Wrocław University of Science and Technology

Study programme

Organizational unit:	Faculty of Chemistry
Field of study:	Sustainable Biomass and Bioproducts Engineering
Level of study:	second degree 4 semesters
Form of study:	full-time studies
Education cycle:	2025/2026

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The Erasmus Mundus Joint Master program is 2 years (4 semesters) program in the field of “Sustainable Bioproducts and Bioprocess Engineering” (SBBE) corresponding to 120 ECTS credits. The program is implemented and developed by combining the joint expertise of the SBBE Consortium which consists of 3 Full Higher Education Institution (HEI) Partners from EU Program Countries: Wroclaw University of Science and Technology (coordinating institution), University of Castilla-La Mancha (Spain), Lappeenranta-Lahti University of Technology (Finaland).

Field of study characteristics

Basic information

Organizational unit:	Faculty of Chemistry
Field of study:	Sustainable Biomass and Bioproducts Engineering
Study level:	second degree 4 semesters
Study form:	full-time studies
Education profile:	general academic profile
Language of study:	English
Valid from the education cycle:	2025/2026
Number of semesters:	4
Total number of hours of classes:	1382
Total number of ECTS points required to complete a given level of study:	120
Professional title awarded to graduates:	magister inżynier

Fields of science and scientific disciplines

Scientific disciplines to which the field of study is assigned:

Field engineering and technical sciences

Assigning the major to the fields and disciplines to which the learning outcomes relate:

Discipline	Percentage
Chemical engineering	100%

Main discipline: Chemical engineering

Description of the field, profile of the graduate and possibilities of continuing studies

The graduate gains fundamental knowledge of an advanced organic chemistry for biobased materials and their in-depth analysis; engineering knowledge about the design and operation of industrial facilities for the bioproducts processing at industrial scale; practical knowledge about green technologies involved in the production of the biobased vectors, utilization of biotechniques for green treatment and conversion of biomass; knowledge related to reduction of environmental impacts of bioprocesses and to increasing use of bio-based products in order to reduce the dependence on fossil-based ones; knowledge about cost optimization and energy consumption due to bio-processes industrial adoption. The graduate acquires transversal skills related to ethical issues, EU legislative framework, and intellectual property rights as well as gains skills in communication, decision taking and collective actions. Highly qualified and creative graduates are prepared for the labor market with a big capacity to adapt themselves and to find new solutions for technological development (problem solving). The received level of training allows the graduates to continue with PhD programs all over the world or

to work as leaders in the developing bioprocesses industry.

Eligibility to apply for admission to a doctoral school, non-degree postgraduate programs.

Currentness of the study programme

Concept and goals of education

The general aim of SBBE project is to increase the attractiveness of the European Higher Education Area by internationalization of the education. The graduates will be prepared to design, develop and implement process' technologies and solutions for the sustainable utilization of renewable resources. They will also learn how to manufacture biobased products, including biofuels, bioenergy, biochemicals, bioplastics, paper, building materials, biocomposites, and about their applications.

The students receive the following knowledge:

1. Fundamental knowledge of an advanced chemistry for biobased materials and their analysis
2. Engineering knowledge about the design and operation of industrial plants involved in bioproducts processing
3. Practical knowledge about green technologies in the production of the biobased products, utilization of biotechniques for green treatment, and conversion of biomass
4. Environmental knowledge related to minimizing environmental impacts of bioprocesses in order to reduce the dependence on fossil-based fuels
5. Economic knowledge about cost optimization and energy consumption to increase bio-processes industrial adoption

Information regarding the inclusion of socio-economic needs in the study programme and the compliance of the major learning outcomes with these needs

The programme is engineering oriented and focuses on analytical skills and practical knowledge. It also covers advanced technological and processing aspects necessary to develop sustainable and competitive bio-based industries in Europe. The "classical" academic disciplines in the field of chemical engineering & biotechnology are extended and focalized, to the changing academic, society and labor market needs. The preparation of graduates mentioned therein reflect, inter alia, the following learning outcomes:

- practical skills in synthesis and analysis of bio-materials, preparation of samples, operation of advanced instrumental equipment and data analysis,
- wide knowledge about biomass conversion methods, biochemical units' operation involved in the production of biofuels; numerical design and optimization of the processes,
- advanced knowledge on present biorefining processes and capacity to modernize the present technologies and develop the new ones,
- basic knowledge about circular economy, the methodology of the valorisation of the biomass, and sustainable bio-economy.

