 30th of September.
2. The semester is an academic period to be passed at the School. The condition required of the PhD student to pass the semester is to fulfill all the obligations specified in the study programme and the individual research programme, and to receive a positive opinion of the scientific supervisor. The PhD student is required to submit a written report within the deadline specified by the Director of the Doctoral School.
3. The semester is credited based on the respective entry in the transcript of records at the Virtual Dean's Office [Wirtualny Dziekanat].

§ 11

1. Obligatory and optional courses, internships/placements and seminars passed by the PhD student are credited in the transcripts at the Virtual Dean's Office [Wirtualny Dziekanat].

2. The following marks (grades) are applicable for examinations and course credits:

1) Very good	5.0 (A)
2) Good plus	4.5 (B)
3) Good	4.0 (C)
4) Satisfactory plus	3.5 (D)
5) Satisfactory	3.0 (D)
1) Unsatisfactory	2.0 (F).

3. The Director of the Doctoral School makes decisions on all issues connected with crediting the PhD students with individual semesters and academic years.

4. Based on the decision of the Rector, following the consent of the scientific supervisor or supervisors, and the Director of the Doctoral School, the PhD student may participate in scientific stays/internships and conduct research at Polish or foreign scientific institutions. The duration of the internship/scientific stay is credited to the period of studies at the School.

§ 12

1. The realisation of the study programme by the PhD student may be suspended for the period corresponding to the duration of:

1) a maternal leave;
2) a leave equivalent to maternal leave;
3) a paternal leave;
4) a parental leave;

specified in the Act of 26 June 1974 - the Labour Code (the unified text in the Journal of Laws Dziennik Ustaw of 2019 item 1040 with later amendments).

2. Such a suspension, as specified in point 1, is granted based on a written and documented request by the PhD student submitted to the Director of the Doctoral School.

§ 13

1. An individual research programme is prepared by the PhD student in consultation with the dissertation supervisor or supervisors and presented to the Director of the Doctoral School within 12 months since the date of the commencement of studies at the School. In the case when an auxiliary supervisor is appointed, his/her opinion is also required.
2. The Director of the Doctoral School presents the individual research programme to the respective council of the scientific discipline to give their opinion.
3. The deadline for the preparation of the individual research programme specified in point 1 is not binding for the *School* candidates preparing their PhD dissertation within the framework of programmes announced by the Minister of Science and Higher Education. An individual research programme is prepared by those candidates and an opinion on the said programme is provided by the respective council of the discipline of science within the timeframe resulting from the application schedules for these programmes as specified in separate regulations.
4. Realisation of the individual research programme is subject to mid-term evaluation taking place in the middle of the study period specified in the study programme. The committee for the mid-term evaluation is composed of 3 members, of which minimum 1 member is a holder of the post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared, employed outside the entity running the *School*. The dissertation supervisor and the auxiliary supervisor may not be the committee members.
5. The date of the mid-term evaluation and the mid-term evaluation committee members, including the chairman, are appointed by the respective Committee of the Scientific Discipline.

6. Prior to the date of the mid-term evaluation PhD students present to the Committee of the respective discipline a report on the execution of the individual research programme approved by their scientific supervisor or supervisors, including:

   1) information on the progress in the execution of research tasks related to the PhD dissertation,

   2) information on the fulfillment of the schedule of tasks presented in the individual research programme.

7. The Committee conducting the mid-term evaluation confers with the PhD students, as well as the dissertation supervisor or dissertation supervisors on the report specified in point 6. The above-mentioned Committee decides on the mid-term evaluation, which is completed with the positive or negative note. The result of the evaluation together with its justification is public.

§ 14

1. The individual research programme specifies the deadline for the submission of the PhD dissertation.
2. The date of submission of the PhD dissertation may be extended for maximum 2 years in the following situations:
   1) accidents connected with the conducted research;
   2) documented disease of the PhD student ;
   3) a maternal leave;
   4) a leave equivalent to a maternal leave;
   5) a paternal leave;
   6) other important, documented circumstances.
3. The decision on the extension of the deadline for the submission of the PhD dissertation is made by the Director of the Doctoral School, at the written request of the PhD student presented along with the opinion of the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, and the Committee of the respective discipline.
4. The Director of the Doctoral School, at a request of the PhD student, makes a decision on granting the individual educational pathway at the School, which consists in arrangement of individual schedules for the teaching load (i.e. classes, examinations, completions of courses, internships/placements, etc.) resulting from the study programme at the School.

§ 15

1. The PhD student may be discontinued in the case of:

1) unsatisfactory progress in the preparation of the PhD dissertation;
2) failure to meet their obligations resulting from the provisions of these Regulations, failure to execute the study programme or the individual research programme.

2. The PhD student is discontinued in the case of:
   1) a negative mid-term evaluation;
   2) failure to submit the PhD dissertation within the deadline specified in the individual research programme;
   3) resignation from studies at the School.
3. The motion on discontinuation may be submitted to the Director of the Doctoral School by the scientific supervisor or supervisors, or by the Committee of the respective discipline in the case of the circumstances specified in points 1 and 2.
4. Discontinuation is effective based on the administrative decision of the Rector. The PhD student is entitled to request a reconsideration of the decision by the Rector, which needs to be submitted within 14 days from the receipt of that decision. The decision issued after the reconsideration is final.
5. Administrative decisions specified in point 4 may be issued by the Director of the Doctoral School based on the respective power of attorney granted by the Rector.
6. An individual, who was a PhD student and resigned from studies at the *School* or was discontinued may be admitted to *the School* again in the competition procedure.

V. Dissertation supervisor or supervisors, auxiliary supervisor

§ 16

1. The dissertation supervisor or supervisors, or the dissertation supervisor and the auxiliary supervisor are appointed in a manner specified in § 8.6.
2. The function of a dissertation supervisor for a PhD student may be served by an academic teacher being a holder of a scientific title of Professor or a degree of Assistant Professor [doktor habilitowany] in the respective or related field of science.
3. The function of a dissertation supervisor may also be served by an employee of a foreign university or research institution, who does not meet the requirements specified in point 2, if the Committee of the respective discipline decides that the person has considerable accomplishments concerning scientific problems in the field discussed in the doctoral dissertation.

4. The function of an auxiliary supervisor, who plays an important auxiliary supervisory function in relation to the PhD student, particularly in the process of research planning, execution and analysis of results, may be served by a holder of the PhD degree in the respective or related discipline and having no authority to serve the function of dissertation supervisor for PhD dissertations.

§ 17

1. In the case of an accident, adequately justified resignation or death of the dissertation supervisor or auxiliary supervisor, at the request of the PhD student submitted to the Director of the Doctoral School the Committee of the respective discipline appoints another dissertation supervisor or auxiliary supervisor within 2 months since the date of the said event.
2. When appointing the next dissertation supervisor or auxiliary supervisor criteria specified in § 16.2 of these Regulations apply.

§ 18

The function of a dissertation supervisor may not be served by a person, who within the last 5 years:

1) has been a dissertation supervisor for four PhD students, who were discontinued due to the negative mid-term evaluation,
2) has supervised preparation of a PhD dissertation by at least two PhD candidates, who did not receive positive reviews of their prepared PhD dissertations.

VI. Obligations and rights of PhD students

§ 19

The PhD student is obliged particularly to:

1) respect the obligations of the oath of academic and professional conduct and the rules of these Regulations, diligently realise the study programme at the School and conduct research;
2) respect the Ethics Code of PhD students;
3) follow the regulations binding at the University;
4) follow the provisions of the currently binding *Regulations* concerning intellectual property rights and related rights, industrial property rights and principles of commercialisation of intellectual property generated at The University;
5) respect the decisions of the Rector and the Director of the Doctoral School in matters within their competence;

6) submit reports from their studies at the School, specified in § 10.2 of these Regulations;
7) complete the internship/placement, as specified in § 9.5 of these Regulations;
8) conduct independent research under the direction of the scientific supervisor or supervisors and the auxiliary supervisor, if such was appointed, in accordance with the approved schedule of the individual research programme;
9) indicate the date of submission for their PhD dissertation, while in justified cases this date, upon receiving consent of the Director of the Doctoral School and the Committee of the respective discipline, may be extended by not more than 2 years;
10) prepare the PhD dissertation, take the PhD examinations as well as defend the PhD dissertation, in accordance with separate regulations, within deadlines specified by the scientific council for the respective discipline;
11) update their personal data by notifying the Director of the Doctoral School of any such changes;
12) follow the fire safety rules and regulations as well as occupational health and safety regulations.

§ 20

1. PhD students are entitled to holiday in the maximum limit of 8 weeks within a year.
2. PhD students have the right particularly to:
   1) obtain research supervision;
   2) extend the length of their studies at the School as stipulated in these *Regulations*;
   3) to a justified change, particularly in the case of a situation described in § 17.1 of these Regulations, of their dissertation supervisor or auxiliary supervisor, if the latter was appointed;
   4) social insurance and common health insurance as specified in separate regulations;
   5) use the library and reading room at the University based on the regulations for University employees;
   6) use research apparatus and teaching facilities as well as laboratory and technical equipment of the University based on regulations binding in a given organisational unit of the University;
   7) take scientific internships in the form approved by the dissertation supervisor or dissertation supervisors and the Director of the Doctoral School;
   8) an electronic PhD student identity card, which entitles to the rights granted to PhD students;
   9) actively participate in the work of the Self-government of PhD students;

10) join PhD students' associations;
11) organise - upon receiving prior consent of the Rector - public gatherings at the University campus, in accordance with the principles specified in the *Statute*;
12) obtain a conditional credit for a semester or year based on the principles specified by the Director of the Doctoral School;
13) studies following the individual educational pathway at the School;
14) awards and distinctions;
15) introduce justified changes to the individual research programme in the period until the date of the mid-term evaluation (in accordance with the provisions of § 13).
16) Apply for funding of the scientific activities related to the preparation of the PhD dissertation upon receiving a prior consent of the head of the respective organisational unit.

§ 21

1. The rights and obligations of the PhD student expire on the day of graduation from the *School* or in the case of discontinuation, on the first day of the calendar month following the month, in which the decision on discontinuation became final.
2. PhD students are held disciplinarily responsible for breaching the regulations binding at the University and for demeaning actions inconsistent with the integrity of PhD students. The regulations of the Act and the Statute apply to matters concerning the disciplinary responsibility of PhD students.

§ 22

1. PhD students may be employed as an academic teacher or a research worker only:
   1) in order to realise a research project organised by the Polish National Agency for Scientific Exchange, the National Centre for Research and Development, the National Science Centre or being a result of an international competition;
   2) for the duration of a research or teaching project financed from EU funds or another entity financing the grant;
   3) after a positive mid-term evaluation;
   4) when the PhD student does not receive a PhD scholarship.
1. PhD students employed as academic teachers and giving classes at the University are relieved from the obligation to take a teaching placement.

§ 23

1. PhD students of the *School* run by the University form the Self-government of PhD students.
2. PhD students elect organs of the Self-government of PhD students in accordance with the provisions specified in the separate Regulations of the Self-government of PhD students at the Poznań University of Life Sciences.
3. Representatives of the Self-government of PhD students participate in meetings of scientific councils of respective disciplines, the Senate and the School Council, in accordance with the provisions specified in *the Statute* and in *the Regulations* of the School Council.

VII. Scholarships for PhD students

§ 24

1. Issues concerning the period, for which a PhD scholarship is granted as well as its minimum amount, are regulated by the *Act*.
2. The amount of the PhD scholarship may be increased in the case of outstanding accomplishments of the PhD student. The decision in this respect is made by the Rector at the motion of the Director of the Doctoral School evaluated by the Committee of the respective discipline.

§ 25

1. PhD students may apply for the Minister's scholarship for outstanding young researchers granted to PhD students by the minister for higher education and science in accordance with the rules specified in *the Act.* Such an application by the PhD student should receive a positive opinion by the scientific council of the respective discipline.
2. PhD students may be granted scholarships by local government units in accordance with the rules specified in the Act.
3. PhD students may be granted scientific scholarships by physical or legal persons not being state or local government entities in accordance with the rules specified in *the Act.*

§ 26

Discontinuation or completion of studies at the School results in the withdrawal of allowance specified in § 24.1 of these Regulations, on the first day of the month following

the month, in which the decision on discontinuation became final, subject to § 25.1 of these *Regulations* and in cases specified in *the Act.*

VIII. PhD students with a medical disability certificate

§ 27

1. The University undertakes actions aiming at providing equal opportunities to realise the study programme at *the School* by PhD students with a medical disability certificate, at the same time taking into consideration particularly:
   1) the degree and character of their disability,
   2) specific character of *the School* by adapting classes to individual needs of PhD students with locomotor impairments.
2. PhD students with a medical disability certificate stating its degree submit a written application to the Director of the Doctoral School for permission to adapt to their own needs the form, dates and period required to obtain course credits and to take examinations, as well as application of other alternative solutions for these students during their studies at *the School*.
3. The application should be submitted before the beginning of the new academic year not later than 14 days after it commences or, in the case of new circumstances, within 14 days of their emergence.
4. Depending on the degree of disability the Director of the Doctoral School may:
   1) establish an individual educational pathway at *the School*;
   2) grant permission to use audiovisual devices facilitating recording of classes, after submission of a written declaration on inviolability of copyright to works generated during such classes and utilisation of recorded material for private use;
   3) grant permission to use specialist equipment ensuring the PhD student's full participation in the education process;
   4) change the manner, in which examinations are taken and courses are credited, e.g. by extending their deadlines, changing their form, place, etc.;
   5) appoint a supervisor to the PhD student e.g. while the PhD student:
      a) gives classes as part of their internship/placement,
      b) conducts research using laboratories of the University,
      c) participates in classes within the study programme at the School.

IX. Transitional and final provisions

§ 28

1. Until 31 December 2023 the Self-government of PhD students at the University is formed by PhD students educated at the School and PhD students educated within the PULS PhD Studies.
2. Any changes in *these Regulations* may only be made in a manner appropriate for their passing.

   In matters not regulated by *these Regulations* commonly binding regulations apply, particularly provisions of the *Act*, as well as internal regulations binding at the University.

Attachment 1

to *The Regulations of the Poznań University of Life Sciences Doctoral School*

FRAMEWORK RULES for RECRUITMENT

to *The Poznań University of Life Sciences Doctoral School*

§ 1

1. Candidates for admission to the Poznań University of Life Sciences Doctoral School, established based on Resolution no. 35/2019 of the Rector of the Poznan University of Life Sciences of the 29th April 2019, hereinafter referred to as the *School,* need to be holders of a Master's degree [magister], a Master's degree following the Bachelor of Science (B.Sc.) degree [magister inżynier] or equivalent, or be a person specified in art. 186.2 of the *Act* , confirmed by a respective diploma, and meet the recruitment conditions specified in this Resolution.
2. Foreigners may enrol at *the School* when they have qualifications specified in point 1 or an *apostille* stamped diploma or another document confirming their graduation from a university abroad, considered, in accordance with the regulations concerning validation of diplomas confirming the completion of higher education studies obtained abroad or on the basis of an international agreement, as equivalent to a respective Polish diploma confirming the completion of second-cycle (graduate) studies or long-term Master's degree studies.

3. Foreigners may commence and undertake studies at the *School* based on provisions of articles 323-327 of the *Act*.

4. Candidates for admission at the *School* may not be PhD students at another doctoral school.

§ 2

1. Recruitment to the 1st year of studies at the *School* will be conducted annually within the disciplines and limits of admissions specified by the PULS Rector as arranged with the respective Deans.
2. Limits of admissions within individual disciplines as specified in point 1 are dependent particularly on the potential for financing research for the PhD dissertation of the prospective PhD student and the procedure related to the conferral of the PhD degree as well as allocation of teaching hours required for the teaching placement of the PhD student

at the unit, at which the PhD dissertation is going to be prepared within the selected discipline of science.

3. Limits of admissions and a specific recruitment schedule (*Notice of recruitment*) are announced every year by the Director of the Doctoral School by posting them on the University website under the tab *The Doctoral School* by the end of March of the year, in which recruitment has been announced.
4. *The School* offers full-time studies, which last 8 semesters and follows the study programme at the *School* specified in the resolution of the Senate of the Poznan University of Life Sciences of the 29th January 2020 and the individual research plan developed in accordance with Article 202.1 of the *Act*.
5. The study programme at the *School* mentioned in point 4 includes a placement programme consisting in teaching classes in the total load of 60 class periods in a given academic year, and jointly amounts to 240 teaching hours in the period of study at the *School.*
6. Studies at *the School* are free of charge and are completed at the submission of a PhD dissertation.

§ 3

1. The recruitment procedure to the *School* is performed by the PULS Doctoral School Council, which constitutes the Recruitment Committee headed by the Director of the *School*. The names of the recruitment committee members are given on the Poznań University of Life Sciences website under the tab *The Doctoral School*. A representative of the Self-government of PhD students participates in the meetings of the recruitment committee in an advisory capacity.
2. The recruitment committee conducts the recruitment procedure according to the following schedule:

1.	On-line recruitment	June or July
2.	Verification of documents and admission of candidates to the recruitment procedure.	July

3.	Oral examination in a modern foreign language and an interview together with the point score evaluation.	July
4.	Announcement of recruitment results in the form of a ranking list, indicating candidates enrolled to the 1st year of the *School*, on the website of the Poznan University of Life Sciences under the tab "Doctoral School".	By the end of July

3. The PULS Rector may decide on an additional recruitment procedure at the motion of the Director of the *School*. The recruitment procedure needs to be concluded by the 30th September of the academic year, in which this recruitment has been announced.

§ 4

1. Recruitment to the *School* is based on a competition. The competition results are public.
2. Recruitment to the *School* is conducted based on:
   1) presented documents,
   2) an oral examination in a modern language, conducted in the case of a lack of a respective certificate of language proficiency specified in Article 4.10 of this document,
   3) interview.
3. Candidates to the *School* submit the following documents at the place, time and in the manner specified in the *Notice of recruitment*:

   1) an application for admission to the School together with the personal data form,
   2) a CV,
   3) 2 photographs,
   4) a copy of a university graduation diploma together with the diploma supplement or a document specified in Article 1.2 of this Attachment,
   5) a declaration of their choice of a modern language or language certificates,
   6) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis),
   7) a medical examination certificate, stating a lack of objections to undertake studies at the *School* within the selected discipline,

8) a description and documentation of scientific activity – maximum 3 accomplishments indicated by the candidate,

9) a description of research plans, which will be realised within the prospective PhD dissertation (max. 6000 characters),

10) an application for the appointment of a scientific supervisor or supervisors, or a scientific supervisor and an auxiliary supervisor,

11) a declaration by the candidate supervisor on allocation of funds for the execution of the PhD research,

12) a declaration of consent to processing of one's personal data for the purpose of recruitment and education at the *School.*

4. Only candidates who have submitted all the documents within the deadline specified in the *Notice of recruitment* will be admitted to participate in the recruitment procedure.

5. Failure to pass the language examination excludes the candidate from further stages of the recruitment process.

6. Admissions to the *School* are based on the score of points (ranking) of candidates, constituting the sum of the following scores:

1) the candidate's accomplishments in studies – max. 10 points,
2) documented scientific activity – max. 20 points,
3) an interview – max. 50 points,
4) proficiency in a modern foreign language – max. 20 points.

7. Accomplishments in studies are evaluated based on the second-cycle or long-term Master's studies graduation diploma supplement, or a document specified in Article 1.2 of this Attachment.
8. Scientific activity of the candidate is evaluated based on documented activity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments.
9. Candidates take an examination in a modern foreign language or submit an international exam-based certificate of proficiency in that language. The language examination in the recruitment process is conducted by a language instructor appointed by the Director of the *School*.
10. The modern language proficiency certificate should document the level of proficiency of the candidate as minimum B2 according to the Common European Framework of Reference for Languages. The documented language proficiency of the candidate at the B2 level is granted a score of 15 points, while at C1 and C2 it is 20 points.

11. The interview concerns the represented discipline and the future PhD dissertation. It is held in Polish or English and may be conducted using a communicator, e.g. Skype.
12. Upon the completion of the recruitment procedure a ranking list of candidates will be prepared based on the number of points received in the recruitment procedure. Candidates may be enrolled at *the School* if they have received min. 50% total number of points, which may be given in the score procedure specified in point 6. Admission to *the School* depends on the position of the candidate on the ranking list for the respective discipline within the limit of admissions mentioned in Article 2.1 of this Attachment.

§ 5

1. Admission to *the School* is executed by enrolment of the PhD students by the Director of *the School*.
2. Refusal of admission to the School is based on an administrative decision issued by the Director of *the School,* based on the power of attorney granted by the Rector.
3. The candidate has the right to appeal from the administrative decision on the refusal of admission and request its reconsideration. Such an appeal may only be submitted on the grounds of infringement of recruitment regulations specified in this Resolution.

§ 6

1. An additional recruitment is held in order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship mentioned in *the Act*, planned for a period of minimum of 36 months, and in order to execute programmes announced by the Minister of Science and Higher Education.
2. Additional recruitment may exceed the limit of admissions specified in Article 2.1 of this Attachment.
3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of the *School* in coordination with the head of the research project.
4. Upon the consent of the recruitment committee the head of the research project has the right to establish additional preferential criteria for this recruitment.
5. The head of the research project or his/her appointed representative participates in the proceedings of the recruitment committee, particularly the interview, and takes part in the process of candidate evaluation following the same regulations as those concerning the recruitment committee members.

§ 7

1. Candidates to the *School*, who will submit a medical certificate stating the degree of disability, will be recruited following regulations specified in this Attachment, subject to the provisions of point 2.
2. Conditions of the examination in a modern foreign language and the interview conducted in the recruitment procedure to *the School* will be adapted to the needs of candidates with disabilities following evaluation of their respective applications submitted to the recruitment committee together with their documents specified in § 4.3 of this Attachment.

§ 8

To ensure proper execution of the recruitment procedure to the *School* candidates are required to present necessary personal data, which will be processed and stored for the purpose of this recruitment and education at the *School*, following binding regulations on the protection of personal data.

Attachment 2

to *The Regulations of the Poznań University of Life Sciences Doctoral School*

FRAMEWORK STUDY PROGRAMME

of *the Poznań University of Life Sciences Doctoral School*

Classes will be held in 1-week modules.

I. 1st year (semesters 1 and 2)

1. Courses:

1)	*Pedagogics*	12 h	Examination
2)	*Global environmental problems*	6 h	Course credit
3)	*Methodology, organisation and financing of research*	14 h	Examination
4)	*Research tools (the R package)*	12 h	Examination
5)	*Interdisciplinary seminar*	16 h	Course credit
6)	*Occupational health and safety instruction*	4 h	Course credit

Total of 64 h/year of courses for all PhD students and:

2. *Teaching placement* 60 h/year Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students

maximum load of 60 h/year

II. 2nd year (semesters 3 and 4)

1. Courses:

1)	*Scientific Writing*	6 h	Course credit
2)	*Global environmental problems*	12 h	Course credit
3)	*Research tools (Statistics)*	14 h	Examination
4)	*Research tools (Internet of Things)*	4 h	Course credit
5)	*Interdisciplinary seminar*	12 h	Course credit

Total of 48 h/year of courses for all PhD students and:

2. *Teaching placement* 60 h/year Course credit
3. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

III. 3rd year (semesters 5 and 6)

1. Courses:

1. *Research tools (Internet of Things)* 8 h Course credit
2. *Global environmental problems* 8 h Examination
3. *Interdisciplinary seminar* 8 h Course credit

Total of 24 h/year of courses for all PhD students and:

4. *Teaching placement* 60 h/year Course credit
5. Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

IV. IV year (semesters 7 and 8)

1. Courses:

1) Interdisciplinary seminar 24 h Course credit

Total of 24 h/year of courses for all PhD students and:

2. *Teaching placement* 60 h/year Course credit

Obligatory and optional classes within a respective discipline will be covered following the recommendations of scientific councils for respective disciplines, depending on the number of PhD students maximum load of 60 h/year

Attachment 3

to *The Regulations of the Poznań University of Life Sciences Doctoral School*

EDUCATION OUTCOMES

of *the Poznań University of Life Sciences Doctoral School*

Graduates from the Poznań University of Life Sciences Doctoral School, upon completion of the specified study programme and receiving their PhD degree diploma, will have attained the following education outcomes in the area of knowledge, skills and social competences.

1. In the area of knowledge graduates (P8U_W) know and understands:

1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice,
2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation,
3) principles of planning and financing of research and evaluation of projects,
4) aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.

2. In the area of skills graduates (P8U_U) know how to:

1) apply knowledge in the process of creative formulation of their research problems,
2) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools,
3) transfer research results to the economic sphere,
4) independently plan and realise their scientific development, as well as inspire and/or organise the development of others,
5) give classes and lectures and verify taught content.

3. In the area of social competences graduates (P8U_K) are capable to:

1) independently plan research and independently broaden the existing body of scientific literature,
2) creatively solve challenges in the professional and public life, considering their ethical aspects,
3) initiate actions for the public good,
4) promote appropriate models of team work,
5) maintain and promote the importance and role of the intellectual community in social life.

Attachment to Resolution no. 44/2021
of the PULS Senate

THE REGULATIONS

of the Poznań University of Life Sciences Doctoral School

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THE REGULATIONS
of the Poznań University of Life Sciences
Doctoral School

I. General provisions

§ 1

1. PhD students are educated at the Doctoral School, hereinafter referred to as *The School*, to meet the requirements for the PhD degree.
2. The Regulations of *the School* of the Poznań University of Life Sciences, hereinafter referred to as *the University*, specify particularly the organisational structure of *the School*, the course of the PhD programme, as well as rights and obligations of PhD students.
3. The legal basis for the operation of *the School* is provided by:
   1) the Act of 20 July 2018 - the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2020, item 85 with later amendments), hereinafter referred to as *the Act*;
   2) the Statute of the Poznań University of Life Sciences;
   3) the Regulations of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as *the Regulations*.

II. Organisation of t*he School*

§ 2

1. *The School* is an organised form of education in nine disciplines: *forestry sciences; agriculture and horticulture; food technology and nutrition; veterinary medicine; animal science and aquaculture; mechanical engineering; environmental engineering, mining engineering and power engineering; life sciences; economics and finances*, which have been awarded minimum B+ scientific category.
2. *The School* offers education for Polish citizens and foreigners.

§ 3

1. *The School* is established and closed by the Rector.
2. *The School* is headed by the Director appointed and dismissed by the Rector.
3. Administrative services for *the School* are provided by organisational units of the university administration as specified by the Rector.

§ 4

Responsibilities of the Director include particularly:
1) chairing the recruitment committee and issuing administrative decisions on the refusal of admission to the School and on the admission of a foreigner to the School, based on the power of attorney granted by the Rector;

2) making public announcements on the specific procedures of recruitment to *The School* within deadlines indicated in the resolution on recruitment to *the School* passed by the Senate and the education programme of *the School*;
3) organising the execution of the education programme at *the School*;
4) evaluating the execution of the education programme at *the School*, including the progress in research conducted by PhD students;
5) confirming that PhD students have passed successive semesters and years of education, including granting a conditional credit;
6) at the request of the PhD student and after consulting with the dissertation supervisor or supervisors granting an extension of the period of education at *the School,* while simultaneously excusing the PhD student from the obligation to attend courses, for a joint period of maximum two years, in cases justified by the need to conduct long-term research or to take scientific stays in other institutions;
7) at the request of the PhD student granting a suspension of the period of education at the School, while simultaneously excusing the PhD student from the obligation to attend courses, jointly for no longer than 2 years, particularly in accordance with § 12.2 of these Regulations;
8) at the request of the PhD student granting a suspension of the period of education at the School for the duration corresponding to their maternal leave, an additional maternal leave, a leave equivalent to maternal leave, an additional leave equivalent to maternal leave, a paternal leave, as well as a parental leave, specified in separate regulations, while simultaneously excusing the PhD student from the obligation to attend courses;
9) granting notification of excused short-term absence of the PhD student in classes, based on a medical certification or a written notification by the PhD student explaining the causes of this absence;
10) issuing administrative decisions on discontinuation for PhD students pursuant to § 15.1 and 2 of these Regulations, based on the power of attorney granted by the Rector;
11) at a request of the PhD student issuing certificates of enrolment at the School, based on the power of attorney granted by the Rector;
12) issuing certificates of the course of education at the School at the request of the individual who has not graduated from the School, based on the power of attorney granted by the Rector;
13) presenting the Rector with reports from the operation of the School and reporting to the School Council and respective councils of scientific disciplines on significant issues concerning the operation of the School;
14) supervision over storage, preparation and submitting documentation of the School to the University archives, provided that the documentation of PhD students is archived after 5 years since graduation or discontinuation of the PhD student;
15) issuing decisions, at the request of PhD students having a medical disability certificate, to adapt the education conditions at the School, in order to facilitate complete execution of the education programme, in accordance with the principles stipulated in § 27 of these Regulations;
16) cooperation with the Committee for Evaluation of Scientific Units (KEN) during evaluation of quality of education at the School and with other institutions authorised to conduct inspections of the School, particularly by providing explanations and preparing documentation for the needs of such evaluation and inspections;
17) timely implementation, updating and removal of data concerning *the School* and PhD students in the Integrated System of Information on Science and Higher Education POL-on, based on the power of attorney granted by the Rector.

§ 5

1. PhD students have the right to file a justified, written objection to the decision of the Director, specified in § 4 points 4 and 5 of *The Regulations*, and submit it to the Rector within 14 days from the date they received the decision.
2. The Rector considers the objection specified in point 1 within 14 days since its receipt, following the presentation of an opinion of the Director. The written decision of the Rector will be promptly presented to the PhD student and the Director; this decision is final.

III. The Doctoral School Council

§ 6

1. The Rector appoints and dismisses members of the School Council. The School Council is an advisory and consultative body operating within the School structure.
2. The School Council is composed of the Director and the chairmen of individual Committees of Disciplines, appointed in the disciplines specified in § 2.1 of these Regulations.
3. The Committees specified in point 2 are composed of maximum 8 representatives of the scientific specialisations in the disciplines, proposed by the respective scientific councils for these disciplines, while at least half of the committee members should be the members of the scientific council of a given discipline.
4. The Chairman of the School Council and the Chairmen of individual Committees of individual disciplines are appointed and dismissed by the Rector.
5. Representatives of the Self-government of PhD students participate in the Council meetings in an advisory capacity.

§ 7

1. Responsibilities of the School Council include:
   1) Supervision over the operation of the *School*,
   2) Assurance of the high standard of the education process and doctoral dissertations prepared by PhD students,
   3) Preparation of a draft of the School Regulations,
   4) Providing opinions on the number of admissions to the *School*;
   5) Proposing the conditions and manner of recruitment to the *School*,
   6) participation in the process of recruitment to the *School* (the School Council constitutes the Recruitment Committee, which is headed by the Director),
   7) preparation of the education programme at the *School* and providing opinions on the qualifications of academic teachers involved in the education process at the *School*,
   8) providing guidelines and principles for the preparation of individual research plans of PhD students, as well as the manner of their confirmation,
   9) specification of the principles for mid-term evaluations,

10) participation in the preparation of materials for the evaluation of the *School*,
11) actions resulting from the provisions of § 112.3 of the Statute of the Poznań University of Life Sciences.

2. The Chairman of the School Council organises and coordinates the work of the School Council, particularly:
   1) Cooperates with the Director,
   2) Presides over the work of the School Council,
   3) Convenes its meetings, specifies the agenda and chairs these meetings,
   4) Signs the School Council resolutions.
3. Meetings of the School Council are held in a manner ensuring timely execution of the Council tasks, at least once quarterly.
4. The Chairman convenes a meeting on his initiative, at the motion of the Rector, at the request of the Director or at the motion of minimum 1/5 of all School Council members, specifying the date, venue, the time when the meeting starts and the proposed agenda.
5. The Chairman of the School Council may invite individuals other than Council members to attend a School Council meeting in an advisory capacity.

IV. Education of PhD students

§ 8

1. *The School* offers full-time education lasting 8 semesters.
2. Education at *the School* is free of charge and is completed at the submission of a PhD dissertation.
3. Education is provided based on the education programme at the School and an individual research programme.
4. In the case of Polish citizens the language of instruction is Polish or English.
5. In the case of foreigners the language of instruction is English.
6. Within 3 months since the date of the commencement of education at *the School* the Committee of the respective discipline appoints the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, on a motion by the PhD student submitted to the Director in the course of the recruitment procedure.
7. In justified cases at the motion of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline by the time of submission of the individual research plan, within maximum 12 months since the date of the commencement of education at *the School*.

§ 9

1. The education programme at the School specifies:
   1) obligatory and optional courses and internships/placements;
   2) the schedule for the execution of tasks required to complete the PhD dissertation and specified in the individual research programme;
   3) the number of class periods in general courses required for all PhD students;
   4) the number of class periods in courses specified in the framework programme for a given discipline of science.

2. The education programme at the School makes it possible to realise the learning outcomes specified in Attachment 1 to these Regulations.
3. The education programme of the School is announced by the Director by posting it on the University website under the tab *The Doctoral School* not later than 5 months before the beginning of the recruitment procedure.
4. The execution of the education programme at the School requires the PhD students to be present at the organisational units of the University and includes classes and research involving the direct participation of academic teachers or dissertation supervisors and auxiliary supervisors, as well as PhD students. Under exceptional circumstances distance learning will be provided within the framework of online education.
5. Education at the School includes a placement programme consisting in teaching classes (from the 1st to the 4th year) in the total load of 60 class periods in a given academic year. In the case of an insufficient number of teaching hours within an organisational unit or in other justified cases at the request of the dissertation supervisor the Rector may reduce the load of teaching hours or authorise co-teaching (team teaching).
6. Teaching of classes by PhD students as part of their placement needs to be arranged with the head of a respective organisational unit and may be partly conducted outside the unit employing the dissertation supervisor. The PhD student submits an application to the Director in this respect, together with the opinion of their scientific supervisor or supervisors.
7. In the case of classes taught in a foreign language by the PhD student the number of class periods for the required load of class periods is calculated applying the conversion factor of 1.5.

§ 10

1. The education programme at the School is realised within the academic year from the 1st of October to the 30th of September.
2. The semester is an academic period to be passed at the School. The condition required of the PhD student to pass the semester is to fulfill all the obligations specified in the education programme and the individual research programme, and to receive a positive opinion of the scientific supervisor. The PhD student is required to submit a written report within the deadline specified by the Director.
3. Submission of a mid-term report relieves the PhD student from the obligation to submit a current semester report.
4. The semester is credited based on the respective entry in the transcript of records at the Virtual Dean's Office [Wirtualny Dziekanat].

§ 11

1. Obligatory and optional courses, internships/placements and seminars passed by the PhD student are credited in the transcripts at the Virtual Dean's Office [Wirtualny Dziekanat].
2. The following system of marks (grades) is applicable for examinations and course credits credited with a mark (grade):

1) Very good	5.0 (A)
2) Good plus	4.5 (B)
3) Good	4.0 (C)
4) Satisfactory plus	3.5 (D)
5) Satisfactory	3.0 (D)

6) Unsatisfactory 2.0 (F).

Otherwise an ungraded pass (UP) applies.

3. PhD students are entitled to complete courses within two periods in the academic year: the regular date and the retake date.
4. In the case of an unexcused absence at the course completion test / examination the PhD student is no longer entitled to complete a given course within that date.
5. In the case of an excused absence at the course completion test / examination the lecturer specifies the additional date(s) for the course completion test / examination.
6. In the case of failure to complete several courses within a given academic year the Director may authorise conditional credit(s) and specify the manner and deadline(s) for the retake of these courses during the successive year of education at the School.
7. In the case of an absence at classes the PhD student is required to present a medical certificate for the sick leave or a written explanation of the cause for this absence.
8. The Director makes decisions on all issues connected with crediting the PhD students with individual semesters and academic years.
9. Based on the decision of the Director, following the consent of the scientific supervisor or supervisors, an internship/scientific stay at Polish or foreign scientific institutions may be credited within the education programme at the School. In such a case the duration of the internship/scientific stay is credited to the period of education at the School.

§ 12

1. The realisation of the education programme by the PhD student is suspended for the period corresponding to the duration of:
   1) a maternal leave;
   2) a leave equivalent to maternal leave;
   3) a paternal leave;
   4) a parental leave;

   specified in the Act of 26 June 1974 - the Labour Code (the unified text in the Journal of Laws Dziennik Ustaw of 2019 item 1040 with later amendments).

2. The execution of the education programme may be suspended particularly in justified situations such as:
   1) Temporal inability of the PhD student to undertake education due to illness,
   2) personal care provided by the PhD student for a diseased family member,
   3) the PhD student providing personal care for a child less than 4 years old or a child with a medical disability certificate,
   4) the PhD student having a medical disability certificate;
3. Such a suspension, as specified in points 1 and 2, is granted based on a written and documented request by the PhD student submitted to the Director subject to provisions of §4.7 of the Regulations.

§ 13

1. An individual research programme is prepared by the PhD student in consultation with the dissertation supervisor or supervisors and presented to the Director within 12 months since the date of the commencement of education at the School. In the case when an auxiliary supervisor is appointed, his/her opinion is also required.

2. The Director presents the individual research programme to the respective Committee of the scientific discipline to give their opinion.
3. Realisation of the individual research programme is subject to mid-term evaluation taking place in the middle of the education period specified in the education programme. The committee for the mid-term evaluation is composed of 3 members, of which minimum 1 member is a holder of the post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared, employed outside the entity running the *School*. The dissertation supervisor and the auxiliary supervisor may not be the committee members.
4. Representatives of the Self-government of PhD students participate in meetings of the above-mentioned committee in an advisory capacity.
5. The date of the mid-term evaluation is set and the mid-term evaluation committee members, including the chairman, are appointed by the respective Committee of the Scientific Discipline from among the candidates proposed by the scientific council of the respective discipline. The PhD students and the dissertation supervisor(s) are notified of the above-mentioned date not later than 60 days before the mid-term evaluation.
6. Not later than 30 days prior to the date of the mid-term evaluation PhD students present to the Committee of the respective discipline a report on the execution of the individual research programme approved by their scientific supervisor or supervisors, including:
   1) information on the progress in the execution of research tasks related to the PhD dissertation,
   2) information on the fulfillment of the schedule of tasks presented in the individual research programme.
   Next this report is submitted to the mid-term evaluation committee.
7. The template and format of this report are specified by the *School* Council.
8. The Committee conducting the mid-term evaluation confers with the PhD students, as well as the dissertation supervisor or dissertation supervisors on the report specified in point 6. The above-mentioned Committee decides on the mid-term evaluation, which is completed with the positive or negative note based on a majority vote. The result of the evaluation together with its justification is public.
9. The PhD student has the right to file an objection to a negative mid-term evaluation by appealing to the School Council within 14 days from the publication of the evaluation result.

§ 14

1. The individual research programme specifies the deadline for the submission of the PhD dissertation.
2. The date of submission of the PhD dissertation may be extended for maximum 2 years in the following situations:
   1) accidents connected with the conducted research;
   2) documented disease of the PhD student;
   3) other important, documented circumstances.
3. The decision on the extension of the deadline for the submission of the PhD dissertation is made by the Director, at the written request of the PhD student presented along with the opinion of the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, and the Committee of the respective discipline.
4. At a request of the PhD student the Director makes a decision on granting the individual educational pathway at the School, which consists in arrangement of individual schedules

for the teaching load (i.e. classes, examinations, completions of courses, internships/placements, etc.) resulting from the education programme at the School.

§ 15

1. The PhD student may be discontinued in the case of:
   1) unsatisfactory progress in the preparation of the PhD dissertation;
   2) failure to meet their obligations resulting from the provisions of these Regulations, failure to execute the education programme or the individual research programme.
2. The PhD student is discontinued in the case of:
   1) a negative mid-term evaluation;
   2) failure to submit the PhD dissertation within the deadline specified in the individual research programme;
   3) resignation from education at the School.
3. The motion on discontinuation may be submitted to the Director by the scientific supervisor or supervisors, or by the Committee of the respective discipline in the case of the circumstances specified in points 1 or 2.
4. Discontinuation is effective based on the administrative decision of the Rector. The PhD student is entitled to request a reconsideration of the decision by the Rector, which needs to be submitted within 14 days from the receipt of that decision. The decision issued after the reconsideration is final.
5. Administrative decisions specified in point 4 may be issued by the Director based on the respective power of attorney granted by the Rector.
6. An individual, who was a PhD student and resigned from education at the *School* or was discontinued may be admitted to *the School* again in the competition procedure.

V. Dissertation supervisor or supervisors, auxiliary supervisor

§ 16

1. The dissertation supervisor(s) or the dissertation supervisor and the auxiliary supervisor are appointed by the Committee of the respective Discipline within 3 months since the commencement of education at the *School* by the PhD student. They are appointed based on the application of the PhD student submitted to the Director in the course of the recruitment procedure or a new application of the PhD student submitted at the latest within 1 month since the commencement of education at the School.
2. In justified cases at the application of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline prior to the submission of the individual research plan and at the latest within 12 months since the commencement of education at the *School* by the PhD student.
3. The function of a dissertation supervisor for a PhD student may be served by a holder of a scientific title of Professor or a degree of Assistant Professor [doktor habilitowany] in the respective or related field of science, and meeting the requirement of the Scientific Council of the respective discipline.
4. The function of a dissertation supervisor may also be served by an employee of a foreign university or research institution, who does not meet the requirements specified in point 2, if the Committee of the respective discipline decides that the person has considerable

accomplishments concerning scientific problems in the field discussed in the doctoral dissertation.

5. The function of an auxiliary supervisor, who plays an important auxiliary supervisory function in relation to the PhD student, particularly in the process of research planning, execution and analysis of results, may be served by a holder of a minimum PhD degree in the respective or related discipline. The auxiliary supervisor needs to supplement the scope of competences of the dissertation supervisor with his/her own, unique scientific competences.
6. In coordination with the Scientific Council of the respective discipline the Committee of the Discipline may specify additional criteria concerning the appointment of the dissertation supervisor and the auxiliary supervisor.

§ 17

1. In the case of an accident, adequately justified resignation or death of the dissertation supervisor or auxiliary supervisor, at the request of the PhD student submitted to the Director the Committee of the respective Discipline appoints or changes the dissertation supervisor or auxiliary supervisor within 2 months since the date of the said event.
2. When changing the dissertation supervisor or auxiliary supervisor criteria specified in § 16.2 - 4 of these Regulations apply.

§ 18

The function of a dissertation supervisor may not be served by a person, who within the last 5 years:

1) has been a dissertation supervisor for four PhD students, who were discontinued due to the negative mid-term evaluation,
2) has supervised preparation of a PhD dissertation by at least two PhD candidates, who did not receive positive reviews of their prepared PhD dissertations.

VI. Obligations and rights of PhD students

§ 19

The PhD student is obliged particularly to:

1) respect the obligations of the oath of academic and professional conduct and the rules of these Regulations, diligently realise the education programme at the School and conduct research aiming at the preparation of the PhD dissertation;
2) respect the Ethics Code of PhD students;
3) follow the regulations binding at the University;
4) follow the provisions of the currently binding *Regulations* concerning intellectual property rights and related rights, industrial property rights and principles of commercialisation of intellectual property generated at The University;
5) respect the decisions of the Rector and the Director in matters within their competence;

6) inform the Director of absences exceeding the period of 1 month, presenting a medical certificate or a written explanation of this absence confirmed by the dissertation supervisor;
7) submit reports from their education at the School, specified in § 10.2 of these Regulations;
8) complete the internship/placement, as specified in § 9.5 of these Regulations;
9) conduct independent research under the direction of the scientific supervisor or supervisors and the auxiliary supervisor, if such was appointed, in accordance with the approved schedule of the individual research programme;
10) promptly inform the Director of issues potentially having a significant impact on the execution of the education programme at the *School*;
11) indicate the date of submission for their PhD dissertation, while in justified cases this date, upon receiving consent of the Director and the Committee of the respective discipline, may be extended by not more than 2 years;
12) update their personal data by notifying the Director of any such changes within 7 days from such a change;
13) follow the fire safety rules and regulations as well as occupational health and safety regulations.

§ 20

1. PhD students are entitled to holiday in the maximum limit of 8 weeks within a year.
2. PhD students have the right particularly to:
   1) obtain research supervision;
   2) extend the duration of their education at the School as stipulated in these *Regulations*;
   3) to a justified change, particularly in the case of a situation described in § 17.1 of these Regulations, of their dissertation supervisor or auxiliary supervisor, if the latter was appointed;
   4) social insurance and common health insurance as specified in separate regulations;
   5) use the library and reading room at the University based on the regulations for University employees;
   6) use research apparatus and teaching facilities as well as laboratory and technical equipment of the University based on regulations binding in a given organisational unit of the University;
   7) take scientific internships in the form approved by the dissertation supervisor or dissertation supervisors and the Director;
   8) an electronic PhD student identity card, which entitles to the rights granted to PhD students;
   9) actively participate in the work of the Self-government of PhD students;
   10) join PhD students' associations;
   11) organise - upon receiving prior consent of the Rector - public gatherings at the University campus, in accordance with the principles specified in the *Statute*;
   12) obtain a conditional credit for a semester or year based on the principles specified by the Director;
   13) education following the individual educational pathway at the School;
   14) awards and distinctions;

   15) apply for funding of the scientific activities related to the preparation of the PhD dissertation upon receiving a prior consent of the head of the respective organisational unit.

§ 21

1. The rights and obligations of the PhD student expire on the day of graduation from the *School* or in the case of discontinuation, on the first day of the calendar month following the month, in which the decision on discontinuation became final.
2. PhD students are held disciplinarily responsible for breaching the regulations binding at the University and for demeaning actions inconsistent with the integrity of PhD students. The regulations of *the Act* and *the Statute* apply to matters concerning the disciplinary responsibility of PhD students.

§ 22

1. PhD students may be employed as an academic teacher or a research worker only:
   1) in order to realise a research project organised by the Polish National Agency for Scientific Exchange, the National Centre for Research and Development, the National Science Centre or being a result of an international competition;
   2) for the duration of a research or teaching project financed from EU funds or another entity financing the grant;
   3) after a positive mid-term evaluation;
   4) when the PhD student does not receive a PhD scholarship.
2. PhD students employed as academic teachers and giving classes at the University are relieved from the obligation to take a teaching placement.

§ 23

1. PhD students of the *School* run by the University form the Self-government of PhD students.
2. PhD students elect organs of the Self-government of PhD students in accordance with the provisions specified in the separate Regulations of the Self-government of PhD students at the Poznań University of Life Sciences.
3. Representatives of the Self-government of PhD students participate in meetings of scientific councils of respective disciplines, the Senate and the School Council, in accordance with the provisions specified in *the Statute* and in *these Regulations*.

VII. Scholarships for PhD students

§ 24

1. Issues concerning the period, for which a PhD scholarship is granted as well as its minimum amount, are regulated by the *Act*.
2. The amount of the PhD scholarship may be increased in the case of outstanding accomplishments of the PhD student. The decision in this respect is made by the Rector at the motion of the Director evaluated by the Committee of the respective discipline.

§ 25

1. PhD students may apply for the Minister's scholarship for outstanding young researchers granted to PhD students by the minister for higher education and science in accordance with the rules specified in *the Act.* Such an application by the PhD student should receive a positive opinion by the scientific council of the respective discipline.
2. PhD students may be granted scholarships by local government units in accordance with the rules specified in the Act.
3. PhD students may be granted scientific scholarships by physical or legal persons not being state or local government entities in accordance with the rules specified in *the Act.*

§ 26

Discontinuation or completion of education at the School results in the withdrawal of allowance specified in § 24.1 of these Regulations, on the first day of the month following the month, in which the decision on discontinuation became final, subject to § 25.1 of these *Regulations* and in cases specified in *the Act.*

VIII. PhD students with a medical disability certificate

§ 27

1. The University undertakes actions aiming at providing equal opportunities to realise the education programme at *the School* by PhD students with a medical disability certificate, at the same time taking into consideration particularly:
   1) the degree and character of their disability,
   2) the specific character of *the School* by adapting classes to individual needs of PhD students with locomotor impairments.
2. PhD students with a medical disability certificate stating its degree submit a written application to the Director for permission to adapt to their own needs the form, dates and period required to obtain course credits and to take examinations, as well as application of other alternative solutions for these students during their education at *the School*.
3. The application should be submitted before the beginning of the new academic year not later than 14 days after it commences or, in the case of new circumstances, within 14 days of their emergence.
4. Depending on the degree of disability the Director may:
   1) establish an individual educational pathway at *the School*;
   2) grant permission to use audiovisual devices facilitating recording of classes, after submission of a written declaration on inviolability of copyright to works generated during such classes and utilisation of recorded material for private use;
   3) grant permission to use specialist equipment ensuring the PhD student's full participation in the education process;
   4) change the manner, in which examinations are taken and courses are credited, e.g. by extending their deadlines, changing their form, place, etc.;
   5) appoint a supervisor to the PhD student e.g. while the PhD student:
      a) gives classes as part of their internship/placement,

b) conducts research using laboratories of the University,
c) participates in classes within the education programme at the School

IX. Transitional and final provisions

§ 28

1. Until 31 December 2023 the Self-government of PhD students at the University is formed by PhD students educated at the School and PhD students educated within the PULS PhD Studies.
2. Any changes in *these Regulations* may only be made in a manner appropriate for their passing.
3. In matters not regulated by *these Regulations* commonly binding regulations apply, particularly provisions of the *Act*, as well as internal regulations binding at the University

Attachment 1
to *The Regulations of the Poznań University of Life Sciences Doctoral School*

EDUCATION OUTCOMES
of *the Poznań University of Life Sciences Doctoral School*

Graduates from the Poznań University of Life Sciences Doctoral School, upon completion of the specified education programme and receiving their PhD degree diploma, will have attained the following education outcomes in the area of knowledge, skills and social competences.

1. In the area of knowledge graduates (P8U_W) know and understands:

1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice,
2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation,
3) principles of planning and financing of research and evaluation of projects,
4) aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.

2. In the area of skills graduates (P8U_U) know how to:

1) apply knowledge in the process of creative formulation of their research problems,
2) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools,
3) transfer research results to the economic sphere,
4) independently plan and realise their scientific development, as well as inspire and/or organise the development of others,
5) give classes and lectures and verify taught content.

3. In the area of social competences graduates (P8U_K) are capable to:

1) independently plan research and independently broaden the existing body of scientific literature,
2) creatively solve challenges in the professional and public life, considering their ethical aspects,
3) initiate actions for the public good,
4) promote appropriate models of team work,
5) maintain and promote the importance and role of the intellectual community in social life.

Attachment to Resolution no. 214/2024
of the PULS Senate

THE REGULATIONS

of the Poznań University of Life Sciences Doctoral School

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THE REGULATIONS
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I. General provisions

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1. PhD students are educated at the Doctoral School, hereinafter referred to as *The School*, to meet the requirements for the PhD degree.
2. The Regulations of *the School* of the Poznań University of Life Sciences, hereinafter referred to as *the University*, specify particularly the organisational structure of *the School*, the course of the PhD programme, as well as rights and obligations of PhD students.
3. The legal basis for the operation of *the School* is provided by:
   1) the Act of 20 July 2018 - the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2023, item 742 with later amendments), hereinafter referred to as *the Act*;
   2) the Statute of the Poznań University of Life Sciences; hereinafter referred as *the Statute*
   3) the Regulations of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as *the Regulations*.