The assumed learning outcomes fit into the current needs of the chemical and biorefinery industry, including companies and workplaces dealing with the design and development of chemical technologies for the fuel, energy, food, biotechnological, agrochemical industries, as well as technologies in environmental protection.

Other important factors determining the validity of the study programme

The biomaterials production is perceived in the social environment as environmentally friendly. Therefore, the social expectations and demand for clean technologies for the bio-based products manufacturing, including biofuels, bioenergy, biochemicals, bioplastics, paper, construction materials and biocomposites are growing. The European Commission has been valued the bio-based and biofuel industry at over €2.2 billion. This industry provides over 18 million employments in Europe and makes a significant contribution to the European agenda for jobs and growth. As the European Platform for Technology and Innovation reports, bioenergy and bio-based products are key to ensuring the development of sustainable products, land use and circularity in production processes for both technological and economic reasons. The sector contributes to increased competitiveness in many other areas, as well as in the rural and urban economy. Currently, 52 universities in Europe offer Masters in Biomaterials and 27 of them Masters in Bioprocesses. However, these are Masters programmes focused on molecular biology and biotechnology.

The SBBE studies are conducted by a consortium of three universities from three EU countries, where Poland is represented by Wrocław University of Science and Technology, Spain by Universidad de Castilla La Mancha, and Finland by Lappeenranta-Lahti University of Technology. The SBBE studies have been planned as the original and complementary curriculum integrating all the best teaching and

research competences of the three partners in the field of biomaterial and bioproduct production, biomass varolization, biorefinery, circular economy, and sustainable business.

The connection of the programme with the University's mission and its development strategy

The mission and strategy of the Wrocław University of Science and Technology is defined in the document: "Development Plan of Wrocław University of Science and Technology". The main aim is to develop creative, critical and tolerant personalities of students and to identify directions for the development of science and technology. The University’s role is to maintain and develop competences related to experimental work. The study programs harmonize the proportions of knowledge directly useful for work and knowledge enabling later professional adaptations. The second-level program of study in the field of the Sustainable Biomass and Bioproducts Engineering is in line with the above goals through: developing creative skills in the nature of scientific work through an increased number of classes related to the implementation of the diploma thesis, a large extent (above 50%) of practical classes, such as laboratories, seminars and projects, taking care of the balance between the general and specialist knowledge communicated, various specialist education within the specializations offered, providing students with knowledge and skills covering the state-of-the-art in science and technology achievements in the field, provision of an interdisciplinary training in the field of green chemistry and green technology, desire to develop sustainable and competitive bio-based industries, forming partially individual student profiles through the possibility of participating in elective courses, developing the personality of students through participation in humanities courses, partial preparation of students for future independent life through classes on management and business, learning of local languages will improve their chances to look for a job in different countries and companies, understanding of the foreign cultures and history will allow them for easier contact with people having different cultural background.