II. Organisation of t*he School*

§ 2

1. *The School* is an organised form of education in ten disciplines: *forestry sciences; agriculture and horticulture; food technology and nutrition; veterinary medicine; animal science and aquaculture; mechanical engineering; environmental engineering, mining engineering and power engineering; biological sciences; economics and finance*; *biotechnology*, which have been awarded minimum B+ scientific category.
2. *The School* offers education for Polish citizens and foreigners.

§ 3

1. *The School* is established and closed by the Rector.
2. *The School* is headed by the Director appointed and dismissed by the Rector.
3. Administrative services for *the School* are provided by organisational units of the university administration as specified by the Rector.

§ 4

Responsibilities of the Director include particularly:

1) chairing the recruitment committee and issuing administrative decisions on the refusal of admission to the School and on the admission of a foreigner to the School, based on the power of attorney granted by the Rector;
2) making public announcements on the specific procedures of recruitment to *The School* within deadlines indicated in the resolution on recruitment to *the School* passed by the Senate and the education programme of *the School*;
3) organising the execution of the education programme at *the School*;
4) evaluating the execution of the education programme at *the School*, including the progress in research conducted by PhD students;
5) confirming that PhD students have passed successive semesters and years of education, including granting a conditional credit;
6) at the request of the PhD student and after consulting with the dissertation supervisor or supervisors granting an extension of the period of education at *the School*, while simultaneously excusing the PhD student from the obligation to attend courses, for a joint period of maximum two years, in cases justified by the need to conduct long-term research or to take scientific stays in other institutions;
7) at the request of the PhD student granting a suspension of the period of education at the School, while simultaneously excusing the PhD student from the obligation to attend courses, jointly for no longer than 2 years, particularly in accordance with § 12.2 of *these Regulations*;
8) at the request of the PhD student granting a suspension of the period of education at the School for the duration corresponding to their maternal leave, an additional maternal leave, a leave equivalent to maternal leave, an additional leave equivalent to maternal leave, a paternal leave, as well as a parental leave, specified in separate regulations, while simultaneously excusing the PhD student from the obligation to attend courses;
9) granting notification of excused short-term absence of the PhD student in classes, based on a medical certification or a written notification by the PhD student explaining the causes of this absence;
10) issuing administrative decisions on discontinuation for PhD students pursuant to § 15.1 and 2 of *these Regulations*, based on the power of attorney granted by the Rector;
11) at a request of the PhD student issuing certificates of enrolment at the School, based on the power of attorney granted by the Rector;
12) issuing certificates of the course of education at the School at the request of the individual who has not graduated from the School, based on the power of attorney granted by the Rector;
13) presenting the Rector with reports from the operation of the School and reporting to the School Council and respective councils of scientific disciplines on significant issues concerning the operation of the School;
14) supervision over storage, preparation and submitting documentation of the School to the University archives, provided that the documentation of PhD students is archived after 5 years since graduation or discontinuation of the PhD student;
15) issuing decisions, at the request of PhD students having a medical disability certificate, to adapt the education conditions at the School, in order to facilitate complete execution of the education programme, in accordance with the principles stipulated in § 27 of *these Regulations;*
16) cooperation with the Committee for Evaluation of Scientific Units (KEN) during evaluation of quality of education at the School and with other institutions authorised to conduct inspections of the School, particularly by providing explanations and preparing documentation for the needs of such evaluation and inspections;

17) timely implementation, updating and removal of data concerning *the School* and PhD students in the Integrated System of Information on Science and Higher Education POL-on, based on the power of attorney granted by the Rector.

§ 5

1. PhD students have the right to file a justified, written objection to the decision of the Director, specified in § 4 points 4 and 5 of *The Regulations*, and submit it to the Rector within 14 days from the date they received the decision.
2. The Rector considers the objection specified in point 1 within 14 days since its receipt, following the presentation of an opinion of the Director. The written decision of the Rector will be promptly presented to the PhD student and the Director; this decision is final.

III. The Doctoral School Council

§ 6

1. The Rector appoints and dismisses members of the School Council. The School Council is an advisory and consultative body operating within the School structure.
2. The School Council is composed of the Director and the chairmen of individual Committees of Disciplines, appointed in the disciplines specified in § 2.1 of *these Regulations*.
3. The Committees specified in point 2 are composed of maximum 8 representatives of the scientific specialisations in the disciplines, proposed by the respective scientific councils for these disciplines, while at least half of the committee members should be the members of the scientific council of a given discipline.
4. The Chairman of the School Council and the Chairmen of individual Committees of individual disciplines are appointed and dismissed by the Rector.
5. Representatives of the Self-government of PhD students may participate in the Council meetings in an advisory capacity.

§ 7

1. Responsibilities of the School Council include:
   1) Supervision over the operation of the *School*,
   2) Assurance of the high standard of the education process and doctoral dissertations prepared by PhD students,
   3) Preparation of a draft of the School Regulations,
   4) Providing opinions on the number of admissions to the *School*;
   5) Proposing the conditions and manner of recruitment to the *School*,
   6) participation in the process of recruitment to the *School*,
   7) preparation of the education programme at the *School* and providing opinions on the qualifications of academic teachers involved in the education process at the *School*,
   8) providing guidelines and principles for the preparation of individual research programmes of PhD students, as well as the manner of their confirmation,

9) specification of the principles for mid-term evaluations,
10) participation in the preparation of materials for the evaluation of the *School.*

2. The Chairman of the School Council organises and coordinates the work of the School Council, particularly:
   1) Cooperates with the Director,
   2) Presides over the work of the School Council,
   3) Convenes its meetings, specifies the agenda and chairs these meetings,
   4) Signs the School Council resolutions.
3. Meetings of the School Council are held in a manner ensuring timely execution of the Council tasks, at least once quarterly.
4. The Chairman convenes a meeting on his initiative, at the motion of the Rector, at the request of the Director or at the motion of minimum 1/5 of all School Council members, specifying the date, venue, the time when the meeting starts and the proposed agenda.
5. The Chairman of the School Council may invite individuals other than Council members to attend a School Council meeting in an advisory capacity.

IV. Education of PhD students

§ 8

1. *The School* offers full-time education lasting 8 semesters.
2. Education at *the School* is free of charge and is completed at the submission of a PhD dissertation.
3. The doctoral dissertation is prepared in the discipline chosen during the recruitment procedure.
4. In the event of the emergence of a new discipline or loss of the rights to conduct it at the School, at the request of the PhD student submitted to the chairman of the scientific council of a given discipline, it is allowed to change the discipline in which the doctoral dissertation is prepared, provided that the subject of the doctoral dissertation is consistent with the new discipline. Such an application must receive a positive opinion from the dean or deans of the faculty or faculties where the doctoral dissertation was/is prepared.
5. in the case, as specified in point 4, the PhD student is obliged to supplement the differences in the disciplinary courses and make appropriate corrections in the individual research programme.
6. Education is provided based on the education programme at the School and an individual research programme.
7. In the case of Polish citizens the language of instruction is Polish or English.
8. In the case of foreigners the language of instruction is English.
9. Within 3 months since the date of the commencement of education at *the School* the Committee of the respective discipline appoints the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, on a motion by the PhD student submitted to the Director in the course of the recruitment procedure.
10. In justified cases at the motion of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline by the time of submission of the report before the mid-term evaluation, within maximum 24 months since the date of the commencement of education at *the School*.

§ 9

1. The education programme at the School specifies:
   1) obligatory and optional courses and internships/placements;
   2) the schedule for the execution of tasks required to complete the PhD dissertation and specified in the individual research programme;
   3) the number of class periods in general courses required for all PhD students;
   4) the number of class periods in courses specified in the framework programme for a given discipline of science.
2. The education programme at the School makes it possible to realise the learning outcomes specified in Attachment 1 to *these Regulations*.
3. The education programme of the School is announced by the Director by posting it on the University website under the tab *The Doctoral School* not later than 5 months before the beginning of the recruitment procedure.
4. The execution of the education programme at the School requires the PhD students to be present at the organisational units of the University and includes classes and research involving the direct participation of academic teachers or dissertation supervisors and auxiliary supervisors, as well as PhD students. Under exceptional circumstances distance learning will be provided within the framework of online education.
5. Education at the School includes a placement programme consisting in teaching classes (from the 1st to the 4th year) in the total load of 60 class periods in a given academic year. In the case of an insufficient number of teaching hours within an organisational unit or in other justified cases at the request of the dissertation supervisor the Rector may reduce the load of teaching hours (maximum by half) or authorise co-teaching (team teaching).
6. A PhD student employed as an academic teacher and giving classes at the University may, at the request of the supervisor, be relieved from the obligation to take a teaching placement.
7. Teaching of classes by PhD students as part of their placement needs to be arranged with the head of a respective organisational unit and may be partly conducted outside the unit employing the dissertation supervisor. The PhD student submits an application to the Director in this respect, together with the opinion of their scientific supervisor or supervisors.
8. In the case of classes taught in a foreign language by the PhD student the number of class periods for the required load of class periods is calculated applying the conversion factor of 1.5.

§ 10

1. The education programme at the School is realised within the academic year from the 1st of October to the 30th of September.
2. The semester is an academic period to be passed at the School. The condition required of the PhD student to pass the semester is to fulfill all the obligations specified in the education programme and the individual research programme, and to receive a positive opinion of the scientific supervisor. The PhD student is required to submit a written report within the deadline specified by the Director.
3. Submission of a mid-term report (as referred to in § 13.5,6 of *these Regulations*) relieves the PhD student from the obligation to submit a current semester report.
4. The semester is credited based on the respective entry in the transcript of records at the Virtual Dean's Office [Wirtualny Dziekanat].

§ 11

1. Obligatory and optional courses, internships/placements and seminars passed by the PhD student are credited in the transcripts at the Virtual Dean's Office [Wirtualny Dziekanat].
2. The following system of marks (grades) is applicable for examinations and course credits credited with a mark (grade):

1) Very good	5.0 (A)
2) Good plus	4.5 (B)
3) Good	4.0 (C)
4) Satisfactory plus	3.5 (D)
5) Satisfactory	3.0 (D)
6) Unsatisfactory	2.0 (F).

Otherwise an ungraded pass (Z) applies.

3. PhD students are entitled to complete courses within two periods in the academic year: the regular date and the retake date.
4. In the case of an unexcused absence at the course completion test / examination the PhD student is no longer entitled to complete a given course within that date.
5. In the case of an excused absence at the course completion test / examination the lecturer specifies the additional date(s) for the course completion test / examination.
6. In the case of failure to complete several courses within a given academic year the Director may authorise conditional credit(s) and specify the manner and deadline(s) for the retake of these courses during the successive year of education at the School.
7. In the case of an absence at classes the PhD student is required to present a medical certificate for the sick leave or a written explanation of the cause for this absence.
8. The Director makes decisions on all issues connected with crediting the PhD students with individual semesters and academic years.
9. Based on the decision of the Director, following the consent of the scientific supervisor or supervisors, an internship/scientific stay at Polish or foreign scientific institutions may be credited within the education programme at the School. In such a case the duration of the internship/scientific stay is credited to the period of education at the School.

§ 12

1. The realisation of the education programme by the PhD student is suspended for the period corresponding to the duration of:
   1) a maternal leave;
   2) a leave equivalent to maternal leave;
   3) a paternal leave;
   4) a parental leave;

   specified in the Act of 26 June 1974 - the Labour Code (the unified text in the Journal of Laws Dziennik Ustaw of 2023 item 775 with later amendments).

2. The execution of the education programme may be suspended particularly in justified situations such as:
   1) Temporal inability of the PhD student to undertake education due to illness,
   2) personal care provided by the PhD student for a diseased family member,

3) the PhD student providing personal care for a child less than 4 years old or a child with a medical disability certificate,

4) the PhD student having a medical disability certificate;

5) in other justified cases.

3. Such a suspension, as specified in points 1 and 2, is granted based on a written and documented request by the PhD student submitted to the Director subject to provisions of §4.7 of *the Regulations*.
4. Decision to suspend the education, as specified in point 2, is made by the Director after seeking the opinion of the supervisor or supervisors and the Committee of the respective Discipline.
5. The doctoral scholarship is withheld in the event of suspension, as specified in point 2.

§ 13

1. An individual research programme is prepared by the PhD student in consultation with the dissertation supervisor or supervisors and presented to the Director within 12 months since the date of the commencement of education at the School. In the case when an auxiliary supervisor is appointed, his/her opinion is also required.
2. Realisation of the individual research programme is subject to mid-term evaluation taking place in the middle of the education period specified in the education programme. The committee for the mid-term evaluation is composed of 3 members, of which minimum 1 member is a holder of the post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared, employed outside the entity running the *School*. The dissertation supervisor and the auxiliary supervisor may not be the committee members.
3. Representatives of the Self-government of PhD students may participate in meetings of the above-mentioned committee in an advisory capacity.
4. The date of the mid-term evaluation is set and the mid-term evaluation committee members, including the chairman, are appointed by the respective Committee of the Scientific Discipline. The PhD students and the dissertation supervisor(s) are notified of the above-mentioned date not later than 60 days before the mid-term evaluation.
5. Not later than 30 days prior to the date of the mid-term evaluation PhD students present to the Committee of the respective discipline a report on the execution of the individual research programme approved by their scientific supervisor or supervisors, including:

   1) information on the progress in the execution of research tasks related to the PhD dissertation,

   2) information on the fulfillment of the schedule of tasks presented in the individual research programme.

   Next this report is submitted to the mid-term evaluation committee.
6. The template and format of this report are specified by the *School* Council.
7. The Committee conducting the mid-term evaluation confers with the PhD students, as well as the dissertation supervisor or dissertation supervisors on the report specified in point 6. The above-mentioned Committee decides on the mid-term evaluation, which is completed with the positive or negative note based on a majority vote. The result of the evaluation together with its justification is public.
8. The PhD student has the right to file an objection to a negative mid-term evaluation by appealing to the School Council within 14 days from the publication of the evaluation result.

§ 14

1. The individual research programme specifies the deadline for the submission of the PhD dissertation, subject to provisions of § 12.1 of *the Regulations*.
2. The date of submission of the PhD dissertation may be extended for maximum 2 years in the following situations:
   1) accidents connected with the conducted research;
   2) documented disease of the PhD student;
   3) other important, documented circumstances.
3. The decision on the extension of the deadline for the submission of the PhD dissertation is made by the Director, at the written request of the PhD student presented along with the opinion of the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, and the Committee of the respective discipline.
4. At a request of the PhD student the Director makes a decision on granting the individual educational pathway at the School, which consists in arrangement of individual schedules for the teaching load (i.e. classes, examinations, completions of courses, internships/placements, etc.) resulting from the education programme at the School.

§ 15

1. The PhD student may be discontinued in the case of:
   1) unsatisfactory progress in the preparation of the PhD dissertation;
   2) failure to meet their obligations resulting from the provisions of these Regulations, failure to execute the education programme or the individual research programme.
2. The PhD student is discontinued in the case of:
   1) a negative mid-term evaluation;
   2) failure to submit the PhD dissertation within the deadline specified in the individual research programme;
   3) resignation from education at the School;
   4) failure to undertake education;
   5) violation of the prohibition reffered to in Article 200, section 7 of *the Act*;
   6) imposition of a disciplinary penalty of expulsion from the doctoral school.
3. The motion on discontinuation may be submitted to the Director by the scientific supervisor or supervisors, or by the Committee of the respective discipline in the case of the circumstances specified in points 1 or 2.
4. Discontinuation is effective based on the administrative decision of the Rector. The PhD student is entitled to request a reconsideration of the decision by the Rector, which needs to be submitted within 14 days from the receipt of that decision. The decision issued after the reconsideration is final.
5. Administrative decisions specified in point 4 may be issued by the Director based on the respective power of attorney granted by the Rector.
6. An individual, who was a PhD student and resigned from education at the *School* or was discontinued may be admitted to *the School* again in the competition procedure.

V. Dissertation supervisor or supervisors, auxiliary supervisor

§ 16

1. The dissertation supervisor(s) or the dissertation supervisor and the auxiliary supervisor are appointed by the Committee of the respective Discipline within 3 months since the commencement of education at the *School* by the PhD student. They are appointed based on the application of the PhD student submitted to the Director in the course of the recruitment procedure or a new application of the PhD student submitted at the latest within 1 month since the commencement of education at the School.
2. In justified cases at the application of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline prior to the submission of the individual research programme and at the latest until submitting individual research programme, no later than 24 months since the date of the commencement of education at the School.
3. The function of a dissertation supervisor for a PhD student may be served by a holder of a scientific title of Professor or a degree of Assistant Professor [doktor habilitowany] in the respective or related field of science, and meeting the requirement of the Scientific Council of the respective discipline.
4. The function of a dissertation supervisor may also be served by an employee of a foreign university or research institution, who does not meet the requirements specified in point 2, if the Committee of the respective discipline decides that the person has considerable accomplishments concerning scientific problems in the field discussed in the doctoral dissertation.
5. The function of an auxiliary supervisor, who plays an important auxiliary supervisory function in relation to the PhD student, particularly in the process of research planning, execution and analysis of results, may be served by a holder of a minimum PhD degree in the respective or related discipline. The auxiliary supervisor needs to supplement the scope of competences of the dissertation supervisor with his/her own, unique scientific competences.
6. In coordination with the Scientific Council of the respective discipline the Committee of the Discipline may specify additional criteria concerning the appointment of the dissertation supervisor and the auxiliary supervisor.

§ 17

1. In the case of an accident, adequately justified resignation or death of the dissertation supervisor or auxiliary supervisor, at the request of the PhD student submitted to the Director the Committee of the respective Discipline appoints or changes the dissertation supervisor or auxiliary supervisor within 2 months since the date of the said event.
2. When changing the dissertation supervisor or auxiliary supervisor criteria specified in § 16.2 - 4 of *these Regulations* apply.

§ 18

The function of a dissertation supervisor may not be served by a person, who within the last 5 years:

1) has been a dissertation supervisor for four PhD students, who were discontinued due to the negative mid-term evaluation,
2) has supervised preparation of a PhD dissertation by at least two PhD candidates, who did not receive positive reviews of their prepared PhD dissertations.

VI. Obligations and rights of PhD students

§ 19

The PhD student is obliged particularly to:

1) respect the obligations of the oath of academic and professional conduct (254.6 of *the Statue*) and the rules of *these Regulations*, diligently realise the education programme at the School and conduct research aiming at the preparation of the PhD dissertation;
2) respect the Ethics Code of PhD students;
3) follow the regulations binding at the University;
4) follow the provisions of the currently binding *Regulations* concerning intellectual property rights and related rights, industrial property rights and principles of commercialisation of intellectual property generated at The University;
5) respect the decisions of the Rector and the Director in matters within their competence;
6) inform the Director of absences exceeding the period of 1 month, presenting a medical certificate or a written explanation of this absence confirmed by the dissertation supervisor;
7) submit reports from their education at the School, specified in § 10.2 of *these Regulations*;
8) complete the internship/placement, as specified in § 9.5 of *these Regulations*;
9) conduct independent research under the direction of the scientific supervisor or supervisors and the auxiliary supervisor, if such was appointed, in accordance with the approved schedule of the individual research programme;
10) promptly inform the Director of issues potentially having a significant impact on the execution of the education programme at the *School*;
11) indicate the date of submission for their PhD dissertation, while in justified cases this date, upon receiving consent of the Director and the Committee of the respective discipline, may be extended by not more than 2 years; subject to provisions of §12.1 of *the Regulations*.
12) update their personal data by notifying the Director of any such changes within 7 days from such a change;
13) follow the fire safety rules and regulations as well as occupational health and safety regulations.

§ 20

1. PhD students are entitled to holiday in the maximum limit of 8 weeks within a year.
2. PhD students have the right particularly to:
   1) obtain research supervision;
   2) extend the duration of their education at the School as stipulated in these *Regulations*;
   3) to a justified change, particularly in the case of a situation described in § 17.1 of *these Regulations,* of their dissertation supervisor or auxiliary supervisor, if the latter was appointed;
   4) social insurance and common health insurance as specified in separate regulations;
   5) use the library and reading room at the University based on the regulations for University employees;
   6) use research apparatus and teaching facilities as well as laboratory and technical equipment of the University based on regulations binding in a given organisational unit of the University;

7) take scientific internships in the form approved by the dissertation supervisor or dissertation supervisors and the Director;
8) an electronic PhD student identity card, which entitles to the rights granted to PhD students;
9) actively participate in the work of the Self-government of PhD students;
10) join PhD students' associations;
11) organise - upon receiving prior consent of the Rector - public gatherings at the University campus, in accordance with the principles specified in the *Statute*;
12) obtain a conditional credit for a semester or year based on the principles specified by the Director;
13) education following the individual educational pathway at the School;
14) awards and distinctions;

15) apply for funding of the scientific activities related to the preparation of the PhD dissertation upon receiving a prior consent of the head of the respective organisational unit.

§ 21

1. The rights and obligations of the PhD student expire on the day of graduation from the *School* or in the case of discontinuation, on the first day of the calendar month following the month, in which the decision on discontinuation became final.
2. PhD students are held disciplinarily responsible for breaching the regulations binding at the University and for demeaning actions inconsistent with the integrity of PhD students. The regulations of *the Act* and *the Statute* apply to matters concerning the disciplinary responsibility of PhD students.

§ 22

1. PhD students of the *School* run by the University form the Self-government of PhD students.
2. PhD students elect organs of the Self-government of PhD students in accordance with the provisions specified in the separate Regulations of the Self-government of PhD students at the Poznań University of Life Sciences.
3. Representatives of the Self-government of PhD students participate in meetings of scientific councils of respective disciplines, the Senate and the School Council, in accordance with the provisions specified in *the Statute* and in *these Regulations*.

VII. Scholarships for PhD students

§ 23

1. Issues concerning the period, for which a PhD scholarship is granted as well as its minimum amount, are regulated by the *Act*.

2. The amount of the PhD scholarship may be increased in the case of outstanding accomplishments of the PhD student. The decision in this respect is made by the Rector at the motion of the Director evaluated by the Committee of the respective discipline.

§ 24

1. PhD students may apply for the Minister's scholarship for outstanding young researchers granted to PhD students by the minister for higher education and science in accordance with the rules specified in *the Act.* Such an application by the PhD student should receive a positive opinion by the scientific council of the respective discipline.
2. PhD students may be granted scholarships by local government units in accordance with the rules specified in the Act.
3. PhD students may be granted scientific scholarships by physical or legal persons not being state or local government entities in accordance with the rules specified in *the Act.*

§ 25

Discontinuation or completion of education at the School results in the withdrawal of allowance specified in § 23.1 of *these Regulations*, on the first day of the month following the month, in which the decision on discontinuation became final, subject to § 24.1 of *these Regulations* and in cases specified in *the Act.*

VIII. PhD students with a medical disability certificate

§ 26

1. The University undertakes actions aiming at providing equal opportunities to realise the education programme at *the School* by PhD students with a medical disability certificate, at the same time taking into consideration particularly:
   1) the degree and character of their disability,
   2) the specific character of *the School* by adapting classes to individual needs of PhD students with locomotor impairments.
2. PhD students with a medical disability certificate stating its degree submit a written application to the Director for permission to adapt to their own needs the form, dates and period required to obtain course credits and to take examinations, as well as application of other alternative solutions for these students during their education at *the School*.
3. The application should be submitted before the beginning of the new academic year not later than 14 days after it commences or, in the case of new circumstances, within 14 days of their emergence.
4. Depending on the degree of disability the Director may:
   1) establish an individual educational pathway at *the School*;
   2) grant permission to use audiovisual devices facilitating recording of classes, after submission of a written declaration on inviolability of copyright to works generated during such classes and utilisation of recorded material for private use;
   3) grant permission to use specialist equipment ensuring the PhD student's full participation in the education process;

4) change the manner, in which examinations are taken and courses are credited, e.g. by extending their deadlines, changing their form, place, etc.;
5) appoint a supervisor to the PhD student e.g. while the PhD student:
   a) gives classes as part of their internship/placement,
   b) conducts research using laboratories of the University,
   c) participates in classes within the education programme at the School

IX. Transitional and final provisions

§ 27

1. Substantial supervision over doctoral studies until 31 December 2024 is exercised by the Doctoral School Council.
2. Until 31 December 2024 the Self-government of PhD students at the University is formed by PhD students educated at the School and PhD students educated within the PULS PhD Studies.
3. Any changes in *these Regulations* may only be made in a manner appropriate for their passing.
4. The attachment to *these Regulations* are EDUCATION OUTCOMES of the Poznań University of Life Sciences Doctoral School, which constitutes an integral part of *these Regulations*.
5. In matters not regulated by *these Regulations* commonly binding regulations apply, particularly provisions of the *Act*, as well as internal regulations binding at the University.

Attachment 1
to *The Regulations of the Poznań University of Life Sciences Doctoral School*

EDUCATION OUTCOMES
of *the Poznań University of Life Sciences Doctoral School*

Graduates from the Poznań University of Life Sciences Doctoral School, upon completion of the specified education programme and receiving their PhD degree diploma, will have attained the following education outcomes in the area of knowledge, skills and social competences.

1. In the area of knowledge graduates (P8U_W) know and understands:

1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice,
2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation,
3) principles of planning and financing of research and evaluation of projects,
4) aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity.

2. In the area of skills graduates (P8U_U) know how to:

1) apply knowledge in the process of creative formulation of their research problems,
2) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools,
3) transfer research results to the economic sphere,
4) independently plan and realise their scientific development, as well as inspire and/or organise the development of others,
5) give classes and lectures and verify taught content.

3. In the area of social competences graduates (P8U_K) are capable to:

1) independently plan research and independently broaden the existing body of scientific literature,
2) creatively solve challenges in the professional and public life, considering their ethical aspects,
3) initiate actions for the public good,
4) promote appropriate models of team work,
5) maintain and promote the importance and role of the intellectual community in social life.

Attachment to Resolution no. 33/2025
of the PULS Senate from 23 April 2025

THE REGULATIONS

of the Poznań University of Life Sciences Doctoral School

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I. General provisions

§ 1

1. PhD students are educated at the Doctoral School, hereinafter referred to as *The School*, to meet the requirements for the PhD degree.
2. The Regulations of *the School* of the Poznań University of Life Sciences, hereinafter referred to as *the University*, specify particularly the organisational structure of *the School*, the course of the PhD programme, as well as rights and obligations of PhD students.
3. The legal basis for the operation of *the School* is provided by:
   1) the Act of 20 July 2018 - the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2024, item 1571 with later amendments), hereinafter referred to as *the Act*;
   2) the Statute of the Poznań University of Life Sciences; hereinafter referred as *the Statute*
   3) the Regulations of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as *the Regulations*.

II. Organisation of *the School*

§ 2

1. *The School* is an organised form of education in ten disciplines: *biotechnology; economics and finance; mechanical engineering; environmental engineering, mining engineering and power engineering; biological sciences; forestry sciences; agriculture and horticulture; food technology and nutrition; veterinary medicine; animal science and aquaculture*, which have been awarded minimum B+ scientific category.
2. The Scientific Councils of the disciplines referred to in paragraph 1 participate in the management of *the School* within a given discipline, including, in particular:
   1) designing the strategy for the development of the discipline at *the School*;
   2) appointing members to the Committee of Discipline;
   3) approving the disciplinary program for doctoral education developed by the Committee of Discipline;
   4) may establish additional criteria for the appointment of supervisors.
3. *The School* offers education for Polish citizens and foreigners.

§ 3

1. *The School* is established and closed by the Rector.
2. *The School* is headed by the Director appointed and dismissed by the Rector.
3. Administrative services for *the School* are provided by organisational units of the university administration as specified by the Rector.

§ 4

Responsibilities of the Director include, in particular:

1) chairing the recruitment committee and issuing administrative decisions on the refusal of admission to the School and on the admission of a foreigner to the School, based on the power of attorney granted by the Rector;
2) making public announcements on the specific procedures of recruitment to *The School* within deadlines indicated in the resolution on recruitment to *the School* passed by the Senate and the education programme of *the School*;
3) organising the execution of the education programme at *the School*;
4) evaluating the execution of the education programme at *the School*, including the progress in research conducted by PhD students;
5) confirming that PhD students have passed successive semesters and years of education, including granting a conditional credit;
6) at the request of the PhD student and after consulting with the dissertation supervisor or supervisors and the Committee of the respective Discipline granting an extension of the period of education at *the School* and the deadline for submitting the doctoral dissertation for a joint period of maximum two years;
7) at the request of the PhD student granting a suspension of the period of education at the School, in accordance with § 13.1 of *these Regulations*;
8) granting a PhD student leave from implementing the educational program and individual research programme, in accordance with § 13.2 of *these Regulations;*
9) granting notification of excused short-term absence of the PhD student in classes, based on a medical certification or a written notification by the PhD student explaining the causes of this absence;
10) issuing administrative decisions on discontinuation for PhD students pursuant to § 16.1 and 2 of *these Regulations*, based on the power of attorney granted by the Rector;
11) at a request of the PhD student issuing certificates of enrolment at *the School*, based on the power of attorney granted by the Rector;
12) issuing certificates of the course of education at the School at the request of the individual who has not graduated from *the School*, based on the power of attorney granted by the Rector;
13) presenting the Rector with reports from the operation of *the School* and reporting to the School Council and respective councils of scientific disciplines on significant issues concerning the operation of the School;
14) supervision over storage, preparation and submitting documentation of *the School* to the University archives, provided that the documentation of PhD students is archived after 5 years since graduation or discontinuation of the PhD student;
15) issuing decisions, at the request of PhD students having a medical disability certificate, to adapt the education conditions at *the School*, in order to facilitate complete execution of the education programme, in accordance with the principles stipulated in § 27 of *these Regulations;*
16) cooperation with the Committee for Evaluation of Scientific Units (KEN) during evaluation of quality of education at the School and with other institutions authorised to conduct inspections of the School, particularly by providing explanations and preparing documentation for the needs of such evaluation and inspections;
17) timely implementation, updating and removal of data concerning *the School* and PhD students in the Integrated System of Information on Science and Higher Education POL-on, based on the power of attorney granted by the Rector.

§ 5

1. PhD students have the right to file a justified, written objection to the decision of the Director, specified in § 4 points 4 and 5 of *The Regulations*, and submit it to the Rector within 14 days from the date they received the decision.
2. The Rector considers the objection specified in point 1 within 14 days since its receipt, following the presentation of an opinion of the Director. The written decision of the Rector will be promptly presented to the PhD student and the Director; this decision is final.

III. The Doctoral School Council and the Committee of Discipline

§ 6

1. The Rector appoints and dismisses members of the School Council. The School Council is an advisory and consultative body operating within the School structure.
2. The School Council is composed of the chairmen of individual Committees of Disciplines, appointed in the disciplines specified in § 2.1 of *these Regulations*.
3. The Committees specified in point 2 are composed of maximum 8 representatives of the scientific specialisations in the disciplines, proposed by the respective scientific councils for these disciplines, while at least half of the committee members should be the members of the scientific council of a given discipline.
4. The Chairman of the School Council and the Chairmen of individual Committees of individual disciplines are appointed and dismissed by the Rector.
5. The Director participates in the Council meetings. The chairmen of the Scientific Councils of the disciplines and representatives of the Self-government of PhD students may participate in the Council meetings in an advisory capacity.

§ 7

1. Responsibilities of the School Council include, in particular:
   1) supervision over the operation of *the School*,
   2) assurance of the high standard of the education process and doctoral dissertations prepared by PhD students,
   3) preparation of a draft of *the School* Regulations,
   4) providing opinions on the number of admissions to *the School*;
   5) proposing the conditions and manner of recruitment to *the School*,
   6) participation in the process of recruitment to *the School*,
   7) preparation of the education programme at *the School* and providing opinions on the qualifications of academic teachers involved in the education process at *the School*,
   8) providing guidelines and principles for the preparation of individual research programmes of PhD students, as well as the manner of their confirmation,
   9) specification of the principles for mid-term evaluations,
   10) participation in the preparation of materials for the evaluation of *the School.*

2. The Chairman of *the School* Council organises and coordinates the work of *the School* Council, particularly:
   1) cooperates with the Director,
   2) presides over the work of *the School* Council,
   3) convenes its meetings, specifies the agenda and chairs these meetings,

4) signs *the School* Council resolutions.

3. Meetings of *the School* Council are held in a manner ensuring timely execution of the Council tasks, at least once quarterly.

4. The Chairman convenes a meeting on his initiative, at the motion of the Rector, at the request of the Director or at the motion of minimum 1/5 of all *School* Council members, specifying the date, venue, the time when the meeting starts and the proposed agenda.
5. The Chairman of *the School* Council may invite individuals other than Council members to attend a School Council meeting in an advisory capacity.

§ 8

1. The Responsibilities of the Committee of Discipline include, in particular:
   1) assurance of the high standard of the education process and doctoral dissertations prepared by PhD students,
   2) preparation of a disciplinary program for education of PhD students;
   3) participation in the process of recruitment to *the School*;
   4) appointing supervisors;
   5) reviewing individual research programmes;
   6) participating in the mid-term evaluation and adopting the PhD student's report on the implementation of the individual research programme;
   7) reviewing PhD students' applications for extensions of the period of study at *the School* and extensions of the deadline for submitting their doctoral dissertations.
2. The Responsibilities of the Chairman of the Committee of Discipline include, in particular:
   1) participating in meetings of *the School* Council;
   2) organizing the disciplinary programme;
   3) co-leading the disciplinary seminar;
   4) reviewing and submitting semester reports of PhD students;
   5) organising the mid-term evaluation, including reviewing the PhD student' report on the implementation of the individual research programme;
   6) reviewing the PhD student's final report on the implementation of the individual research programme;
   7) collaborating with the Director and *the School* Council.

IV. Education of PhD students

§ 9

1. *The School* offers full-time education lasting 8 semesters.
2. Education at *the School* is free of charge for PhD students and is completed at the submission of a PhD dissertation to the Scientific Council of a respective Discipline.
3. The doctoral dissertation is prepared in the discipline chosen during the recruitment procedure.
4. In the event of the emergence of a new discipline or loss of the rights to conduct it at *the School*, at the request of the PhD student submitted to the chairman of the scientific council of a given discipline, it is allowed to change the discipline in which the doctoral dissertation is prepared, provided that the subject of the doctoral dissertation is consistent with the new discipline. Such an application must receive a positive opinion from the dean or deans of the faculty or faculties where the doctoral dissertation was/is prepared.

5. in the case, as specified in point 4, the PhD student is obliged to supplement the differences in the disciplinary courses and make appropriate corrections in the individual research programme.
6. Education is provided based on the education programme at *the School* and an individual research programme.
7. In the case of Polish citizens the language of instruction is Polish or English.
8. In the case of foreigners the language of instruction is English.
9. Within 3 months since the date of the commencement of education at *the School* the Committee of the respective discipline appoints the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, on a motion by the PhD student submitted to the Director in the course of the recruitment procedure.
10. In justified cases at the application of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline by the time of submission of the mid-term evaluation report, within maximum 24 months since the date of the commencement of education at *the School*.

§ 10

1. The education programme at *the School* specifies:
   1) obligatory and optional courses and internships/placements;
   2) the number of class periods in general courses required for all PhD students;
   3) the number of class periods in courses specified in the framework programme for a given discipline of science.
2. The education programme at *the School* makes it possible to realise the learning outcomes specified in Attachment 1 to *these Regulations*.
3. The education programme of *the School* is announced by the Director by posting it on the University website under the tab *The Doctoral School* not later than 5 months before the beginning of the recruitment procedure.
4. The execution of the education programme at *the School* requires the PhD students to be present at the organisational units of the University and includes classes and research involving the direct participation of academic teachers or dissertation supervisors and auxiliary supervisors, as well as PhD students. Under exceptional circumstances, with the Director's consent, distance learning will be provided within the framework of online education.
5. Education at *the School* includes a placement programme consisting in teaching classes (from the 1st to the 4th year) in the total load of 60 class periods in a given academic year. In the case of an insufficient number of teaching hours within an organisational unit or in other justified cases at the request of the dissertation supervisor the Rector may reduce the load of teaching hours (maximum by half) or authorise co-teaching (team teaching).
6. A PhD student employed as an academic teacher and giving classes at the University may, at the request of the supervisor, be relieved from the obligation to take a teaching placement.
7. Teaching of classes by PhD students as part of their placement needs to be arranged with the head of a respective organisational unit and may be partly conducted outside the unit employing the dissertation supervisor. The PhD student submits an application to the Director in this respect, together with the opinion of their scientific supervisor or supervisors.
8. In the case of classes taught in a foreign language by the PhD student the number of class periods for the required load of class periods is calculated applying the conversion factor of 1.5.

§ 11

1. The education programme at *the School* is realised within the academic year from the 1st of October to the 30th of September.
2. The semester is an academic period to be passed at *the School*. The condition required of the PhD student to pass the semester is to fulfill all the obligations specified in the education programme and the individual research programme, and to receive a positive opinion of the scientific supervisor. The PhD student is required to submit a written report within the deadline specified by the Director.
3. Submission of a mid-term report (as referred to in § 14.5,6 of *these Regulations*) relieves the PhD student from the obligation to submit a current semester report.
4. The semester is credited based on the respective entry in the transcript of records in the dedicated IT system.

§ 12

1. Obligatory and optional courses, internships/placements and seminars passed by the PhD student are credited in the transcripts in the dedicated IT system.
2. The following system of marks (grades) is applicable for examinations and course credits credited with a mark (grade):

    1) Very good 5.0 (A)
    2) Good plus 4.5 (B)
    3) Good 4.0 (C)
    4) Satisfactory plus 3.5 (D)
    5) Satisfactory 3.0 (E)
    6) Unsatisfactory 2.0 (F).

    Otherwise an ungraded pass (Z) applies.

3. PhD students are entitled to complete courses within two periods in the academic year: the regular date and the retake date.
4. In the case of an unexcused absence at the course completion test / examination the PhD student is no longer entitled to complete a given course within that date.
5. In the case of an excused absence at the course completion test / examination the lecturer specifies the additional date(s) for the course completion test / examination.
6. In the case of failure to complete several courses within a given academic year the Director may authorise conditional credit(s) and specify the manner and deadline(s) for the retake of these courses during the successive year of education at the School.
7. In the case of an absence at classes the PhD student is required to present a medical certificate for the sick leave or a written explanation of the cause for this absence to the Director and the lecturer.
8. The Director makes decisions on all issues connected with crediting the PhD students with individual semesters and academic years.
9. Based on the decision of the Director, following the consent of the scientific supervisor or supervisors, an internship/scientific stay at Polish or foreign scientific institutions may

be credited within the education programme at *the School*.

§ 13

1. The realisation of the education programme by the PhD student is suspended at the request of the PhD student submitted to the Director for a period corresponding to the duration of:
   1) a maternity leave;
   2) a supplementary maternity leave;
   3) a leave equivalent to maternity leave;
   4) a paternity leave;
   5) a parental leave;

   specified in the Act of 26 June 1974 - the Labour Code (the unified text in the Journal of Laws Dziennik Ustaw of 2025 item 277 with later amendments).

2. A PhD student may be granted leave from pursuing their education programme and individual research programme in cases justified by unforeseen circumstances:
   1) temporal inability of the PhD student to undertake education due to illness;
   2) personal care provided by the PhD student for a diseased family member;
   3) the PhD student providing personal care for a child less than 4 years old or a child with a medical disability certificate,
   4) the PhD student having a medical disability certificate;
   5) in other justified cases.
3. The leave, as specified in point 2, is granted based on a written and documented request by the PhD student submitted to the Director subject to provisions of §4.6 of *these Regulations*.
4. Decision to grant leave from pursuing the education, as specified in point 2, is made by the Director after seeking the opinion of the supervisor or supervisors and the Committee of the respective Discipline.

§ 14

1. An individual research programme is prepared by the PhD student in consultation with the dissertation supervisor or supervisors and reviewed by the Committee of the respective Discipline. It is presented to the Director within 12 months since the date of the commencement of education at *the School*. In the case when an auxiliary supervisor is appointed, his/her opinion is also required.
2. Realisation of the individual research programme is subject to mid-term evaluation taking place in the middle of the education period specified in the education programme. The committee for the mid-term evaluation is composed of 3 members, of which minimum 1 member is a holder of the post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared, employed outside the entity running *the School*. The dissertation supervisor and the auxiliary supervisor may not be the committee members.
3. Representatives of the Self-government of PhD students may participate in meetings of the above-mentioned committee in an advisory capacity.
4. The date of the mid-term evaluation is set and the mid-term evaluation committee members, including the chairman, are appointed by the respective Committee

of the Discipline. The PhD students and the dissertation supervisor(s) are notified of the above-mentioned date not later than 60 days before the mid-term evaluation.

5. Not later than 30 days prior to the date of the mid-term evaluation PhD students present to the Committee of the respective discipline a report on the execution of the individual research programme approved by their scientific supervisor or supervisors, including:
   1) information on the progress in the execution of research tasks related to the PhD dissertation,
   2) information on the fulfillment of the schedule of tasks presented in the individual research programme.
   Next this report is submitted to the mid-term evaluation committee.
6. The template and format of this report are specified by *the School* Council.
7. The Committee conducting the mid-term evaluation confers with the PhD students, as well as the dissertation supervisor or dissertation supervisors on the report specified in point 6. The above-mentioned Committee decides on the mid-term evaluation, which is completed with the positive or negative note based on a majority vote. The result of the evaluation together with its justification is public.
8. The PhD student has the right to file an objection to a negative mid-term evaluation by appealing to *the School* Council within 14 days from the publication of the evaluation result.

§ 15

1. The individual research programme specifies the deadline for the submission of the PhD dissertation, subject to provisions of § 13.1 of *these Regulations*.
2. The dissertation is submitted as an appendix to the application to initiate proceedings for the award of a doctoral degree, the rules of which are determined by the Senate.
3. The application must be accompanied by an opinion issued by the Director on the course of education at *the School*, together with information on passing all subjects.
4. The opinion is prepared at the request of the PhD student submitted to the Director, to which the PhD student attaches a final report on the implementation of the individual research programme, with the opinion of the supervisor or supervisors, or by the supervisor and the auxiliary supervisor and the chairman of the Committee of a respective Discipline.
5. The dissertation is prepared in accordance with the framework guidelines, which outline the requirements and structure of the dissertation, and include templates for attachments. These guidelines are provided by the Scientific Councils of the Disciplines.
6. The date of submission of the PhD dissertation may be extended for maximum 2 years in the following situations:
   1) leave referred to in § 13.2 of *these Regulations*;
   2) unforeseen events related to the conducted research;
   3) documented illness of the PhD student;
   4) other important, documented circumstances.
7. The decision on the extension of the deadline for the submission of the PhD dissertation is made by the Director, at the written request of the PhD student presented along with the opinion of the dissertation supervisor(-s), or the dissertation supervisor and the auxiliary supervisor, and the Committee of the respective Discipline.
8. At a request of the PhD student the Director makes a decision on granting the individual educational pathway at *the School*, which consists in arrangement of individual schedules for the teaching load (i.e. classes, examinations, completions of courses, internships/placements, etc.) resulting from the education programme at *the School*.

§ 16

1. The PhD student may be discontinued in the case of:
   1) unsatisfactory progress in the preparation of the PhD dissertation;
   2) failure to meet their obligations resulting from the provisions of *these Regulations*, failure to execute the education programme or the individual research programme.
2. The PhD student is discontinued in the case of:
   1) a negative mid-term evaluation;
   2) failure to submit the PhD dissertation within the deadline specified in the individual research programme;
   3) resignation from education at the School;
   4) failure to undertake education;
   5) violation of the prohibition referred to in Article 200, section 7 of the Act;
   6) imposition of a disciplinary penalty of expulsion from *the School.*
3. The motion on discontinuation may be submitted to the Director by the scientific supervisor or supervisors, or by the Committee of the respective Discipline in the case of the circumstances specified in points 1 or 2.
4. Discontinuation is effective based on the administrative decision of the Rector. The PhD student is entitled to request a reconsideration of the decision by the Rector, which needs to be submitted within 14 days from the receipt of that decision. The decision issued after the reconsideration is final.
5. Administrative decisions specified in point 4 may be issued by the Director based on the respective power of attorney granted by the Rector.
6. An individual, who was a PhD student and resigned from education at *the School* or was discontinued may be admitted to *the School* again in the competition procedure.

V. Dissertation supervisor or supervisors, auxiliary supervisor

§ 17

1. The dissertation supervisor(s) or the dissertation supervisor and the auxiliary supervisor are appointed by the Committee of the respective Discipline within 3 months since the commencement of education at *the School* by the PhD student. They are appointed based on the application of the PhD student submitted to the Director in the course of the recruitment procedure or a new application of the PhD student submitted at the latest within 1 month since the commencement of education at *the School.*
2. In justified cases at the application of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline prior to the submission of the individual research programme and at the latest until submitting individual research programme, no later than 24 months since the date of the commencement of education at *the School.*

   In justified cases at the application of the PhD student submitted to the Director the auxiliary supervisor may be appointed by the Committee of the respective Discipline by the time of submission of the mid-term evaluation report, within maximum 24 months since the date of the commencement of education at the School.
3. The function of a dissertation supervisor for a PhD student may be served by a holder of a scientific title of Professor or a degree of Assistant Professor [doktor habilitowany] in the respective or related field of science, with current scientific achievements in the field of research related to the subject of the doctoral dissertation.

4. The function of a dissertation supervisor may also be served by an employee of a foreign university or research institution, who does not meet the requirements specified in point 3, if the Committee of the respective Discipline decides that the person has considerable accomplishments concerning scientific problems in the field discussed in the doctoral dissertation.
5. If two supervisors are appointed, they should have different scientific competences ensuring substantive supervision of the prepared doctoral dissertation.
6. The function of an auxiliary supervisor, who plays an important auxiliary supervisory function in relation to the PhD student, particularly in the process of research planning, execution and analysis of results, may be served by a holder of a minimum PhD degree in the respective or related Discipline. The auxiliary supervisor needs to supplement the scope of competences of the dissertation supervisor with his/her own, unique scientific competences.
7. In coordination with the Scientific Council of the respective discipline the Committee of the Discipline may specify additional criteria concerning the appointment of the dissertation supervisor and the auxiliary supervisor.

§ 18

1. In the case of an unforeseen event, adequately justified resignation or death of the dissertation supervisor or auxiliary supervisor, at the request of the PhD student submitted to the Director the Committee of the respective Discipline appoints or changes the dissertation supervisor or auxiliary supervisor within 2 months since the date of the said event.
2. When changing the dissertation supervisor or auxiliary supervisor criteria specified in § 17.2-5 of *these Regulations* apply.

§ 19

1. The responsibilities of the supervisor include, in particular:
   1) providing scientific supervision to the PhD student in the context of preparing their doctoral dissertation;
   2) ensuring research funding and optimal conditions for preparing the doctoral dissertation;
   3) supporting the PhD student in developing an individual research programme and the schedule contained therein;
   4) supporting the PhD student in research and teaching;
   5) organizing and supporting the PhD student substantively and methodologically in implementing their professional internship (in the form of conducting classes);
   6) assessing the progress of the PhD student's research and teaching in a semester report;
   7) reviewing the mid-term and final reports on the implementation of the individual research programme;
   8) participating in the mid-term evaluation;
   9) cooperating with the Director, in particular informing the Director of important matters concerning the implementation of the doctoral dissertation, including those affecting the deadline for its submission;
   10) reviewing documents submitted by the PhD student;
2. The responsibilities of the auxiliary supervisor include, in particular:
   1) reviewing the PhD student's individual research programme;
   2) collaborating with the supervisor;

3) supporting the PhD student in the process of research planning, implementation, and analysis of results;
4) collaborating with the Director;

3. The function of a dissertation supervisor may not be served by a person, who within the last 5 years:
   1) has been a dissertation supervisor for four PhD students, who were discontinued due to the negative mid-term evaluation,
   2) has supervised preparation of a PhD dissertation by at least two PhD candidates, who did not receive at least two positive reviews of their prepared PhD dissertations.

VI. Obligations and rights of PhD students

§ 20

The PhD student is obliged particularly to:

1) respect the obligations of the oath of academic and professional conduct (§54.6 of *the Statue*) and the rules of *these Regulations*, diligently realise the education programme at *the School* and conduct research aiming at the preparation of the PhD dissertation;
2) respect the Ethics Code of PhD students;
3) follow the regulations binding at the University;
4) follow the provisions of the currently binding *Regulations* concerning intellectual property rights and related rights, industrial property rights and principles of commercialisation of intellectual property generated at The University;
5) respect the decisions of the Rector and the Director in matters within their competence;
6) inform the Director of absences exceeding the period of 1 month, presenting a medical certificate or a written explanation of this absence confirmed by the dissertation supervisor;
7) inform the Director of foreign travels using the appropriate form;
8) submit reports from their education at *the School*, specified in § 11.2 of *these Regulations*;
9) verify of the completeness of entries in a dedicated IT system
10) complete the internship/placement, as specified in § 10.5 of *these Regulations*;
11) conduct independent research under the direction of the scientific supervisor or supervisors and the auxiliary supervisor, if such was appointed, in accordance with the approved schedule of the individual research programme;
12) promptly inform the Director of issues potentially having a significant impact on the execution of the education programme at *the School*;
13) indicate the date of submission for their PhD dissertation, while in justified cases this date, upon receiving consent of the Director and the Committee of the respective discipline, may be extended by not more than 2 years; subject to provisions of §13.1 of *these Regulations*.
14) update their personal data by notifying the Director of any such changes within 7 days from such a change;
15) follow the fire safety rules and regulations as well as occupational health and safety regulations.

§ 21

1. PhD students are entitled to holiday in the maximum limit of 8 weeks within a year. The dates of these breaks must be agreed with the supervisor or supervisors.
2. PhD students have the right particularly to:
   1) obtain research supervision;
   2) suspension of education in accordance with § 13.1 of *these Regulations*;
   3) leave from the implementation of the education programme and individual research programme in accordance with § 13.2 of *these Regulations;*
   4) extend the duration of their education at *the School* as stipulated in *these Regulations*;
   5) to a justified change, particularly in the case of a situation described in § 18.1 of *these Regulations*, of their dissertation supervisor or auxiliary supervisor, if the latter was appointed;
   6) social insurance and common health insurance as specified in separate regulations;
   7) use the library and reading room at the University based on the regulations for University employees;
   8) use research apparatus and teaching facilities as well as laboratory and technical equipment of the University based on regulations binding in a given organisational unit of the University;
   9) take scientific internships in the form approved by the dissertation supervisor or dissertation supervisors and the Director;
   10) an electronic PhD student identity card, which entitles to the rights granted to PhD students;
   11) actively participate in the work of the Self-government of PhD students;
   12) join PhD students' associations;
   13) organise - upon receiving prior consent of the Rector - public gatherings at the University campus, in accordance with the principles specified in *the Statute*;
   14) obtain a conditional credit for a semester or year based on the principles specified by the Director;
   15) education following the individual educational pathway at *the School*;
   16) awards and distinctions;
   17) apply for funding of the scientific activities related to the preparation of the PhD dissertation upon receiving a prior consent of the head of the respective organisational unit.