Learning outcomes

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
Knowledge			
K2_SBB_W01	Has the thorough knowledge of the principles of biomaterials composition and synthesis methodology	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W02	Has thorough knowledge about instrumental analysis of biomaterials' structural and chemical properties	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W03	Has horough knowledge of valorization of the biomass/biogenic fraction of waste into different valuable bioproducts	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ
K2_SBB_W04	Has thorough knowledge about chemical, mechanical, thermal biomass conversion processes, biomass treatment, purification and modification	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W05	Has thorough knowledge of biochemical units operation	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W06	Has thorough knowledge of modelling and processes simulation methods, process control and industrial measurements	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ
K2_SBB_W07	Has advanced knowledge on state-of-the-art lignocellulosic resources and biorefining processes	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W08	Knows fundamentals of sustainable bio-economy related to sustainable economic development (climate warming and fossil resources, natural resource scarcity, biomass competition, biodiversity, waste streams, governance, social well-being)	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ
K2_SBB_W09	Knows fundamentals of circular economy and methodology of conversion of resources, residues, by-products and side streams into value added products	P7U_W, P7S_WG	P7S_WG_INŻ
K2_SBB_W10	Has thorough knowledge of Good Laboratory Practice approach and research methodology strategies	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ
K2_SBB_W11	Has thorough knowledge of safety, consistency, high quality, and reliability of chemicals in laboratory and at industry	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ
K2_SBB_W12	Knows and understands the fundamental dilemmas of modern civilization and science	P7U_W, P7S_WK	
K2_SBB_W13	Knows and understands the basic concepts of project design and management, financial analysis and business plan	P7U_W, P7S_WK	P7S_WG_INŻ
K2_SBB_W14	Knows and understands the conceptualization of engineering models, apply innovative methods in problem solving and appropriate software applications, for the design, simulation, optimization and control of processes and systems	P7U_W, P7S_WG	P7S_WG_INŻ
Skills			
K2_SBB_U01	Has practical skills in synthesis and analysis of bio-materials and analyses the obtained product by using advanced instrumental equipment	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U02	Has practical skills in biomass conversion, recovery of valuable bioproducts and their practical applications	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U03	Has practical skills in design and optimization of the bioprocesses	P7U_U, P7S_UW	P7S_UW_INŻ

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
K2_SBB_U04	Has practical skills in carrying out selected chemical, thermal and mechanical conversion processes	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U05	Conceive, prepare and use bioproducts in various professional contexts, integrating ethical environmental and societal challenges	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U06	Is able to apply principles of work organization in a laboratory, preparation and implementation of documentation ensuring safety, high quality, and operations repeatability	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U07	Is able to perform of Life Cycle Assessment, Environmental Management System, and waste valorization	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U08	Can make a critical analysis of scientific information	P7U_U, P7S_UW	
K2_SBB_U09	Is able to perform a development and technical and economic evaluation of a project of innovation and research	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U10	Is able to deal with complex situations or those that require the development of new solutions in the academic, work or professional field of study of Chemical Engineering	P7U_U, P7S_UW	P7S_UW_INŻ
K2_SBB_U11	Has practical skills in communication in a foreign language	P7U_U, P7S_UK	
K2_SBB_U12	Is able to work independently and in a team, assuming various roles, including managerial ones, as well as plan his own development and stimulate others to do so	P7U_U, P7S_UO, P7S_UU	
Social competence			
K2_SBB_K01	Is ready to critically evaluate the knowledge and received content	P7U_K, P7S_KK	
K2_SBB_K02	Understands the need for entrepreneurial thinking and action	P7U_K, P7S_KO	
K2_SBB_K03	Is aware of the need to act in the public interest	P7U_K, P7S_KO	
K2_SBB_K04	Recognizes the importance of knowledge in solving cognitive and practical problems	P7U_K, P7S_KK	
K2_SBB_K05	Responsibly interacts in the group taking various roles in it, including managerial	P7U_K, P7S_KO, P7S_KR	
K2_SBB_K06	Is ready to use the knowledge and experience of experts in case of difficulties with problem solving	P7U_K, P7S_KK	
K2_SBB_K07	Is ready to comply with the principles of professional ethics and respect for the law, including copyrights	P7U_K, P7S_KR	
K2_SBB_K08	Recognizes the importance and understands the non-technical aspects and effects of scientific and engineering activities, including its impact on the environment, as well as the associated responsibilities	P7U_K, P7S_KR	
K2_SBB_K09	Is aware of the social role of a technical university graduate and the need to uphold the ethos of the engineering profession	P7U_K, P7S_KR	
Language outcomes			
SWF_S2_U01	Is aware of the importance of systematic physical activity for physical and mental health		