§ 22

1. The rights and obligations of the PhD student expire on the day of graduation from *the School* or in the case of discontinuation, on the first day of the calendar month following the month, in which the decision on discontinuation became final.
2. PhD students are held disciplinarily responsible for breaching the regulations binding at the University and for demeaning actions inconsistent with the integrity of PhD students. The regulations of *the Act* and *the Statute* apply to matters concerning the disciplinary responsibility of PhD students.

§ 23

1. PhD students of *the School* run by the University form the Self-government of PhD students.
2. PhD students elect organs of the Self-government of PhD students in accordance with the provisions specified in the separate Regulations of the Self-government of PhD students at the Poznań University of Life Sciences.

3. Representatives of the Self-government of PhD students participate in meetings of scientific councils of respective disciplines, the Senate and the School Council, in accordance with the provisions specified in *the Statute* and in *these Regulations*.

VII. Scholarships for PhD students

§ 24

1. Issues concerning the period, for which a PhD scholarship is granted as well as its minimum amount, are regulated by the *Act*.
2. The amount of the PhD scholarship may be increased in the case of outstanding accomplishments of the PhD student. The decision in this respect is made by the Rector at the motion of the Director evaluated by the Committee of the respective Discipline.

§ 25

1. PhD students may apply for the Minister's scholarship for outstanding young researchers granted to PhD students by the minister for higher education and science in accordance with the rules specified in *the Act.* Such an application by the PhD student should receive a positive opinion by the Scientific Council of the respective Discipline.
2. PhD students may be granted scholarships by local government units in accordance with the rules specified in *the Act.*
3. PhD students may be granted scientific scholarships by physical or legal persons not being state or local government entities in accordance with the rules specified in *the Act.*

§ 26

Discontinuation or completion of education at *the School* results in the withdrawal of allowance specified in § 24.1 of *these Regulations*, on the first day of the month following the month, in which the decision on discontinuation became final, subject to § 25.1 of *these Regulations* and in cases specified in *the Act.*

VIII. PhD students with a medical disability certificate

§ 27

1. The University undertakes actions aiming at providing equal opportunities to realise the education programme at *the School* by PhD students with a medical disability certificate, at the same time taking into consideration particularly:
   1) the degree and character of their disability,
   2) the specific character of *the School* by adapting classes to individual needs of PhD students with locomotor impairments.
2. PhD students with a medical disability certificate stating its degree submit a written application to the Director for permission to adapt to their own needs the form, dates and period required to obtain course credits and to take examinations, as well as application of other alternative solutions for these students during their education at *the School*.

3. The application should be submitted before the beginning of the new academic year not later than 14 days after it commences or, in the case of new circumstances, within 14 days of their emergence.
4. Depending on the degree of disability the Director may:
   1) establish an individual educational pathway at *the School*;
   2) grant permission to use audiovisual devices facilitating recording of classes, after submission of a written declaration on inviolability of copyright to works generated during such classes and utilisation of recorded material for private use;
   3) grant permission to use specialist equipment ensuring the PhD student's full participation in the education process;
   4) change the manner, in which examinations are taken and courses are credited, e.g. by extending their deadlines, changing their form, place, etc.;
   5) appoint a supervisor to the PhD student e.g. while the PhD student:
      a) gives classes as part of their internship/placement,
      b) conducts research using laboratories of the University,
      c) participates in classes within the education programme at *the School.*

IX. Final provisions

§ 28

1. Any changes in *these Regulations* may only be made in a manner appropriate for their passing.
2. The attachment to *these Regulations* are **EDUCATION OUTCOMES of the Poznań University of Life Sciences Doctoral School**, which constitutes an integral part of *these Regulations*.
3. In matters not regulated by *these Regulations* commonly binding regulations apply, particularly provisions of *the Act*, as well as internal regulations binding at the University.

Attachment 1
to *The Regulations of the Poznań University of Life Sciences Doctoral School*

EDUCATION OUTCOMES
of *the Poznań University of Life Sciences Doctoral School*

Graduates from the Poznań University of Life Sciences Doctoral School, upon completion of the specified education programme should achieve the following education outcomes in the area of knowledge, skills and social competences.

1. In the area of knowledge graduates (P8U_W) know and understands:

1) world scientific literature concerning specific problems related to a given discipline along with the resulting implications for practice(P8U_W_1);
2) the latest theories and trends in disciplines, within which education was offered at the Doctoral School, thus facilitating creation of original research concepts and their scientific interpretation (P8U_W_2);
3) principles of planning and financing of research and evaluation of projects (P8U_W_3);
4) aspects concerning intellectual property and principles of confidentiality related to scientific and academic activity (P8U_W_4).

2. In the area of skills graduates (P8U_U) know how to:

1) apply knowledge in the process of creative formulation of their research problems (P8U_U_1);
2) innovatively solve research tasks using independently gained knowledge concerning state-of-the-art methods and research tools (P8U_U_2);
3) transfer research results to the economic sphere (P8U_U_3);
4) independently plan and realise their scientific development, as well as inspire and/or organise the development of others (P8U_U_4);
5) give classes and lectures and verify taught content (P8U_U_5).

3. In the area of social competences graduates (P8U_K) are capable to:

1) independently plan research and independently broaden the existing body of scientific literature (P8U_K_1);
2) creatively solve challenges in the professional and public life, considering their ethical aspects (P8U_K_2);
3) initiate actions for the public good (P8U_K_3);
4) promote appropriate models of team work (P8U_K_4);
5) maintain and promote the importance and role of the intellectual community in social life (P8U_K_5).

Attachment 1
to *The Regulations of the Doctoral School at the Poznań University of Life Sciences*

FRAMEWORK RULES for RECRUITMENT
to *The Doctoral School, The Poznań University of Life Sciences*

§ 1

Limits of admissions

At the request of the Director of the Doctoral School the Rector specifies the annual limits of admissions to *the School*, divided into disciplines with minimum B+ scientific category.

§ 2

Recruitment time frame

1. The recruitment procedure is held in July of the year, in which the academic year commences and if needed, the additional recruitment procedure takes place in September of the same year.

2. A detailed schedule for the procedure is established and announced annually by the Director of the Doctoral School.

§ 3

General provisions and recruitment mode

1. The recruitment procedure executed by the committee is transparent and it adheres to the principles of equal opportunities and non-discrimination, including equal access to education for individuals with disabilities.

2. Candidates submit the following documents, which specimens are given on the University website:

   1) an application for admission to the School,

   2) a CV,

   3) 2 photographs,

   4) a copy of a university graduation diploma,

   5) A declaration of their choice of a modern language or language certificates,

6) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis),

7) a medical examination certificate, stating a lack of objections to undertake studies at the School within a given discipline,

8) a description and documentation of scientific activity as well as a description of research plans, which will be realised within the prospective PhD dissertation,

9) an application for the appointment of a scientific supervisor or supervisors,

10) a declaration of consent to processing of one's personal data for the purpose of recruitment and education at the School.

3. The School Council constitutes the Recruitment Committee, hereinafter referred to as *the Committee*, with the Director of the Doctoral School as its Chairman.

4. *The Committee* evaluates the candidates applying a scoring system and settles issues not regulated by the Recruitment Regulations.

5. *The Committee* may disqualify a candidate with no evalution procedure performed if justified doubts are raised concerning the validity of documents submitted by the candidate, medical containdications for studies are observed or when the documentation submitted by the candidate shows beyond reasonable doubt that the planned research of scientific supervision may not be reasonably executed.

6. Candidates may be enrolled to *the School* when they have received min. 50% total score specified in § 4.1 of this Attachment.

7. Admission to the School depends on the position of the candidate on the ranking list for the respective discipline, based on the score awarded within the recruitment procedure.

§ 4

Scoring systems for accomplishments of candidates

1. *The Committee* evaluates accomplishments of candidates during their studies (max. 10 points), their documented scientific activity (max. 30 points), language skills related to a given modern language (max. 20 points) and an interview (max. 40 points).

2. Accomplishments in studies are evaluated based on a diploma confirming graduation from second-cycle or long-cycle Master's studies.

3. Scientific activity of candidates is evaluated based on documented acitvity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments.

4. Candidates take an examination verifying their proficiency in a selected modern or submit an international exam-based certificate confirming their language skills in that language.

5. The language certificate in a selected modern language may not be older than 2 years and should document the level of proficiency of the candidate as minimum B2 according to the Common European Framework of Reference for Languages. The documented language proficiency of the candidate at the B2 level is granted a score of 15 points, while at C1 and C2 it is 20 points, in accordance with the rules specified in point 1.

6. The examination of proficiency in a modern language is conducted by a language teacher appointed by the Director of the Doctoral School.

7. The interview concerns the represented discipline and the future PhD dissertation. It is held in Polish or English.

§ 5

Additional recruitment connected with research projects

1. In order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship for a period of minimum of 36 months, an additional recruitment is held.

2. Additional recruitment may exceed the limit of admissions specified in §1.1 of this Attachment.

3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of the Doctoral School in coordination with the head of the research project.

4. Upon the consent of *the Committee* the head of the research project has the right to establish additional preferential criteria for this recruitment.

5. The head of the research project or his/her appointed representative participates in the proceedings of the *Committee*, particularly the interview, and takes part in the process of candidate evaluation following the same regulations as those concerning the *Committee* members.

Resolution
concerning rules for recruitment
to the PULS Doctoral School

Article 1

1. Candidates for admission to the Doctoral School of the Poznań University of Life Sciences, established based on Resolution no. 35/2019 of the Rector of the Poznań University of Life Sciences, hereinafter referred to as *the School*, need to be holders of a Master's degree [magister], a Master's degree following the Bachelor of Science (B.Sc.) degree [magister inżynier] or equivalent, or be a person specified in art. 186.2 of the Act confirmed by a respective diploma and meet the recruitment conditions specified in this Resolution.
2. Foreigners may enroll at *the School* when they have qualifications specified in Artcile1.1 or a diploma or another document confirming their graduation from a university abroad, considered, in accordance with the regulations concerning validation of diplomas confirming the completion of higher education studies obtained abroad or on the basis of an international agreement, as equivalent to a respective Polish diploma confirming the completion of second-cycle (graduate) studies or long-term Master's degree studies.
3. Foreigners may enroll and be educated at *the School* based on stipulations of art. 323-327 of the Act (the Act on Higher Education and Science (unified text in the Journal of Laws Dziennik Ustaw of 2018, item 1668 with later amendments).
4. Candidates for enrolment at *the School* may not be PhD students in another doctoral school.

Article 2

1. Recruitment for the 1st year of *the School* will be conducted annually within the disciplines and the limits of admissions specified by the Rector, as agreed with the respective Deans.
2. Limits of admissions in individual disciplines specified in paragraph 1 are dependent particularly on the available funding for research related to the planned doctoral dissertation of the PhD student and the PhD degree conferral procedure as well as a sufficient number of teaching hours as the required teaching load for the placement of the PhD student at the organisational unit, in which the PhD dissertation will be prepared within the selected discipline.
3. Limits of admissions and a detailed calendar (*Notice of recruitment*) are annually announced by the Director of the School on the University website under the tab "Doctoral School" by the end of March in the year, for which the recruitment is announced.

4. Education at *the School* is provided within the full-time programme, lasts 8 semesters and follows the study programme at *the School* specified in the Resolution of the Senate of the Poznań University of Life Sciences of 29 January 2020 and the individual research plan prepared in accordance with Art. 202.1 of the Act.
5. The study programme at the *School*, mentioned in Article 2.4, includes a placement programme consisting in teaching classes by the PhD student in the total load of 60 class periods in a given academic year and comprises jointly 240 class periods taught during the study period at *the School*.
6. Studies at *the School* are free of charge and are completed at the submission of a PhD dissertation.

Article 3

1. The recruitment procedure to *the School* is executed by the PULS Doctoral School Council constituting *the Recruitment Committee*, with the Director of the Doctoral School as its Chairman. *The Recruitment Committee* members are listed on the Poznań University of Life Sciences website under the tab "Doctoral School". A representative of the PULS Self-government of PhD Students participates in meetings of *the Recruitment Committee* in an advisory role.
2. The recruitment committee conducts the recruitment procedure following the schedule given below:

1.	Submission of documents by candidates	June or July
2.	Verification of documents and admission of candidates to the next stage of the recruitment procedure	July
3.	Oral examination in a modern foreign language and an interview together with the score point assessment	July
4.	Announcement of recruitment results in the form of a ranking list, indicating candidates enrolled to the 1st year, on the website of the Poznan University of Life Sciences under the tab "Doctoral School"	by the end of July

3. The Rector may decide on additional recruitment at the request of the Director of *the School*. The recruitment procedure needs to be completed by 30 September of the academic year, for which the recruitment was announced.

Article 4

1. Recruitment to *the School* is based on a competition, which results are public.
2. Recruitment to *the School* is conducted based on:
   1) presented documents,
   2) an oral examination in a modern language, conducted in the case of a lack of a respective certificate of language proficiency specified in Article 4.10 of this Resolution,
   3) an interview.
3. Candidates to *the School* submit the following documents at the place, time and in the manner specified in the *Notice of recruitment*:
   1) an application for admission to *the School* together with the personal data form,
   2) a CV,
   3) 2 photographs,
   4) a copy of a university graduation diploma together with the diploma supplement or a document specified in Article 1.2 of this Resolution,
   5) a declaration of their choice of a modern language or language certificates,
   6) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis),
   7) a medical examination certificate, stating a lack of objections to undertake studies at *the Scho*ol within a given discipline,
   8) a description and documentation of scientific activity – maximum 3 accomplishments indicated by the candidate,
   9) a description of research plans, which will be realised within the prospective PhD dissertation (max. 6000 characters),
   10) an application for the appointment of a scientific supervisor or supervisors, or a scientific supervisor and an auxiliary supervisor,
   11) a declaration by the candidate supervisor on allocation of funds for the execution of the PhD research,
   12) a declaration of consent to processing of one's personal data for the purpose of recruitment and education at *the School.*

4. Only candidates who have submitted on time all the documents specified in the *Notice of recruitment* will be admitted to participate in the recruitment procedure.
5. Failure to pass the language examination excludes the candidate from further stages of the recruitment process.
6. Admissions to *the School* are based on the score of points (ranking) of candidates, constituting the sum of the following scores:
    1) the candidate's accomplishments in studies – max. 10 points,
    2) documented scientific activity – max. 20 points,
    3) an interview – max. 50 points,
    4) proficiency in a modern foreign language – max. 20 points.
7. Accomplishments in studies are evaluated based on the second-cycle or long-term Master's studies graduation diploma supplement, or a document specified in Article 1.2 of this Resolution.
8. Scientific activity of the candidate is evaluated based on documented activity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments.
9. Candidates take an examination in a modern foreign language or submit an international exam-based certificate of proficiency in that language. The language examination in the recruitment process is conducted by a language instructor appointed by the Director of *the School*.
10. The language proficiency certificate should document the level of proficiency of the candidate as minimum B2 according to the Common European Framework of Reference for Languages. The documented language proficiency of the candidate at the B2 level is granted a score of 15 points, while at C1 and C2 it is 20 points.
11. The interview concerns the represented discipline and the future PhD dissertation. It is held in Polish or English and may be conducted using a communicator, e.g. Skype.
12. Upon the completion of the recruitment procedure a ranking list of candidates will be prepared based on the number of points received in the recruitment procedure. Candidates may be enrolled at *the School* if they have received min. 50% total number of points, which may be given in the score procedure specified in Article 4.6. Admission to *the School* depends on the position of the candidate on the ranking list for the respective discipline within the limit of admissions mentioned in Article 2.1 of this Resolution.

Article 5

1. Admission to *the School* is executed by enrolment of the PhD students by the Director of *the School*.
2. Refusal of admission to *the School* is based on an administrative decision issued by the Director of *the School*, based on the power of attorney granted by the Rector.
3. The candidate has the right to appeal from the administrative decision on the refusal of admission and request its reconsideration. Such an appeal may only be submitted on the grounds of infringement of recruitment regulations specified in this Resolution.

Article 6

1. An additional recruitment is held in order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship mentioned in the Act, planned for a period of minimum of 36 months, and in order to execute programmes announced by the Minister of Science and Higher Education.
2. Additional recruitment may exceed the limit of admissions specified in Article 2.1 of this Resolution.
3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of *the School* in coordination with the head of the research project.
4. Upon the consent of *the Recruitment Committee* the head of the research project has the right to establish additional preferential criteria for this recruitment.
5. The head of the research project or his/her appointed representative participates in the proceedings of *the Recruitment Committee*, particularly the interview, and takes part in the process of candidate evaluation following the same regulations as those concerning *the Recruitment Committee* members.

Article 7

1. Candidates to *the School*, who will submit a medical certificate stating the degree of disability, will be recruited following regulations specified in this Resolution, subject to the provisions of Article 7.2 below.
2. Conditions of the examination in a modern foreign language and the interview conducted in the recruitment procedure to *the School* will be adapted to the needs of candidates with disabilities following evaluation of their respective applications submitted to *the*

Recruitment Committee together with their documents specified in Article 4.3 of this Resolution.

Article 8

To ensure proper execution of the recruitment procedure to *the School* candidates are required to present necessary personal data, which will be processed and stored for the purpose of this recruitment and education at *the School*, following binding regulations on the protection of personal data.

Article 9

The Resolution enters into force upon its adoption and the Rector is appointed to supervise its execution.

Resolution no. 35/2021
of the Senate of the Poznań University of Life Sciences
of 27 January 2021

concerning: rules for recruitment to the Doctoral School, the Poznań University of Life Sciences

Based on Article 200 paragraph 2 of the Act of 20 July 2018 - the Act on Higher Education and Science (the Journal of Laws Dziennik Ustaw of 2020, item 85 with later amendments), hereinafter referred to as *the Act*, and in relation to § 54.5 of the *Statute of the Poznań University of Life Sciences*, the Senate declares as follows:

Article 1

1. Candidates for admission to the Doctoral School of the Poznań University of Life Sciences, established based on Resolution no. 35/2019 of the Rector of the Poznań University of Life Sciences of 29 April 2019, hereinafter referred to as *the School*, need to be holders of a Master's degree [magister], a Master's degree following the Bachelor of Science (B.Sc.) degree [magister inżynier] or equivalent, or be a person specified in art. 186(2) of *the Act* confirmed by a respective diploma and meet the recruitment conditions specified in this Resolution.
2. Foreigners may enroll at *the School* when they have qualifications specified in Article 1(1) or a diploma or another document confirming their graduation from a university abroad, considered, in accordance with the regulations concerning validation of diplomas confirming the completion of higher education studies obtained abroad or on the basis of an international agreement, as equivalent to a respective Polish diploma confirming the completion of second-cycle (graduate) studies or long-term Master's degree studies.
3. Foreigners may enroll and be educated at *the School* based on stipulations of art. 323-327 of *the Act*.
4. Candidates for enrolment at *the School* may not be PhD students in another doctoral school.

Article 2

1. Recruitment for the 1st year of *the School* will be conducted annually within the disciplines and the limits of admissions specified by the Rector, as agreed with the respective Deans.
2. Limits of admissions in individual disciplines specified in paragraph 1 are dependent particularly on the available funding for research related to the planned doctoral dissertation

of the PhD student and the PhD degree conferral procedure as well as a sufficient number of teaching hours as the required teaching load for the placement of the PhD student at the organisational unit, in which the PhD dissertation will be prepared within the selected discipline.

3. Limits of admissions and a detailed calendar (*Notice of recruitment*) are annually announced by the Director of *the School* on the University website under the tab "Doctoral School" by the end of March in the year, for which the recruitment is announced.

Article 3

1. The recruitment procedure to *the School* is executed by the Recruitment Committee, with the Director of the Doctoral School as its Chairman. The recruitment committee includes members of the School Council and a representative of the PULS Self-government of PhD Students participating in meetings of the recruitment committee in an advisory role. The recruitment committee members are listed on the Poznań University of Life Sciences website under the tab "Doctoral School".
2. The recruitment committee conducts the recruitment procedure following the schedule given below:

1.	Submission of documents by candidates	June or July
2.	Verification of documents and admission of candidates to the recruitment procedure	July
3.	Oral English examination and an interview in Polish or English together with the score point assessment	July
4.	Announcement of recruitment results in the form of a ranking list, indicating candidates enrolled to the 1st year, on the website of the Poznan University of Life Sciences under the tab "Doctoral School"	by the end of July

3. The Rector may decide on additional recruitment at the request of the Director of *the School*. The recruitment procedure needs to be completed by 30 September of the academic year, for which the recruitment was announced.

Article 4

1. Recruitment to the *School* Recruitment to *the School* is based on a competition, which results are public.
2. Recruitment to *the School* is conducted based on:
   1) presented documents,
   2) an oral English examination, conducted in the case of a lack of a respective certificate of language proficiency specified in Article 4 (9) of this Resolution,
   3) an interview.
3. Candidates to *the School* submit the following documents at the place, time and in the manner specified in the *Notice of recruitment*:
   1) an application for admission to *the School* together with the personal data form,
   2) a CV,
   3) 2 photographs,
   4) a copy of a university graduation diploma together with the diploma supplement or a document specified in Article 1(2) of this Resolution; in the case of individuals specified in Article 186(2) of *the Act* it is a copy of a university graduation diploma for first-cycle studies,
   5) a certificate of English language proficiency (if applicable),
   6) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis) or an opinion of the scientific supervisor in the case of individuals specified in Article 186(2) of *the Act*,
   7) a medical examination certificate, stating a lack of objections to undertake studies at *the Scho*ol within a given discipline,
   8) a description and documentation of scientific activity – maximum 3 accomplishments indicated by the candidate,
   9) a description of the research concept and plans, which will be realised within the prospective PhD dissertation (max. 6000 characters),
   10) an application for the appointment of a scientific supervisor or supervisors, or a scientific supervisor and an auxiliary supervisor,
   11) a declaration by the candidate supervisor, confirmed by the head of the respective unit, on allocation of funds for the execution of the PhD research.
4. Only candidates who have submitted on time all the documents specified in the *Notice of recruitment* will be admitted to participate in the recruitment procedure.

5. Failure to pass the language examination excludes the candidate from further stages of the recruitment process.
6. Admissions to *the School* are based on the score of points (ranking) of candidates, constituting the sum of the following scores:
    1) the candidate's accomplishments in studies – max. 10 points,
    2) documented scientific activity – max. 20 points,
    3) an interview – max. 50 points, of which max. 30 points for the evaluated concept of the PhD research and max. 20 points in the evaluation of the candidate's general knowledge in a given discipline,
    4) English language proficiency – max. 20 points.
7. Accomplishments in studies are evaluated based on the second-cycle or long-term Master's studies graduation diploma supplement, or a document specified in Article 1(2) of this Resolution. In the case of individuals specified in Article 186(2) of *the Act* accomplishments in studies are evaluated based on the first-cycle study graduation diploma supplement.
8. Scientific activity of the candidate is evaluated based on documented activity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments.
9. The English language proficiency certificate should document the level of proficiency of the candidate as minimum B2 according to the Common European Framework of Reference for Languages. The documented language proficiency of the candidate at the B2 level is granted a score of 10 points, while at C1 it is 15 points and at C2 it is 20 points.
10. In the case of a lack of the English language proficiency certificate the candidate needs to take an English language proficiency examination. The language examination in the recruitment process is conducted by a language instructor appointed by the Director of *the School*.
11. The interview concerns particularly the concept for the PhD research and the represented discipline. It may be held at *the School* premises or be conducted using electronic communicators facilitating video image and sound transmission.
12. Upon the completion of the recruitment procedure a ranking list of candidates will be prepared based on the number of points received in the recruitment procedure. Candidates may be enrolled at *the School* if they have received min. 60% total number of points, which may be given in the score procedure specified in Article 4(6). Admission to *the School* depends on the position of the candidate on the ranking list for the respective discipline within the limit of admissions mentioned in Article 2(1) of this Resolution.

Article 5

1. Admission to *the School* is executed by enrolment of the PhD students by the Director of *the School*.
2. Refusal of admission to *the School* is based on an administrative decision issued by the Director of *the School*, based on the power of attorney granted by the Rector.
3. The candidate has the right to appeal from the administrative decision on the refusal of admission and request its reconsideration.

Article 6

1. An additional recruitment is held in order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship mentioned in *the Act*, planned for a period of minimum of 36 months, and in order to execute programmes announced by the Minister of Science and Higher Education.
2. Additional recruitment may exceed the limit of admissions specified in Article 2(1) of this Resolution.
3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of *the School* in coordination with the head of the research project.
4. The head of the research project or his/her appointed representative participates in the additional recruitment proceedings in an advisory role.

Article 7

1. Candidates to *the School*, who will submit a medical certificate stating the degree of disability, will be recruited following regulations specified in this Resolution, subject to the provisions of Article 7.2 below.
2. Conditions of the English language examination and the interview conducted in the recruitment procedure to *the School* will be adapted to the needs of candidates with disabilities following evaluation of their respective applications submitted to the Recruitment Committee together with their documents specified in Article 4(3) of this Resolution.

Article 8

To ensure proper execution of the recruitment procedure to *the School* candidates are required to present necessary personal data, which will be processed and stored for the purpose of this

recruitment and education at *the School*, following binding regulations on the protection of personal data.

Article 9

The Resolution enters into force upon its adoption and the Rector is appointed to supervise its execution.

R e c t o r

/-/ prof. dr hab. Krzysztof Szoszkiewicz

Resolution no. 137/2023
of the Senate of the Poznań University of Life Sciences
of 25 January 2023

concerning: rules for recruitment to the Doctoral School, the Poznań University of Life Sciences

Based on Article 200 paragraph 2 of the Act of 20 July 2018 - *the Act on Higher Education and Science* (the Journal of Laws Dziennik Ustaw of 2022, item 574 with later amendments), hereinafter referred to as *the Act*, and in relation to § 54.5 of the *Statute of the Poznań University of Life Sciences*, the Senate declares as follows:

Article 1

1. Candidates for admission to the Doctoral School of the Poznań University of Life Sciences, established based on Resolution no. 35/2019 of the Rector of the Poznań University of Life Sciences of 29 April 2019, hereinafter referred to as *the School*, need to be holders of a Master's degree [magister], a Master's degree following the Bachelor of Science (B.Sc.) degree [magister inżynier] or equivalent, or be a person specified in art. 186(2) of *the Act* confirmed by a respective diploma and meet the recruitment conditions specified in this Resolution.
2. Foreigners may enroll at *the School* when they have qualifications specified in Article 1(1) or a diploma or another document confirming their graduation from a university abroad, considered, in accordance with the regulations concerning validation of diplomas confirming the completion of higher education studies obtained abroad or on the basis of an international agreement, as equivalent to a respective Polish diploma confirming the completion of second-cycle (graduate) studies or long-term Master's degree studies.
3. Foreigners may enroll and be educated at *the School* based on stipulations of art. 323-327 of *the Act*.
4. Candidates for enrolment at *the School* may not be PhD students in another doctoral school.

Article 2

1. Recruitment for the 1st year of *the School* will be conducted annually within the disciplines and the limits of admissions specified by the Rector, as agreed with the respective Deans.
2. Limits of admissions in individual disciplines specified in paragraph 1 are dependent particularly on the available funding for research related to the planned doctoral dissertation of the PhD student and the PhD degree conferral procedure as well as a sufficient number of teaching hours as the required teaching load for the placement of the PhD student at the organisational unit, in which the PhD dissertation will be prepared within the selected discipline.
3. Limits of admissions and a detailed calendar (*Notice of recruitment*) are annually announced by the Director of *the School* on the University website under the tab "Doctoral School" by the end of March in the year, for which the recruitment is announced.

Article 3

1. The recruitment procedure to *the School* is executed by the Recruitment Committee, with the Director of the Doctoral School as its Chairman. In addition to the Director the recruitment committee for a given discipline includes a Chairman and two members of a Committee of the Discipline and a representative of the PULS Self-government of PhD Students participating in meetings of the recruitment committee in an advisory role. The

recruitment committee members are listed on the Poznań University of Life Sciences website under the tab “Doctoral School”.

2. The recruitment committee conducts the recruitment procedure following the schedule given below:

1.	Submission of documents by candidates	June or July
2.	Verification of documents and admission of candidates to the recruitment procedure	July
3.	Oral English examination and admission of candidates to the further recruitment procedure	July
4.	An interview in Polish or English together with the score point assessment	July
5.	Announcement of recruitment results in the form of a ranking list, indicating candidates enrolled to the 1st year, on the website of the Poznan University of Life Sciences under the tab "Doctoral School"	by the end of July

3. The Rector may decide on additional recruitment at the request of the Director of *the School*. The recruitment procedure needs to be completed by 30 September of the academic year, for which the recruitment was announced.

Article 4

1. Recruitment to the *School* is based on a competition, which results are public.
2. Recruitment to *the School* takes place in two stages:
   1) an oral English examination,
   2) an interview.

   The English examination in the recruitment process is conducted by a language instructor appointed by the Director of the School. There will be assessed: content of the message, language correctness, language richness, pronunciation and intonation. Failure to pass the language examination excludes the candidate from further recruitment process.
3. The score is awarded on the basis of:
   1) presented documents,
   2) an interview.
4. Candidates to *the School* submit the following documents at the place, time and in the manner specified in the *Notice of recruitment*:
   1) an application for admission to *the School* together with the personal data form,
   2) a CV,
   3) 2 photographs,
   4) a copy of a university graduation diploma together with the diploma supplement or a document specified in Article 1(2) of this Resolution; in the case of individuals

specified in Article 186(2) of *the Act* it is a copy of a university graduation diploma for first-cycle studies,

5) an opinion of their Master's thesis dissertation supervisor (if the studies were completed based on a Master's thesis) or an opinion of the scientific supervisor in the case of individuals specified in Article 186(2) of *the Act*,
6) a medical certificate, stating a lack of objections to undertake studies at *the Scho*ol within a given discipline,
7) a description and documentation of scientific activity – maximum 3 accomplishments indicated by the candidate or a certificate of work experience,
8) a description of the research concept and plans, which will be realised within the prospective PhD dissertation (max. 6000 characters),
9) an application for the appointment of a scientific supervisor or supervisors, or a scientific supervisor and an auxiliary supervisor,
10) a declaration by the candidate supervisor, confirmed by the head of the respective unit, on allocation of funds for the execution of the PhD research.

5. Only candidates who have submitted on time all the documents specified in the *Notice of recruitment* will be admitted to participate in the recruitment procedure.
6. Admissions to *the School* are based on the score of points (ranking) of candidates, constituting the sum of the following scores:
   1) the candidate's accomplishments in studies – max. 20 points,
   2) documented scientific activity or certified work experience in case of candidates for the "implementation doctorate" programme – max. 30 points,
   3) an interview – max. 50 points, of which max. 30 points for the evaluated concept of the PhD research and max. 20 points in the evaluation of the candidate's general knowledge in a given discipline,
7. Accomplishments in studies are evaluated based on the second-cycle or long-term Master's studies graduation diploma supplement, or a document specified in Article 1(2) of this Resolution. In the case of individuals specified in Article 186(2) of *the Act* accomplishments in studies are evaluated based on the first-cycle study graduation diploma supplement.
8. Scientific activity of the candidate is evaluated by the recruitment commettee of a given discipline based on documented activity in scientific associations and clubs, authorship of scientific papers and communications, taken courses, internships, scientific stays and placements as well as other accomplishments or based on a certified work experience.
9. The interview concerns particularly the concept for the PhD research and the represented discipline. It may be held at *the School* premises or be conducted using electronic communicators facilitating video image and sound transmission.
10. Upon the completion of the recruitment procedure a ranking list of candidates will be prepared based on the number of points received in the recruitment procedure. Candidates may be enrolled at *the School* if they have received min. 60% total number of points, which may be given in the score procedure specified in Article 4(6). Admission to *the School* depends on the position of the candidate on the ranking list for the respective discipline within the limit of admissions mentioned in Article 2(1) of this Resolution.

Article 5

1. Admission to *the School* is executed by enrolment of the PhD students by the Director of *the School*. The candidate receives a PhD student status at the moment of taking the oath.
2. Refusal of admission to *the School* is based on an administrative decision issued by the Director of *the School*, based on the power of attorney granted by the Rector.
3. The candidate has the right to appeal from the administrative decision on the refusal of admission and request its reconsideration.

Article 6

1. An additional recruitment is held in order to realise a research project, within which funds have been allocated towards payment of a PhD scholarship mentioned in *the Act*, planned for a period of minimum of 36 months, and in order to execute programmes announced by the Minister of Science and Higher Education.
2. Additional recruitment may exceed the limit of admissions specified in Article 2(1) of this Resolution.
3. Additional recruitment may be held at any time during a given academic year and its date is specified by the Director of *the School* in coordination with the head of the research project.
4. The head of the research project or his/her appointed representative can participate in the additional recruitment proceedings in an advisory role.

Article 7

1. Candidates to *the School*, who will submit a medical certificate stating the degree of disability, will be recruited following regulations specified in this Resolution, subject to the provisions of Article 7.2 below.
2. Conditions of the English language examination and the interview conducted in the recruitment procedure to *the School* will be adapted to the needs of candidates with disabilities following evaluation of their respective applications submitted to the Recruitment Committee together with their documents specified in Article 4(3) of this Resolution.

Article 8

To ensure proper execution of the recruitment procedure to *the School* candidates are required to present necessary personal data, which will be processed and stored for the purpose of this recruitment and education at *the School*, following binding regulations on the protection of personal data.

Article 9

The Resolution enters into force upon its adoption and the Rector is appointed to supervise its execution.

R e c t o r

/-/ prof. dr hab. Krzysztof Szoszkiewicz

RECRUITMENT COMMITTEES FOR THE PULS DOCTORAL SCHOOL

Recruitment for the academic year 2019/2020

The Recruitment Committee appointed by the Rector, composed of heads of the Doctoral Study Programme with many years of experience in recruiting PhD candidates from individual faculties:

- prof. dr hab. Janusz Olejnik (Director of the School) – chair
- dr hab. Monika Jakubus – Faculty of Agriculture and Bioengineering
- prof. UPP dr hab. Roman Jaszczak – Faculty of Forestry
- prof. dr hab. Maciej Szydłowski – Faculty of Veterinary Medicine and Animal Science
- prof. dr hab. Waldemar Moliński – Faculty of Wood Technology
- prof. dr hab. Włodzimierz Breś – Faculty of Horticulture and Landscape Architecture
- prof. dr hab. Małgorzata Nogala-Kałucka – Faculty of Food Science and Nutrition
- dr hab. Jolanta Kanclerz – Faculty of Environmental Engineering and Spatial Management
- prof. dr hab. Feliks Wysocki – Faculty of Economics and Social Sciences
- mgr Joanna Cybulska – secretary

Recruitment for the academic year 2020/2021

According to the new recruitment rules, the recruitment procedure is conducted by the School Council (Chairs of Discipline Committees, specialists in specific disciplines) with an advisory vote from a representative of the PULS Self-Government of PhD Students:

- prof. dr hab. Janusz Olejnik (Director of the School) – chair
- prof. dr hab. Izabela Szczerbal, Discipline Committee: Biological Sciences
- prof. dr hab. Włodzimierz Breś, Discipline Committee: Agriculture and Horticulture
- prof. UPP dr hab. Witold Grzywiński, Discipline Committee: Forestry Sciences
- prof. dr hab. Dorota Cieślak, Discipline Committee: Animal Science and Fisheries
- prof. UPP dr hab. Magdalena Zielińska-Dawidziak, Discipline Committee: Food Technology and Nutrition
- prof. dr hab. Piotr Boniecki, Discipline Committee: Mechanical Engineering
- prof. dr hab. Agnieszka Ławniczak-Malińska, Discipline Committee: Environmental Engineering, Mining and Energy
- prof. UPP dr hab. Karolina Pawlak, Discipline Committee: Economics and Finance
- mgr Joanna Cybulska – secretary

Recruitment for the academic years 2021/2022 and 2022/2023

The recruitment procedure is conducted by the School Council (Chairs of Discipline Committees, specialists in relevant disciplines) with an advisory vote from the PULS Self-Government of PhD Students:

- prof. dr hab. Janusz Olejnik (Director of the School) – chair
- prof. dr hab. Izabela Szczerbal, Discipline Committee: Biological Sciences
- prof. UPP dr hab. Janetta Niemann, Discipline Committee: Agriculture and Horticulture
- prof. UPP dr hab. Witold Grzywiński, Discipline Committee: Forestry Sciences
- prof. dr hab. Dorota Cieślak, Discipline Committee: Animal Science and Fisheries
- prof. UPP dr hab. Magdalena Zielińska-Dawidziak, Discipline Committee: Food Technology and Nutrition
- prof. UPP dr hab. Maciej Zaborowicz, Discipline Committee: Mechanical Engineering

- prof. dr hab. Agnieszka Ławniczak-Malińska, Discipline Committee: Environmental Engineering, Mining and Energy
- prof. UPP dr hab. Karolina Pawlak, Discipline Committee: Economics and Finance
- mgr Joanna Cybulska – secretary

Recruitment for the academic year 2023/2024

According to the recruitment rules, the procedure is conducted by a recruitment committee chaired by the Director of the School. For each discipline, the committee consists of: the Director of the School, the Chair of the relevant Discipline Committee, two members of that Committee (specialists), and an advisory representative of the PULS Self-Government of PhD Students.

July 2023 recruitment

prof. dr hab. Janusz Olejnik (Director of the School) – chair
mgr Joanna Cybulska – secretary

Environmental Engineering, Mining Engineering and Power Engineering

prof. dr hab. Agnieszka Ławniczak-Malińska
prof. UPP dr hab. Jolanta Kanclerz
dr hab. inż. Tomasz Dysarz

Economics and Finance

prof. UPP dr hab. Karolina Pawlak (prof. dr hab. Walenty Poczta)
prof. UPP dr hab. Rafał Baum
prof. UPP dr hab. Arkadiusz Sadowski

Animal Science and Aquaculture

prof. dr hab. Dorota Cieślak
prof. UPP dr hab. Jan Mazurkiewicz
dr hab. Zofia Madeja

Agriculture and Horticulture

prof. dr hab. Katarzyna Panasiewicz
prof. UPP dr hab. Danuta Kurasiak-Popowska
prof. UPP dr hab. Włodzimierz Krzesiński

Biological Sciences

prof. dr hab. Izabela Szczerbal
prof. dr hab. Piotr Tryjanowski
prof. dr hab. Iwona Morkunas

Veterinary Medicine

prof. UPP dr hab. Agnieszka Pękala-Safińska
prof. UPP dr hab. Lidia Radko
dr n. wet. Arkadiusz Dors

Forestry Sciences

prof. dr hab. Witold Grzywiński
prof. dr hab. Paweł Rutkowski
prof. UPP dr hab. Jerzy Majka

Food Technology and Nutrition

prof. UPP dr hab. Magdalena Zielińska-Dawidziak
prof. UPP dr hab. Hanna Baranowska
prof. UPP dr hab. Wojciech Białas

<u>September 2023 recruitment</u>

prof. dr hab. Janusz Olejnik (Director of the School) – chair
mgr Joanna Cybulska – secretary

Environmental Engineering, Mining Engineering and Power Engineering

prof. dr hab. Agnieszka Ławniczak-Malińska
prof. dr hab. Radosław Juszczak
dr hab. inż. Tomasz Dysarz

Economics and Finance

prof. UPP dr hab. Karolina Pawlak
prof. UPP dr hab. Rafał Baum
prof. UPP dr hab. Arkadiusz Sadowski

Animal Science and Aquaculture

prof. dr hab. Dorota Cieślak
prof. UPP dr hab. Jan Mazurkiewicz
dr hab. Zofia Madeja

Agriculture and Horticulture

prof. dr hab. Katarzyna Panasiewicz
prof. UPP dr hab. Agnieszka Wolna-Maruwka
prof. UPP dr hab. Jarosław Potarzycki

Biological Sciences

prof. dr hab. Izabela Szczerbal
prof. UPP dr hab. Ewelina Celińska
dr hab. Weronika Banaszak-Cibicka

Forestry Sciences

prof. dr hab. Witold Grzywiński
prof. dr hab. Paweł Rutkowski
prof. UPP dr hab. Jerzy Majka

Mechanical Engineering

prof. dr hab. Jacek Przybył
prof. UPP dr hab. Karol Durczak
prof. UPP dr hab. Mariusz Drygaś

Recruitment for the academic year 2024/2025

In accordance with the recruitment regulations, the admission procedure to the School is carried out by an admission committee chaired by the Director of the School. For each discipline, the admission committee includes, in addition to the Director, the Chair and two members of the Discipline Committee (specialists in the respective disciplines), as well as a representative of the PULS Self-Government of PhD Students with an advisory vote.

July 2024 recruitment:

prof. dr hab. Janusz Olejnik (Director of the School) – Chair
mgr Joanna Cybulska (Secretary)

BIOTECHNOLOGY:
Prof. dr hab. Daria Szymanowska
Prof. UPP dr hab. Roman Marecik
Dr inż. Joanna Suszyńska-Zajczyk

ECONOMICS AND FINANCE:
Prof. UPP dr hab. Karolina Pawlak
Prof. dr hab. Władysława Łuczka
Prof. UPP dr hab. Arkadiusz Sadowski (Prof. dr hab. Ewa Kiryluk-Dryjska)

MECHANICAL ENGINEERING:
Prof. dr hab. Agnieszka Sujak
Prof. dr hab. inż. Maciej Zaborowicz
Prof. dr hab. inż. Gniewko Niedbała

ENVIRONMETAL ENGINEERING, MINING ENGINEERING AND POWER ENGINEERING:
Dr hab. inż. Tomasz Dysarz
Prof. dr hab. inż. Radosław Juszczak
Prof. UPP dr hab. inż. Ryszard Staniszewski

BIOLOGICAL SCIENCES:
Prof. dr hab. Izabela Szczerbal
Prof. dr hab. Iwona Morkunas
Dr hab. Weronika Banaszak-Cibicka

FORESTRY SCIENCES:
Prof. dr hab. Paweł Rutkowski
Dr hab. inż. Dorota Dukarska
Prof. UPP dr hab. inż. Jerzy Majka

AGRICULTURE AND HORTICULTURE:
Prof. dr hab. Katarzyna Panasiewicz (Prof. UPP dr hab. Beata Borowiak)
Prof. UPP dr hab. Agnieszka Wolna-Maruwka
Prof. UPP dr hab. Maciej Bosiacki

FOOD TECHNOLOGY AND NUTRITION:
Prof. UPP dr hab. Magdalena Zielińska-Dawidziak
Dr hab. Elżbieta Radziejewska-Kubzdela
Prof. UPP dr hab. Wojciech Białas

ANIMAL SCIENCE AND AQUACULTURE:
Prof. UPP dr hab. Jan Mazurkiewicz (Dr hab. inż. Zofia Madeja)
Prof. dr hab. Włodzimierz Nowak
Dr hab. Oskar Wasielewski

<u>September 2024 recruitment:</u>

prof. dr hab. Janusz Olejnik (Director of the School) – Chair
mgr Joanna Cybulska (Secretary)

ENVIRONMETAL ENGINEERING, MINING ENGINEERING AND POWER ENGINEERING:
Prof. UPP dr hab. Ireneusz Laks
Prof. UPP dr hab. inż. Ryszard Staniszewski
Prof. UPP dr hab. Mariusz Spychała

BIOLOGICAL SCIENCES:
Prof. dr hab. Izabela Szczerbal
Prof. dr hab. Iwona Morkunas
Dr hab. Łukasz Myczko

FOOD TECHNOLOGY AND NUTRITION:
Prof. UPP dr hab. Magdalena Zielińska-Dawidziak
Prof. dr hab. Hanna Baranowska
Prof. UPP dr hab. Artur Szwengiel

Recruitment for the academic year 2025/2026

As per the recruitment regulations, the admission procedure is conducted by an admission committee chaired by the Director of the School. For each discipline, the committee consists of the Director, the Chair and two members of the Discipline Committee (specialists in the respective disciplines), together with a representative of the PULS Self-Government of PhD Students with an advisory vote.

July 2025 recruitment:

prof. dr hab. Janusz Olejnik (Director of the School) – Chair
mgr Joanna Cybulska (Secretary)

BIOTECHNOLOGY:
Prof. dr hab. Daria Szymanowska
Prof. UPP dr inż. Roman Marecik
Dr inż. Agnieszka Drożdżyńska

ECONOMICS AND FINANCE:
Prof. dr hab. Karolina Pawlak (Prof. UPP dr hab. Rafał Baum)
Prof. dr hab. Ewa Kiryluk-Dryjska
Prof. UPP dr hab. Arkadiusz Sadowski

MECHANICAL ENGINEERING:
prof. dr hab. Agnieszka Sujak
prof. UPP dr hab. inż. Mariusz Drygaś
prof. UPP dr hab. inż. Karol Durczak

ENVIRONMENTAL ENGINEERING, MINING ENGINEERING AND POWER ENGINEERING:
prof. dr hab. inż. Radosław Juszczak
prof. UPP dr hab. inż. Tomasz Dysarz
prof. UPP dr hab. inż. Ireneusz Laks

BIOLOGICAL SCIENCES:
prof. dr hab. Joanna Śliwowska
prof. dr hab. Iwona Morkunas
prof. dr hab. Izabela Szczerbal

FORESTRY SCIENCES:
prof. UPP dr hab. Monika Gąsecka
prof. UPP dr hab. Beata Doczekalska
prof. UPP dr hab. Wojciech Kowalkowski

AGRICULTURE AND HORTICULTURE:
prof. dr hab. Katarzyna Panasiewicz (prof. UPP dr hab. Beata Borowiak)
prof. dr hab. Agnieszka Wolna-Maruwka
prof. UPP dr hab. Danuta Kurasiak-Popowska

FOOD TECHNOLOGY AND NUTRITION:
prof. dr hab. Jolanta Tomaszewska-Gras
prof. UPP dr hab. Grażyna Neunert
prof. UPP dr hab. Magdalena Zielińska-Dawidziak

ANIMAL SCIENCE AND AQUACULTURE:
prof. dr hab. Dorota Cieślak
dr hab. Małgorzata Kasprowicz-Potocka, prof. UPP
dr Mateusz Rawski

<u>September 2025 recruitment:</u>

prof. dr hab. Janusz Olejnik (Director of the School) – Chair
mgr Joanna Cybulska (Secretary)

BIOTECHNOLOGY:
prof. dr hab. Daria Szymanowska
prof. UPP dr hab. Roman Marecik
dr inż. Agnieszka Drożdżyńska

MECHANICAL ENGINEERING:
prof. UPP dr hab. inż. Mariusz Drygaś
prof. UPP dr hab. inż. Karol Durczak
prof. dr hab. Agnieszka Sujak

BIOLOGICAL SCIENCES:
prof. dr hab. Joanna Śliwowska
prof. dr hab. Iwona Morkunas
prof. dr hab. Izabela Szczerbal

FORESTRY SCIENCES:
prof. dr hab. Tomasz Rogoziński
prof. UPP dr hab. Beata Doczekalska
dr hab. Tomasz Krystofiak

FOOD TECHNOLOGY AND NUTRITION:
prof. dr hab. Jolanta Tomaszewska-Gras
prof. UPP dr hab. Magdalena Zielińska-Dawidziak
prof. UPP dr hab. Grażyna Neunert

ANIMAL SCIENCE AND AQUACULTURE:
prof. UPP dr hab. Małgorzata Kasprowicz-Potocka
dr hab. Oskar Wasielewski
dr Mateusz Rawski

Regulations of mid-term evaluation in the Poznań University of Life Sciences Doctoral School

I. General provisions

1. Realisation of the individual research plan prepared by the Ph.D. student is subject to a mid-term evaluation in the middle of the education period specified in the education programme – at the Poznań University of Life Sciences the deadline is by the end of September in the 4th semester.
2. The mid-term evaluation is performed by a committee composed of 3 members, of which minimum 1 member is a holder of the post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared, and who is employed outside the Poznań University of Life Sciences.
3. The members of the mid-term evaluation committee, including the chairman, are selected by the respective Committee of the Scientific Discipline from among the candidates proposed by the Scientific Council of the respective discipline. Upon consultation with the mid-term evaluation committee members the chairman of the Committee of the respective discipline specifies the date of the mid-term evaluation. The chairman notifies PhD students and the dissertation supervisor(s) of the above-mentioned date not later than 60 days before the mid-term evaluation.
4. A separate committee is appointed for each discipline, whereas within a single discipline the number of appointed committees may equal the number of Ph.D. students educated within that discipline and subjected to the mid-term evaluation. The committee members employed outside the Poznań University of Life Sciences are entitled to remuneration amounting to 20% remuneration of a Professor.
5. Not later than 30 days before the specified date of the mid-term evaluation Ph.D. students submit to the respective Committee of the respective discipline reports from the realisation of their individual research plans (Attachment 1) authorised by their scientific supervisor or supervisors, with the reports including information concerning:
    1) the degree of progress in the execution of the research tasks comprising their Ph.D. dissertations;
    2) compliance with the schedule presented in their individual research plans;

3) additional activities and accomplishments, including the realisation of the education programme and internships/placements.

6. Ph.D. students present the contents of the report in person in the form of a self-presentation (e.g. Power Point) before the Committee of their Discipline.
7. Immediately after the completion of their presentation the Ph.D. students submit their reports to the Committee of their Discipline, which promptly hands over the reports to the chairman of the respective committee conducting the mid-term evaluation.

II. Principles of proceedings of the Committee for the mid-term evaluation

1. The Committee for the mid-term evaluation interviews Ph.D. students, as well as their scientific supervisor or supervisors concerning the submitted report.
   Representatives of the Self-government of PhD students participate in the meetings of this Committee in an advisory capacity.
2. This interview proceeds as follows:
   1) a 15-minute self-presentation (e.g. Power Point), during which the Ph.D. students discuss their reports and explain potential alternations and modifications in their individual research plans;
   2) questions asked by the committee members to the Ph.D. students concerning their reports and future actions aiming at completion and submission of the Ph.D. dissertation;
   3) questions asked by the committee members to the scientific supervisor or scientific supervisors concerning their scientific supervision and the progress in the realisation of the Ph.D. dissertation;
   4) a discussion between the mid-term evaluation committee and individual Ph.D. students and their scientific supervisor or scientific supervisors.
3. The Committee by a majority vote makes a decision on the result of the mid-term evaluation (positive or negative). Upon the completion of the vote the committee informs verbally the Ph.D. student and the scientific supervisor or scientific supervisors on the evaluation result.
4. The Committee prepares the minutes from the proceedings of the mid-term evaluation (Attachment 2), which are signed by all the committee members. An attachment to the

minutes is the mid-term evaluation card (Attachment 3). A score of min. 65 points out of the total of 100 points needs to be obtained for a positive result of the mid-term evaluation. Minutes from the mid-term evaluation proceedings together with the evaluation card are promptly handed over to the School Director. The minutes from the proceedings of the mid-term evaluation are open and the Ph.D. students as well as their scientific supervisor or scientific supervisors may read them at the School office.

III. The schedule of the mid-term evaluation (see Attachment 4)

1. Not later than by the end of May the School Director presents the Council of the respective Discipline with a list of Ph.D. students subjected to the mid-term evaluation along with a request to propose min. 6 candidates for the committee for the mid-term evaluation, including min. 2 persons not being PULS employees. Individual research plans of the Ph.D. students are attached to this list.
2. Not later than by the middle of June the Scientific Council of the Discipline presents the chairman of the Committee of the respective Discipline with a list of candidate members of the committee for the mid-term evaluation.
3. Within 14 days from the receipt of this list of candidates proposed by the Scientific Council of the Discipline the Committee of the Discipline selects members of the committee for the mid-term evaluation and its chairman and informs the School Director; the committee is appointed by the Rector.
4. Not later than 60 days before the mid-term evaluation the chairman of the Committee of the respective Discipline informs the Ph.D. students and their scientific supervisor or scientific supervisors on the venue and date of the mid-term evaluation, at the same time informing the Ph.D. students on the date and venue for the presentation of their self-presentation and the submission of their report.
5. After the self-presentation has been presented and the report has been submitted to the Committee of the respective Discipline its chairman hands over this report to the chairman of the committee for the mid-term evaluation, which proceeds according to the previously specified schedule.
6. Upon completion of the proceedings of the committee for the mid-term evaluation its chairman hands over to the School Director minutes from the mid-term evaluation

proceedings, with the attached mid-term evaluation opinion together with its justification.

7. Under exceptional circumstances and in the case of chance events (suspension of the Ph.D. student, maternity leave, pandemic, etc.) the School Director may propose a modification of the schedule for individual stages of the mid-term evaluation, provided that the date of the mid-term evaluation is accepted both by the chairman of the committee for the mid-term evaluation and the Ph.D. student, as well as the scientific supervisor or scientific supervisors.
8. The School Director informs in writing the Ph.D. student and the scientific supervisor or scientific supervisors on the result of the mid-term evaluation not later than 7 days from the receipt of the evaluation card.
9. Ph.D. students may appeal against the negative result of the mid-term evaluation to the School Council within 14 days of the date when the results of this evaluation were made public.
10. In the case of a negative evaluation result the Ph.D. student is discontinued by the administrative decision issued by the School Director based on the power of attorney granted by the Rector.
11. In the case of a positive mid-term evaluation result the Ph.D. student continues education and the scholarship amount is increased as specified in the Act.

Attachment 1 Poznań, …….

PH.D. STUDENT'S REPORT
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES
DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	
ESTIMATED BY THE PH.D. STUDENT: PROGRESS IN THE REALISATION OF THE PH.D. DISSERTATION (EXPRESSED IN PERCENT) EXPECTED DATE OF THE SUBMISSION OF PH.D. DISSERTATION	
ATTACHMENT TO THE REPORT:	**Accepted and signed Individual Research Plan**
NUMBER OF OTHER ATTACHMENTS:	

1. DESCRIPTION OF PROGRESS IN THE REALISATION OF THE INDIVIDUAL RESEARCH PLAN (IRP), INCLUDING:

- a comparison of assumed tasks with IRP, including already executed elements of the plan;
- a description of tasks not realised to date or tasks realised only in part in relation to IRP;
- a description of reasons for the incomplete execution of tasks assumed in IRP;
- a description of a manner to eliminate the backlog resulting from the comparison of IRP with completed tasks;
- a description of the effect of deviations from IRP on the realisation of Ph.D. research and the date of submission of the Ph.D. dissertation;
- a description of cooperation with the scientific supervisor or scientific supervisors and, if applicable, with the auxiliary supervisor;
- other information having an effect on the mid-term evaluation at this point (**max. 3 pages of text**, font size 12, line spacing 1.5)

2. DESCRIPTION OF SCIENTIFIC DEVELOPMENT AND ACCOMPLISHMENTS OF THE PH.D. STUDENT DURING EDUCATION AT THE DOCTORAL SCHOOL, INCLUDING:

- a list of publications;
- participation in conferences;
- granted projects/received research grants;
- scientific internships/stays in Poland and abroad;
- other information influencing the evaluation of the scientific development and accomplishments of the Ph.D. student (**max. 2 pages of text**, font size 12, line spacing 1.5, attachments: first pages of papers, copies of confirmations of participation in conferences, projects and internships/scientific stays, etc.)

3. DESCRIPTION OF REALISATION OF THE EDUCATION PROGRAMME AT THE DOCTORAL SCHOOL, INCLUDING:

- results of examinations or general course credits;
- results of examinations or course credits within the discipline;
- the degree of realisation of internships/placements (number of hours).

(**max. 1 page of text**, font size 12, line spacing 1.5, attachments: the education progress record at the PULS Doctoral School and confirmation of the internships/placements by the unit head)

4. SELF-PRESENTATION (e.g. POWER POINT), INCLUDING:
   - the tile of the Ph.D. dissertation, discipline, scientific supervisor(s), auxiliary supervisor (if applicable);
   - research problem;
   - applied research methods and manner of their realisation;
   - results of research conducted to date;
   - **Individual Research Plan and progress in its realisation**;
   - problems with the realisation of IRP and how to solve them;
   - scientific accomplishments of the Ph.D. student;
   - other activities during the period of education at the Doctoral School;
   - concluding remarks.

   (**max. 15 minutes**, the language of the presentation selected by the Ph.D. student)

5. OPINION OF THE SCIENTIFIC SUPERVISOR OR SUPERVISORS:

I approve the report ☐ I do not approve the report ☐

- Scientific work of the Ph.D. student, including progress and manner of IRP realisation:

……

……

……

……

……

……

- Teaching work of the Ph.D. student:

……

……

……

……

……

……

PH.D. STUDENT | Scientific supervisor(s)

……. | ……

(signature) | (signature)

Date of submission and signature of the Chairman of the Committee of the Discipline:

…… | ……

(date) | (signature)

Date of submission and signature of the Chairman of the Committee for mid-term evaluation:

…… | ……

(date) | (signature)

Attachment 2 Poznań, …….

Minutes from the meeting of the Committee for the mid-term evaluation
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

The mid-term evaluation of Mr./Ms.
……

was conducted on …… at the Poznań University of Life Sciences Doctoral School by the Committee for the mid-term evaluation

composed of:

Committee Chairman (first name, surname, unit): …….

Member (first name, surname, unit): …….

Member (first name, surname, unit): ……..

Point score for individual elements of the mid-term evaluation

(THE point scores are means of point scores awarded by each of the committee members)

1. EVALUATION OF THE REALISATION, ADHERENCE TO SCHEDULE AND PROGRESSION OF THE INDIVIDUAL RESEARCH PLAN (IRP) **(MAX. 40 POINTS)**	
GRADE SYSTEM AND POINT SCORES	**SCORE**
40 – excellent realisation of IRP within the assumed schedule 35 – very good realisation of IRP within the assumed schedule with justified deviations from the schedule 30 – appropriate realisation of IRP within the assumed schedule, certain shortcomings have been found 25 – serious deviations from the IRP schedule, but the Ph.D. research may still be completed 20 – serious deviations and errors in the IRP realisation, but Ph.D. research might be completed after some modifications are made 10 – serious deviations and errors in the IRP realisation, limited chance of the Ph.D. research completion 0 – IRP has not been realised	
JUSTIFICATION FOR THE EVALUATION RESULT (description of progression in IRP realisation, specifying reasons for the lowering of the maximum point score and their effect on IRP realisation):	

2. EVALUATION OF SCIENTIFIC DEVELOPMENT AND ACCOMPLISHMENTS OF THE PH.D. STUDENT DURING EDUCATION AT THE DOCTORAL SCHOOL (MAX. 30 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. PUBLICATIONS BY PH.D. STUDENT (MAX. 10 POINTS)	
2. PARTICIPATION IN CONFERENCES (MAX. 5 POINTS)	
3. GRANTED PROJECTS/AWARDED SCIENTIFIC GRANTS (MAX. 5 POINTS)	
4. SCIENTIFIC STAYS RELATED TO PH.D. DISSERTATION (MAX. 5 POINTS)	
5. OTHER ACTIVITIES (organisational activity, activity for the development of science and teaching practice, patent claims, etc.) (MAX. 5 POINTS)	
JUSTIFICATION FOR THE EVALUATION RESULT	

3. EVALUATION OF REALISATION OF EDUCATION PROGRAMME DURING EDUCATION AT THE DOCTORAL SCHOOL (MAX. 10 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. EVALUATION OF EXAMINATIONS AND GENERAL COURSE CREDITS AT THE DOCTORAL SCHOOL AND COURSE CREDITS WITHIN THE DISCIPLINE (MAX. 5 POINTS)	
2. EVALUATION OF INTERNSHIPS/PLACEMENTS (MAX. 5 POINTS)	
JUSTIFICATION FOR THE EVALUATION RESULT	

4. EVALUATION OF THE REPORT, SELF-PRESENTATION AND DISCUSSION (MAX. 20 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. EVALUATION OF THE REPORT ON PROGRESSION IN PH.D. RESEARCH (MAX. 10 POINTS)	
2. EVALUATION OF SELF-PRESENTATION TOGETHER WITH DISCUSSION WITH THE PH.D. STUDENT (MAX. 10 POINTS)	
QUESTIONS ASKED AND JUSTIFICATION FOR THE EVALUATION RESULT	

TOTAL SCORE OF POINTS FROM INDIVIDUAL EVALUATIONS IN POINTS 1 TO 4, OUT OF THE MAXIMUM OF 100 POINTS:

……..

MINIMUM 65 POINTS ARE REQUIRED TO OBTAIN A POSITIVE RESULTS OF MID-TERM EVALUATION

THE EVALUATION RESULT TOGETHER WITH THE JUSTIFICATION FOR THE EVALUATION RESULT ARE GIVEN IN THE ATTACHED MID-TERM EVALUATION CARD

Committee Chairman: Committee Member: Committee Member:

……. ……. …….

(signature) (signature) (signature)

Attached: the mid-term evaluation card and the Ph.D. student's report

Date of submission and signature of the Director of the PULS Doctoral School:

…… ……

(date) (signature)

Attachment 3

Poznań, ……

MID-TERM EVALUATION CARD
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

MID-TERM EVALUATION RESULT (marked as appropriate)**:**

POSITIVE ☐ **NEGATIVE** ☐

JUSTIFICATION FOR THE EVALUATION RESULT:

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Committee Chairman:	Committee Member:	Committee Member:
…….	……	……
(signature)	(signature)	(signature)

Date of submission and signature of the Director of the PULS Doctoral School:

……	……
(date)	(signature)

attachment 4

Legend of colours denoting activities:
Doctoral School
Scientific Council of Discipline
Committee of Discipline
Committee for the mid-term evaluation

	Potential time frame		March	April	May	June	July	August	September
Motion by the School Director to the chairman of the Scientific Council of the Discipline to propose candidate members of the mid-term evaluation committee together with the list of Ph.D. students subjected to the mid-term evaluation	from beggining of March	to end of May							
Presentation of candidate members of the mid-term evaluation committee by the Scientific Council of the Discipline to the chairman of the Committee of the Discipline	form mid-March	to mid-June							
Selection of the mid-term evaluation committee members by the Committee of the Discipline and appointment of the committee and its chairman by the Rector	from beggining of April	to end of June							
Notification of the Ph.D. student and the scientific supervisor(s) by the chairman of the Committee of the Discipline on the date and venue for the presentation of the self-presentation and submission of the report and on the venue and date of mid-term evaluation	from mid-April	to mid-July							
Presentation of self-presentation by the Ph.D. student in front of the Committee of the Discipline and submission of the report	from mid-May	to end of July							
The Ph.D. student's report is handed over to the mid-term evaluation committee by the chairman of the Committee of the Discipline	from mid-May	to end of July							
Mid-term evaluation is conducted by the mid-term evaluation committee and the result is submitted to the School Director	from mid-June	to mid-September							
The Ph.D. student and scientific supervisor(s) are notified in writing on the result of mid-term evaluation and administrative decision on discontinuation of Ph.D. students is issued by the School Director	from mid-June	to end of September							
Potential appeals against negative mid-term evaluation result are examined by the School Council	from mid-June	to end of September							

RP-0211-68/2022

Ordinance No. 68/2022
of the Rector of the Poznań University of Life Sciences
of 12 May 2022

on the Principles of Conducting the Mid-term Evaluation at the PULS Doctoral School

Pursuant to Article 23(1) and (2)(2) of the Act of 20 July 2018 – Law on Higher Education and Science (consolidated text: Journal of Laws of 2022, item 574, with later amendments), and § 25(3) of the Statute of the Poznań University of Life Sciences, it is hereby ordered as follows:

§ 1

The Principles of Conducting the Mid-term Evaluation at the Doctoral School are hereby introduced at the Poznań University of Life Sciences, constituting an appendix and an integral part of this ordinance.

§ 2

This ordinance shall enter into force on the date of its signing.

Rector
/-/
Prof. dr. hab. Krzysztof Szoszkiewicz

Regulations of mid-term evaluation in the Poznań University of Life Sciences Doctoral School

§ 1 General regulations

1. The following regulations determine the manner of conducting the mid-term evaluation at the Poznań University of Life Sciences Doctoral School.
2. Realisation of the individual research plan prepared by the Ph.D. student is subject to a mid-term evaluation in the middle of the education period specified in the education programme – at the Poznań University of Life Sciences the deadline is by the end of September in the 4th semester.
3. Whenever these Regulations refer to:
    1) PULS – Poznań University of Life Sciences, hereinafter referred to as PULS,
    2) The Statute of the Poznań University of Life Sciences, hereinafter referred to as the Statute,
    3) Poznań University of Life Sciences Doctoral School, hereinafter referred to as the School,
    4) The Regulations of PULS Doctoral School, passed by the Senate of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as the Regulations,
    5) Scientific Council of Discipline, mentioned in § 37 of the Statute, hereinafter referred to as the Scientific Council, of the respective scientific discipline of the PhD student.
    6) The Committee of the Discipline – mentioned in § 6 of the Regulations, of the respective scientific discipline of the PhD student.
    7) The Director of PULS Doctoral School, mentioned in the Regulations, hereinafter referred to as the Director.
    8) The Mid-term evaluation Committee – appointed and acting according to the Regulations, especially § 13, hereinafter referred to as the Committee,
    9) The Doctoral School Council - hereinafter referred to as the the School Council, mentioned mentioned in § 6 of the Regulations.
4. The mid-term evaluation schedule in graphic form is attached as Appendix 4.

§ 2 The Committee

1. The mid-term evaluation is performed by a committee composed of 3 members, neither of whom can the PhD student’s scientific supervisor.

2. At least one member of the Committee must be employed outside the Poznań University of Life Sciences, having a post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared.

3. The committee members employed outside the Poznań University of Life Sciences are entitled to remuneration amounting to 20% remuneration of a Professor.
4. Not later than by the end of May the School Director presents the Council of the respective Discipline with a list of Ph.D. students subjected to the mid-term evaluation along with a request to propose min. 6 candidates for the committee for the mid-term evaluation, including min. 2 persons not being PULS employees. Individual research plans of the Ph.D. students are attached to this list.
5. A separate committee is appointed for each discipline. The Scientific Council of Discipline, if needed, may decide that there will be more than one Committee appointed within a single discipline.
6. Not later than by the middle of June the Scientific Council of the Discipline presents the chairman of the Committee of the respective Discipline with a list of candidate members of the committee for the mid-term evaluation. At least two members of the Committee must fulfill the criteria indicated in points 1 & 2. Being appointed for one Committee does not exclude from participation in another Committee.
7. Within 14 days from the receipt of this list of candidates proposed by the Scientific Council of the Discipline the Committee of the Discipline selects members of the committee for the mid-term evaluation and its chairman and informs the School Director.
8. The committee is appointed by the Rector.

§ 3 The presentation before the Committee of the Discipline

1. In agreement with the members of the Committee, the chairman of the Discipline Committee sets a date for the mid-term evaluation.
2. Not later than 60 days before the mid-term evaluation, not later than July 15th , the chairman of the Committee of the respective Discipline informs the Ph.D. students and

their scientific supervisor or scientific supervisors on the venue and date of the mid-term evaluation, at the same time informing the Ph.D. students on the date and venue for the presentation of their self-presentation and the submission of their report.

3. Under exceptional circumstances and in the case of chance events (suspension of the Ph.D. student, maternity leave, a state of natural disaster) the School Director may propose a modification of the schedule for individual stages of the mid-term evaluation, provided that the date of the mid-term evaluation is accepted both by the chairman of the committee for the mid-term evaluation and the Ph.D. student, as well as the scientific supervisor or scientific supervisors.
4. Not later than 30 days before the specified date of the mid-term evaluation, not later than the end of July, Ph.D. students submit to the respective Committee of the respective discipline reports from the realisation of their individual research plans (Attachment 1) authorised by their scientific supervisor or supervisors, with the reports including information concerning:
    1) the degree of progress in the execution of the research tasks comprising their Ph.D. dissertations;
    2) compliance with the schedule presented in their individual research plans;
    3) additional activities and accomplishments, including the realisation of the education programme and internships/placements.
5. Ph.D. students present the contents of the report in person in the form of a presentation (e.g. Power Point) before the Committee of their Discipline.
6. Immediately after the completion of their presentation the Ph.D. students submit their reports to the Committee of their Discipline, which promptly hands over the reports to the chairman of the respective committee conducting the mid-term evaluation, according to the previously set dates.

§ 4 Mid-term evaluation

1. The Committee for the mid-term evaluation interviews Ph.D. students, as well as their scientific supervisor or supervisors concerning the submitted report. Representatives of the Self-government of PhD students participate in the meetings of this Committee in an advisory capacity.

2. The interview with the PhD student is open.
3. This interview proceeds as follows:
    1) a 15-minute presentation (e.g. Power Point), during which the Ph.D. students discuss their reports and explain potential alternations and modifications in their individual research plans;
    2) questions asked by the committee members to the Ph.D. students concerning their reports and future actions aiming at completion and submission of the Ph.D. dissertation;
    3) questions asked by the committee members to the scientific supervisor or scientific supervisors concerning their scientific supervision and the progress in the realisation of the Ph.D. dissertation;
    4) a discussion between the mid-term evaluation committee and individual Ph.D. students and their scientific supervisor or scientific supervisors.
4. After the interview the Committee debates and by a majority vote makes a decision on the result of the mid-term evaluation (positive or negative). The debate and voting are classified.
5. Upon the completion of the vote the committee informs verbally the Ph.D. student and the scientific supervisor or scientific supervisors on the evaluation result, quoting the motive for the decision.
6. The Committee prepares the minutes from the proceedings of the mid-term evaluation (Attachment 2), which are signed by all the committee members. An attachment to the minutes is the mid-term evaluation card (Attachment 3).
7. A score of min. 65 points out of the total of 100 points needs to be obtained for a positive result of the mid-term evaluation.
8. Minutes from the mid-term evaluation proceedings together with the evaluation card are promptly handed over to the School Director. The minutes from the proceedings of the mid-term evaluation are open and the Ph.D. students as well as their scientific supervisor or scientific supervisors may read them at the School office.
9. The School Director informs in writing the Ph.D. student and the scientific supervisor or scientific supervisors on the result of the mid-term evaluation not later than 7 days from the receipt of the evaluation card.
10. Ph.D. students may appeal against the negative result of the mid-term evaluation to the School Council within 14 days of the date when the results of this evaluation were made public.

11. In the case of a negative evaluation result the Ph.D. student is discontinued by the administrative decision issued by the School Director based on the power of attorney granted by the Rector.
12. In the case of a positive mid-term evaluation result the Ph.D. student continues education and the scholarship amount is increased as specified in the Act of 20 July 2018 - the Act on Higher Education and Science.

Attachment 1 Poznań, …….

PH.D. STUDENT'S REPORT
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES
DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	
ESTIMATED BY THE PH.D. STUDENT: PROGRESS IN THE REALISATION OF THE PH.D. DISSERTATION (EXPRESSED IN PERCENT) EXPECTED DATE OF THE SUBMISSION OF PH.D. DISSERTATION	
ATTACHMENT TO THE REPORT:	**Accepted and signed Individual Research Plan**

NUMBER OF OTHER ATTACHMENTS:	

1. DESCRIPTION OF PROGRESS IN THE REALISATION OF THE INDIVIDUAL RESEARCH PLAN (IRP), INCLUDING:
   - a comparison of assumed tasks with IRP, including already executed elements of the plan;
   - a description of tasks not realised to date or tasks realised only in part in relation to IRP;
   - a description of reasons for the incomplete execution of tasks assumed in IRP;
   - a description of a manner to eliminate the backlog resulting from the comparison of IRP with completed tasks;
   - a description of the effect of deviations from IRP on the realisation of Ph.D. research and the date of submission of the Ph.D. dissertation;
   - a description of cooperation with the scientific supervisor or scientific supervisors and, if applicable, with the auxiliary supervisor;
   - other information having an effect on the mid-term evaluation at this point (**max. 3 pages of text**, font size 12, line spacing 1.5)

2. DESCRIPTION OF SCIENTIFIC DEVELOPMENT AND ACCOMPLISHMENTS OF THE PH.D. STUDENT DURING EDUCATION AT THE DOCTORAL SCHOOL, INCLUDING:
   - a list of publications;
   - participation in conferences;
   - granted projects/received research grants;
   - scientific internships/stays in Poland and abroad;
   - other information influencing the evaluation of the scientific development and accomplishments of the Ph.D. student (**max. 2 pages of text**, font size 12, line spacing 1.5, attachments: first pages of papers, copies of confirmations of participation in conferences, projects and internships/scientific stays, etc.)

3. DESCRIPTION OF REALISATION OF THE EDUCATION PROGRAMME AT THE DOCTORAL SCHOOL, INCLUDING:
   - results of examinations or general course credits;
   - results of examinations or course credits within the discipline;
   - the degree of realisation of internships/placements (number of hours).

(**max. 1 page of text**, font size 12, line spacing 1.5, attachments: the education progress record at the PULS Doctoral School and confirmation of the internships/placements by the unit head)

4. PRESENTATION (e.g. POWER POINT), INCLUDING:
   - the tile of the Ph.D. dissertation, discipline, scientific supervisor(s), auxiliary supervisor (if applicable);
   - research problem;
   - applied research methods and manner of their realisation;
   - results of research conducted to date;
   - **Individual Research Plan and progress in its realisation**;
   - problems with the realisation of IRP and how to solve them;
   - scientific accomplishments of the Ph.D. student;
   - other activities during the period of education at the Doctoral School;
   - concluding remarks.

   (**max. 15 minutes**, the language of the presentation selected by the Ph.D. student)

5. OPINION OF THE SCIENTIFIC SUPERVISOR OR SUPERVISORS:

I approve the report ☐ I do not approve the report ☐

- Scientific work of the Ph.D. student, including progress and manner of IRP realisation:

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- Teaching work of the Ph.D. student:

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PH.D. STUDENT

Scientific supervisor(s)

…….

(signature)

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(signature)

Date of submission and signature of the Chairman of the Committee of the Discipline:

……

(date)

……

(signature)

Date of submission and signature of the Chairman of the Committee for mid-term evaluation:

……

(date)

……

(signature)

Attachment 2 Poznań, …….

Minutes from the meeting of the Committee for the mid-term evaluation
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

The mid-term evaluation of Mr./Ms.
……

was conducted on …… at the Poznań University of Life Sciences Doctoral School by the Committee for the mid-term evaluation

composed of:

Committee Chairman (first name, surname, unit): …….

Member (first name, surname, unit): …….

Member (first name, surname, unit): ……..

Point score for individual elements of the mid-term evaluation

(THE point scores are means of point scores awarded by each of the committee members)

1. EVALUATION OF THE REALISATION, ADHERENCE TO SCHEDULE AND PROGRESSION OF THE INDIVIDUAL RESEARCH PLAN (IRP) **(MAX. 40 POINTS)**	
GRADE SYSTEM AND POINT SCORES	**SCORE**
40 – excellent realisation of IRP within the assumed schedule 35 – very good realisation of IRP within the assumed schedule with justified deviations from the schedule 30 – appropriate realisation of IRP within the assumed schedule, certain shortcomings have been found 25 – serious deviations from the IRP schedule, but the Ph.D. research may still be completed 20 – serious deviations and errors in the IRP realisation, but Ph.D. research might be completed after some modifications are made 10 – serious deviations and errors in the IRP realisation, limited chance of the Ph.D. research completion 0 – IRP has not been realised	
JUSTIFICATION FOR THE EVALUATION RESULT (description of progression in IRP realisation, specifying reasons for the lowering of the maximum point score and their effect on IRP realisation):	

2. EVALUATION OF SCIENTIFIC DEVELOPMENT AND ACCOMPLISHMENTS OF THE PH.D. STUDENT DURING EDUCATION AT THE DOCTORAL SCHOOL (MAX. 30 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. PUBLICATIONS BY PH.D. STUDENT (MAX. 10 POINTS)	
2. PARTICIPATION IN CONFERENCES (MAX. 5 POINTS)	
3. GRANTED PROJECTS/AWARDED SCIENTIFIC GRANTS (MAX. 5 POINTS)	
4. SCIENTIFIC STAYS RELATED TO PH.D. DISSERTATION (MAX. 5 POINTS)	
5. OTHER ACTIVITIES (organisational activity, activity for the development of science and teaching practice, patent claims, etc.) (MAX. 5 POINTS)	
JUSTIFICATION FOR THE EVALUATION RESULT	

3. EVALUATION OF REALISATION OF EDUCATION PROGRAMME DURING EDUCATION AT THE DOCTORAL SCHOOL (MAX. 10 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. EVALUATION OF EXAMINATIONS AND GENERAL COURSE CREDITS AT THE DOCTORAL SCHOOL AND COURSE CREDITS WITHIN THE DISCIPLINE (MAX. 5 POINTS)	
2. EVALUATION OF INTERNSHIPS/PLACEMENTS (MAX. 5 POINTS)	

JUSTIFICATION FOR THE EVALUATION RESULT	
4. EVALUATION OF THE REPORT, SELF-PRESENTATION AND DISCUSSION (MAX. 20 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. EVALUATION OF THE REPORT ON PROGRESSION IN PH.D. RESEARCH (MAX. 10 POINTS)	
2. EVALUATION OF SELF-PRESENTATION TOGETHER WITH DISCUSSION WITH THE PH.D. STUDENT (MAX. 10 POINTS)	
QUESTIONS ASKED AND JUSTIFICATION FOR THE EVALUATION RESULT	

TOTAL SCORE OF POINTS FROM INDIVIDUAL EVALUATIONS IN POINTS 1 TO 4, OUT OF THE MAXIMUM OF 100 POINTS:

……..

MINIMUM 65 POINTS ARE REQUIRED TO OBTAIN A POSITIVE RESULTS OF MID-TERM EVALUATION

THE EVALUATION RESULT TOGETHER WITH THE JUSTIFICATION FOR THE EVALUATION RESULT ARE GIVEN IN THE ATTACHED MID-TERM EVALUATION CARD

Committee Chairman: Committee Member: Committee Member:

……. …… …….

(signature) (signature) (signature)

Attached: the mid-term evaluation card and the Ph.D. student's report

Date of submission and signature of the Director of the PULS Doctoral School:

…… ……

(date) (signature)

Attachment 3

Poznań, ……

MID-TERM EVALUATION CARD
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

MID-TERM EVALUATION RESULT (marked as appropriate)**:**

POSITIVE ☐ **NEGATIVE** ☐

JUSTIFICATION FOR THE EVALUATION RESULT:

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Committee Chairman:	Committee Member:	Committee Member:
…….	……	……
(signature)	(signature)	(signature)

Date of submission and signature of the Director of the PULS Doctoral School:

……	……
(date)	(signature)

attachment 4

Legend of colours denoting activities:
Doctoral School
Scientific Council of Discipline
Committee of Discipline
Committee for the mid-term evaluation

	Potential time frame		March	April	May	June	July	August	September
Motion by the School Director to the chairman of the Scientific Council of the Discipline to propose candidate members of the mid-term evaluation committee together with the list of Ph.D. students subjected to the mid-term evaluation	from beggining of March	to end of May							
Presentation of candidate members of the mid-term evaluation committee by the Scientific Council of the Discipline to the chairman of the Committee of the Discipline	form mid-March	to mid-June							
Selection of the mid-term evaluation committee members by the Committee of the Discipline and appointment of the committee and its chairman by the Rector	from beggining of April	to end of June							
Notification of the Ph.D. student and the scientific supervisor(s) by the chairman of the Committee of the Discipline on the date and venue for the presentation of the self-presentation and submission of the report and on the venue and date of mid-term evaluation	from mid-April	to mid-July							
Presentation of self-presentation by the Ph.D. student in front of the Committee of the Discipline and submission of the report	from mid-May	to end of July							
The Ph.D. student's report is handed over to the mid-term evaluation committee by the chairman of the Committee of the Discipline	from mid-May	to end of July							
Mid-term evaluation is conducted by the mid-term evaluation committee and the result is submitted to the School Director	from mid-June	to mid-September							
The Ph.D. student and scientific supervisor(s) are notified in writing on the result of mid-term evaluation and administrative decision on discontinuation of Ph.D. students is issued by the School Director	from mid-June	to end of September							
Potential appeals against negative mid-term evaluation result are examined by the School Council	from mid-June	to end of September							

RKD.0141.1.2025

Ordinance No. 15/2025
of the Rector of the Poznań University of Life Sciences
of 25 February 2025

on the Principles of Conducting the Mid-term Evaluation at the PULS Doctoral School

Pursuant to Article 23(1) and (2)(2) of the Act of 20 July 2018 – Law on Higher Education and Science (consolidated text: Journal of Laws of 2024, item 1571, with later amendments), and § 25(3) of the Statute of the Poznań University of Life Sciences, it is hereby ordered as follows:

§1

The Principles of Conducting the Mid-term Evaluation at the Doctoral School are hereby introduced at the Poznań University of Life Sciences, constituting an appendix and an integral part of this ordinance.

§2

This ordinance shall enter into force on the date of its signing.

Rector
/-/
Prof. dr. hab. Krzysztof Szoszkiewicz

Regulations of mid-term evaluation in the Poznań University of Life Sciences Doctoral School

§ 1 General regulations

1. The following regulations determine the manner of conducting the mid-term evaluation at the Poznań University of Life Sciences Doctoral School.
2. Realisation of the individual research plan prepared by the Ph.D. student is subject to a mid-term evaluation in the middle of the education period specified in the education programme – at the Poznań University of Life Sciences the deadline is by the end of September in the 4th semester.
3. Whenever these Regulations refer to:
   1) PULS – Poznań University of Life Sciences, hereinafter referred to as PULS,
   2) The Statute of the Poznań University of Life Sciences, hereinafter referred to as the Statute;
   3) Poznań University of Life Sciences Doctoral School, hereinafter referred to as the School;
   4) The Regulations of PULS Doctoral School, passed by the Senate of the Poznań University of Life Sciences Doctoral School, hereinafter referred to as the Regulations;
   5) Scientific Council of Discipline, mentioned in § 37 of the Statute, hereinafter referred to as the Scientific Council, of the respective scientific discipline of the Ph.D. student;
   6) The Committee of Discipline – mentioned in § 6 of the Regulations, of the respective scientific discipline of the PhD student;
   7) The Director of PULS Doctoral School, mentioned in the Regulations, hereinafter referred to as the Director;
   8) The Mid-term evaluation Committee – appointed and acting according to the Regulations, especially § 13, hereinafter referred to as the Committee;
   9) The Doctoral School Council - hereinafter referred to as the School Council, mentioned in § 6 of the Regulations.
4. The mid-term evaluation schedule in graphic form is attached as Appendix 4.
5. The documents relating to the mid-term evaluation are prepared in the language in which the Ph.D. dissertation is being prepared.

§ 2 The Committee

1. The mid-term evaluation is performed by a committee composed of 3 members, neither of whom can the Ph.D. student's scientific supervisor.
2. At least one member of the Committee must be employed outside the Poznań University of Life Sciences, having a post-doctoral degree of [doktor habilitowany, comparable to DSc or Assistant Professor] or full professor in the discipline, in which the doctoral dissertation is being prepared.
3. The committee members employed outside the Poznań University of Life Sciences are entitled to remuneration amounting to 20% remuneration of a Professor.
4. Not later than by the end of May the School Director presents the Committee of the Discipline with a list of Ph.D. students subjected to the mid-term evaluation along with a request to propose candidates for the committee for the mid-term evaluation. Individual research plans of the Ph.D. students are attached to this list.
5. A separate Committee is appointed for each discipline. The Committee of Discipline, if needed, may decide that there will be more than one Committee appointed within a single discipline.

6. Not later than by the end of June the Committee of the Discipline and the Scientific Council of the Discipline propose candidate members of the committee for the mid-term evaluation and its chairman. Being appointed for one Committee does not exclude from participation in another Committee.
7. The committee is appointed by the Rector who informs the School Director, Deans and Chairmen of the Scientific Councils of the Disciplines about this fact.

§ 3 The presentation before the Committee of the Discipline

1. In agreement with the members of the Committee, the chairman of the Discipline Committee sets a date for the mid-term evaluation.
2. Not later than 60 days before the mid-term evaluation, not later than July 15th , the chairman of the Committee of the respective Discipline informs the Ph.D. students and their scientific supervisor or scientific supervisors on the venue and date of the mid-term evaluation, at the same time informing the Ph.D. students on the date and venue for the presentation of their self-presentation and the submission of their report.
3. Under exceptional circumstances and in the case of chance events (suspension of the Ph.D. student, maternity leave, a state of natural disaster) the School Director may propose a modification of the schedule for individual stages of the mid-term evaluation, provided that the date of the mid-term evaluation is accepted both by the chairman of the committee for the mid-term evaluation and the Ph.D. student, as well as the scientific supervisor or scientific supervisors.
4. Not later than 30 days before the specified date of the mid-term evaluation, not later than the end of July, Ph.D. students submit to the respective Committee of the respective discipline reports from the realisation of their individual research plans (Attachment 1) authorised by their scientific supervisor or supervisors.
5. Ph.D. students present the contents of the report in person in the form of a presentation (e.g. Power Point) before the Committee of their Discipline.
6. After the completion of their presentation the Ph.D. students submit their reports to the Committee of their Discipline, which promptly hands over the reports to the chairman of the respective committee conducting the mid-term evaluation, according to the previously set dates.

§ 4 Mid-term evaluation

1. The Committee for the mid-term evaluation interviews Ph.D. students, as well as their scientific supervisor or supervisors concerning the submitted report. Representatives of the Self-government of Ph.D. students participate in the meetings of this Committee in an advisory capacity.
2. The interview with the Ph.D. student is open and takes place in the language in which the Ph.D. dissertation is being prepared.
3. This interview proceeds as follows:
   1) a 15-minute presentation (e.g. Power Point), during which the Ph.D. students discuss their reports and explain potential alternations and modifications in their individual research plans;
   2) questions asked by the committee members to the Ph.D. students concerning their reports and future actions aiming at completion and submission of the Ph.D. dissertation;
   3) questions asked by the committee members to the scientific supervisor or scientific supervisors concerning their scientific supervision and the progress in the realisation of the Ph.D. dissertation;
   4) a discussion between the mid-term evaluation committee and individual Ph.D. students and their scientific supervisor or scientific supervisors.

4. After the interview the Committee debates and by a majority vote makes a decision on the result of the mid-term evaluation (positive or negative). The debate and voting are classified.
5. Upon the completion of the vote the committee informs verbally the Ph.D. student and the scientific supervisor or scientific supervisors on the evaluation result, quoting the motive for the decision.
6. The Committee prepares the minutes from the proceedings of the mid-term evaluation (Attachment 2), which are signed by all the committee members. An attachment to the minutes is the mid-term evaluation card (Attachment 3).
7. A score of min. 60 points out of the total of 100 points needs to be obtained for a positive result of the mid-term evaluation.
8. Minutes from the mid-term evaluation proceedings together with the evaluation card are promptly handed over to the School Director. The minutes from the proceedings of the mid-term evaluation are open and the Ph.D. students as well as their scientific supervisor or scientific supervisors may read them at the School office.
9. The School Director informs in writing the Ph.D. student and the scientific supervisor or scientific supervisors on the result of the mid-term evaluation not later than 7 days from the receipt of the evaluation card.
10. Ph.D. students may appeal against the negative result of the mid-term evaluation to the School Council within 14 days of the date when the results of this evaluation were made available in writing. The appeal is submitted through the School Director.
11. In the case of a negative evaluation result the Ph.D. student is discontinued by the administrative decision issued by the School Director based on the power of attorney granted by the Rector.
12. In the case of a positive mid-term evaluation result the Ph.D. student continues education and the scholarship amount is increased as specified in the Act of 20 July 2018 - the Act on Higher Education and Science.
13. In the Ph.D. student’s activity report submitted after obtaining a positive mid-term evaluation, both the supervisor or supervisors and the Ph.D. student refer to any comments presented in the mid-term evaluation card.

Attachment 1 Poznań, ……..

PH.D. STUDENT'S REPORT
FOR THE PURPOSE OF MID-TERM EVALUATION
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES
DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF PH.D. STUDENT	
ALBUM NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	
ESTIMATED BY THE PH.D. STUDENT: PROGRESS IN THE REALISATION OF THE PH.D. DISSERTATION (EXPRESSED IN PERCENT) EXPECTED DATE OF THE SUBMISSION OF PH.D. DISSERTATION	
ATTACHMENT TO THE REPORT:	**Signed Individual Research Programme with the opinion of the Committee of Discipline**
NUMBER OF OTHER ATTACHMENTS:	

1. DESCRIPTION OF PROGRESS IN THE REALISATION OF THE INDIVIDUAL RESEARCH PLAN (IRP), INCLUDING:
   - the degree of advancement in the implementation of research tasks constituting the Ph.D. dissertation
   - compliance with the schedule presented in the IRP;
   - a comparison of assumed tasks with IRP, including already executed elements of the programme;
   - a description of tasks not realised to date or tasks realised only in part in relation to IRP;
   - a description of reasons for the incomplete execution of tasks assumed in IRP;
   - a description of a manner to eliminate the backlog resulting from the comparison of IRP with completed tasks;
   - a description of the effect of deviations from IRP on the realisation of Ph.D. research and the date of submission of the Ph.D. dissertation;
   - a description of cooperation with the scientific supervisor or scientific supervisors and, if applicable, with the auxiliary supervisor;
   - other information having an effect on the mid-term evaluation at this point (**max. 3 pages of text**, font size 12, line spacing 1.5)

2. DESCRIPTION OF SCIENTIFIC DEVELOPMENT AND ACCOMPLISHMENTS OF THE PH.D. STUDENT DURING EDUCATION AT THE DOCTORAL SCHOOL, INCLUDING:
   - a list of publications;
   - participation in conferences;
   - granted projects/received research grants;
   - scientific internships/stays in Poland and abroad;
   - other information influencing the evaluation of the scientific development and accomplishments of the Ph.D. student (**max. 2 pages of text**, font size 12, line spacing 1.5, attachments: first pages of papers, copies of confirmations of participation in conferences, projects and internships/scientific stays, etc.)

3. PRESENTATION (e.g. POWER POINT), INCLUDING:
   - the tile of the Ph.D. dissertation, discipline, scientific supervisor(s), auxiliary supervisor (if applicable);
   - research problem;
   - applied research methods and manner of their realisation;
   - results of research conducted to date;
   - **Individual Research Programme and progress in its realisation**;

- problems with the realisation of IRP and how to solve them;
- scientific accomplishments of the Ph.D. student;
- other activities during the period of education at the Doctoral School;
- concluding remarks.

(**max. 15 minutes**, the language of the presentation is consistent with the language in which the Ph.D. dissertation is prepared)

4. OPINION OF THE SCIENTIFIC SUPERVISOR OR SUPERVISORS:

I approve the report ☐ I do not approve the report ☐

- Scientific work of the Ph.D. student, including progress and manner of IRP realisation:

……

……

……

……

……

……

PH.D. STUDENT Scientific supervisor(s)

……. ……

(signature) (signature)

Date of submission and signature of the Chairman of the Committee of the Discipline:

…… ……

(date) (signature)

Date of submission and signature of the Chairman of the Committee for mid-term evaluation:

…… ……

(date) (signature)

Attachment 2 Poznań, ……..

Minutes from the meeting of the Committee for the mid-term evaluation
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME, SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

The mid-term evaluation of Mr./Ms.
……

was conducted on …… at the Poznań University of Life Sciences Doctoral School by the Committee for the mid-term evaluation

composed of:

Committee Chairman (first name, surname, unit): ……..

Member (first name, surname, unit): ……

Member (first name, surname, unit): ……

1. EVALUATION OF THE PROGRESS OF THE IMPLEMENTATION OF RESEARCH TASKS CONSTITUTING THE PH.D. DISSERTATION (MAX. 40 POINTS)		
INDICATIVE GRADE SYSTEM AND POINT SCORES		**SCORE**
38-40	excellent realisation of the research tasks	
31-37	very good realisation of the research tasks with justified deviations from the schedule	
26-30	appropriate realisation of the research tasks, certain shortcomings have been found	
21-25	deviations from the realisation of the research tasks, but the Ph.D. research may still be completed	
11-20	deviations or errors in the realisation of the research tasks, but Ph.D. research might be completed after some modifications are made	
1-10	serious deviations in the realisation of the research tasks, limited chance of the Ph.D. research completion	
0	IRP has not been realised	

JUSTIFICATION FOR THE EVALUATION RESULT (description of progression of research tasks specifying possible reasons for the lowering of the maximum point score and their effect on IRP realisation):

2. EVALUATION OF THE COMPLIANCE WITH THE SCHEDULE PRESENTED IN THE INDIVIDUAL RESEARCH PROGRAMME (MAX. 40 POINTS)		
INDICATIVE GRADE SYSTEM AND POINT SCORES		**SCORE**
38-40	excellent realisation of the schedule	
31-37	very good realisation of the schedule with justified deviations	
26-30	appropriate realisation of the schedule, certain shortcomings have been found	
21-25	deviations from the schedule, but the Ph.D. research may still be completed	
11-20	deviations and errors in the schedule, but Ph.D. research might be completed after some modifications are made	
1-10	serious deviations and errors in the schedule, limited chance of the Ph.D. research completion	
0	schedule has not been realised	

JUSTIFICATION FOR THE EVALUATION RESULT (description of progression of research tasks specifying reasons for the lowering of the maximum point score and their effect on IRP realisation):

3. EVALUATION OF THE REPORT, SELF-PRESENTATION AND DISCUSSION (MAX. 20 POINTS)	
EVALUATION CRITERIA AND POINT SCORES	**SCORES**
1. EVALUATION OF THE REPORT ON PROGRESSION IN PH.D. RESEARCH (MAX. 5 POINTS)	
2. EVALUATION OF PRESENTATION (MAX. 5 POINTS)	
3. EVALUATION OF THE DISCUSSION WITH THE Ph.D. STUDENT (MAX. 10 POINTS)	
JUSTIFICATION FOR THE EVALUATION RESULT (the following should be taken into account: reliability and transparency of the prepared report, clarity and aesthetics of presentation, reference to all the Committee's questions, precision of answers, etc.)	

TOTAL SCORE OF POINTS FROM INDIVIDUAL EVALUATIONS IN POINTS 1 TO 3, OUT OF THE MAXIMUM OF 100 POINTS:

……..

MINIMUM 60 POINTS ARE REQUIRED TO OBTAIN A POSITIVE RESULT OF MID-TERM EVALUATION

THE EVALUATION RESULT TOGETHER WITH THE JUSTIFICATION FOR THE EVALUATION RESULT ARE GIVEN IN THE ATTACHED MID-TERM EVALUATION CARD

Committee Chairman:	Committee Member:	Committee Member:
…….	……	……
(signature)	(signature)	(signature)

Attached: the mid-term evaluation card and the Ph.D. student's report

Date of submission and signature of the Director of the PULS Doctoral School:

…… ……

(date) (signature)

Attachment 3

Poznań, ……..

MID-TERM EVALUATION CARD
THE POZNAŃ UNIVERSITY OF LIFE SCIENCES DOCTORAL SCHOOL

FIRST NAME AND SURNAME OF THE PH.D. STUDENT	
MATRICULATION NUMBER	
YEAR OF ADMISSION TO THE DOCTORAL SCHOOL	
PULS FACULTY	
DISCIPLINE	
SCIENTIFIC SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• PULS unit	
AUXILIARY SUPERVISOR (DEGREE/TITLE, FIRST NAME AND SURNAME)	
• Unit	
SUBJECT OF RESEARCH	

MID-TERM EVALUATION RESULT (marked as appropriate)**:**

POSITIVE ☐ **NEGATIVE** ☐

JUSTIFICATION:

1. in relation to the level of advancement in the implementation of the research tasks that make up the Ph.D. dissertation:

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2. in relation to compliance with the schedule presented and individual research programme:

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3. in relation to the submitted report, presentation and discussion with the Ph.D. student:

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……
……

Committee Chairman:	Committee Member:	Committee Member:
…….	……	……
(signature)	(signature)	(signature)

Date of submission and signature of the Director of the PULS Doctoral School:

…… ……

(date) (signature)

attachment 4

Legend of colours denoting activities:
Doctoral School
Committee of Discipline
Committee for the mid-term evaluation

	Potential time frame		March	April	May	June	July	August	September
Motion by the School Director to the Chairman of the Committee of the Discipline and Scientific Council to propose candidate members of the mid-term evaluation committee together with the list of Ph.D. students subjected to the mid-term evaluation	from beggining of March	to end of May							
Selection of the mid-term evaluation committee members by the Committee of the Discipline and Scientific Council and appointment of the committee and its chairman by the Rector	from mid-March	to end of June							
Notification of the Ph.D. student and the scientific supervisor(s) by the chairman of the Committee of the Discipline on the date and venue for the presentation of the self-presentation and submission of the report and on the venue and date of mid-term evaluation	from mid-April	to mid-July							
Presentation of self-presentation by the Ph.D. student in front of the Committee of the Discipline and submission of the report	from mid-May	to end of July							
The Ph.D. student's report is handed over to the mid-term evaluation committee by the chairman of the Committee of the Discipline	from mid-May	to end of July							
Mid-term evaluation is conducted by the mid-term evaluation committee and the result is submitted to the School Director	from mid-June	to mid-September							
The Ph.D. student and scientific supervisor(s) are notified in writing on the result of mid-term evaluation and administrative decision on discontinuation of Ph.D. students is issued by the School Director	from mid-June	to end of September							
Potential appeals against negative mid-term evaluation result are examined by the School Council	from mid-June	to end of September							

Uniwersytet Przyrodniczy w Poznaniu
ul. Wojska Polskiego 28
60-637 Poznań
tel. +48 61 848 70 01
e-mail: rektorat@up.poznan.pl

REKTOR

Poznań, dnia 6 listopada 2025 roku

RP.013.351.2025

UPOWAŻNIENIE

Ja, niżej podpisana **prof. dr hab. Karolina Pawlak**, Prorektor ds. Współpracy Międzynarodowej, działając w imieniu i na rzecz Uniwersytetu Przyrodniczego w Poznaniu (ul. Wojska Polskiego 28, 60-637 Poznań; NIP: 777-00-04-960, REGON 000001844) na podstawie pełnomocnictwa Rektora Uniwersytetu Przyrodniczego w Poznaniu (z dnia 23 października 2025 roku numer RP.013.329.2025), udzielam niniejszym upoważnienia **prof. dr. hab. Januszowi Olejnikowi,** Pełnomocnikowi Rektora ds. ewaluacji Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, do podpisywania raportów samooceny oraz wszelkich oświadczeń, o których mowa w ust. 2 pkt 2 oraz czynności, o których mowa w § 6 ust. 1 pkt 1 i ust. 2 rozporządzenia Ministra Edukacji i Nauki z dnia 27 września 2021 r. w sprawie ewaluacji jakości kształcenia w szkole doktorskiej.

Upoważnienie zostaje udzielone do czasu odwołania przez Mocodawcę.

z up. Rektora Uniwersytetu
Przyrodniczego w Poznaniu

Prorektor ds. Współpracy Międzynarodowej

KPawlak

prof. dr hab. Karolina Pawlak

Uniwersytet Przyrodniczy w Poznaniu
ul. Wojska Polskiego 28
60-637 Poznań
tel. +48 61 848 70 01
e-mail: rektorat@up.poznan.pl

REKTOR

Poznań, dnia 23 października 2025 roku

RP.013.329.2025

PEŁNOMOCNICTWO

Ja, niżej podpisany prof. dr hab. Krzysztof Szoszkiewicz, **Rektor Uniwersytetu Przyrodniczego w Poznaniu**, działając w imieniu i na rzecz Uniwersytetu Przyrodniczego w Poznaniu (ul. Wojska Polskiego 28, 60-637 Poznań; NIP: 777-00-04-960, REGON 000001844) jako organ uprawniony do reprezentowania (działania w imieniu i na rzecz) Uniwersytetu Przyrodniczego w Poznaniu, udzielam niniejszym Prorektor ds. Współpracy Międzynarodowej **prof. dr hab. Karolinie Pawlak**, legitymującej się dowodem osobistym serii CCM numer 938532, pełnomocnictwa do dokonywania w czasie mojej nieobecności wszelkich czynności wynikających z treści art. 23 ustawy z dnia 20 lipca 2018 r. Prawo o szkolnictwie wyższym i nauce oraz § 24 i § 25 Statutu Uniwersytetu Przyrodniczego w Poznaniu.

Pełnomocnictwo zostaje udzielone na czas od 2 listopada do 9 listopada 2025 roku.

Pełnomocnik może ustanowić dalszych pełnomocników, z wyłączeniem czynności z zakresu gospodarowania środkami finansowymi Uczelni oraz prawa pracy.

Rektor

prof. dr hab. Krzysztof Szoszkiewicz

Przyjmuję pełnomocnictwo, jak również powierzone mi prawa i obowiązki.

Poznań, dnia 24.10.2025

Krawiak

podpis Pełnomocnika

UNIWERSYTET PRZYRODNICZY
w Poznaniu
DZIAŁ PRAWODAWSTWA WEWNĘTRZNEGO
ul. Wojska Polskiego 28
60-637 POZNAŃ
NIP 777-00-04-960 Regon 000001844

Zgodność odpisu z oryginałem
poświadczam
PRAWODAWSTWA WEWNĘTRZNEGO
mgr Renata Markiewicz
Poznań, dnia 13.11.2025

KEN

2023-2027

NATIONAL INFORMATION PROCESSING INSTITUTE

Minister of Science and Higher Education
Republic of Poland

Assessment of the quality of education in doctoral schools
is made by the Science Evaluation Committee

The Evaluation System of Doctoral Schools
is financed by the Minister of Science and Higher Education