Detailed information on ECTS points

Sustainable Biomass and Bioproducts Engineering

Name	Value
Total ECTS	120
Total number of hours of classes	1382
Number of ECTS points assigned to classes related to scientific activities conducted at the university in the discipline or disciplines to which the field of study is assigned (DN)	102/120 (85%)
Number of ECTS points allocated to classes developing practical skills (including laboratory, project) (P)	67.8
The number of ECTS points that a student will receive by completing classes that require the direct participation of academic teachers or other persons conducting classes and students (BU)	60.1
Percentage of ECTS for elective courses	37/120 (30.83%)
The number of ECTS points that a student will receive by completing classes in the humanities or social sciences appropriate for a given field of study	7
The number of ECTS points that a student will receive by completing classes in basic sciences (mathematics, physics/chemistry)	12

Organization of studies

Implementation of the study programme

Allowable ECTS deficit

Semester	Allowable deficit of ECTS points after a semester
Semester 1	0
Semester 2	0
Semester 3	0
Semester 4	0

Detailed requirements

Each course in the study plan should be credited in accordance with the study plan. If it is necessary to repeat the course, the course should be credited in the next semester in which it is offered.

Methods of verifying the intended learning outcomes

Activity form	Methods of verifying the intended learning outcomes
Seminar	Multimedia presentations conducted and prepared individually or in groups; case study analysis, class participation, paper
Classes	Credit - oral, written; short test, input task, evaluation of the sub-tasks; practical exam, model, essay, paper
Project	Project preparation, project implementation, project documentation, case study analysis, model
Laboratory	Preparation of laboratory reports; oral statements, class participation; short test, input task, evaluation of the sub-tasks
Lecture	Exam - oral, written, credit, test - oral, written

Description of the process leading to achieving learning outcomes

The student acquires knowledge and skills by participating in theoretical and practical classes, which are largely based on the results of scientific research conducted by academic teachers - course tutors conducting classes with students. The basis of teaching and learning process are laboratory, seminar and project courses. Education in the field of studies is conducted in accordance with the principle of increasing the complexity of theoretical and practical tasks set for students. Modern teaching methods are implemented in the teaching practice, thanks to which the students' activity during the classes increases. Theoretical courses in the form of lectures and seminars are supplemented with project and laboratory classes, which include, among others: computer modelling and design, as well as conducting scientific research. The program is complemented by humanities and foreign language courses. The course (study programme) ends with a master thesis preparation and its defence checking the student's theoretical knowledge.
Verification and assessment of learning outcomes with reference to courses or groups of courses throughout the entire education cycle takes place with reference to the information contained in the subject cards (syllabuses).

Ways of verifying assumed learning outcomes:

- lecture - examination, progress/final test
- class - progress/final test
- laboratory - pretest, report from laboratory
- project - project defence
- seminar - participation in discussion, topic presentation, essay

- diploma dissertation - prepared diploma dissertation

Internships

Student has the opportunity to realize an internship between 2nd and 3rd semester (during the summer break) at a partner university or in industry (in associated with the SBBE internship program partners). Suggested duration of the internship is 2-4 weeks.

Diploma exam

The Master's exam is held according to the rules of the Wrocław University of Science and Technology, in particular:

- in front of an international committee composed of representatives of partner universities

- in the presence of external experts (representatives of industry and international organizations)

- the diploma exam is held in English language

Study plan

Sustainable Biomass and Bioproducts Engineering

Semester 1

Wrocław University of Science and Technology (WUST) Wrocław, Poland

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Nature of Bio-Materials	Lecture: 12 Laboratory: 12	Graded credit	2	Obligatory
Bio-Components Characterization	Lecture: 12 Laboratory: 24	Graded credit	3	Obligatory
Modification of Recovered Bio-Components	Lecture: 12 Laboratory: 12	Graded credit	2	Obligatory
Recovery of Bio-Components	Lecture: 12 Laboratory: 24	Exam	3	Obligatory
Operations Unit and Reactors of Biomass Treatment I WUST	Lecture: 12 Classes: 12 Laboratory: 36	Exam	5	Obligatory
Operations Unit and Reactors of Biomass Treatment I UCLM	Lecture: 12, including sub-activities: • Synchronous lecture: 12	Graded credit	1	Obligatory
Lignocellulosic Resources LUT	Lecture: 16, including sub-activities: • Synchronous lecture: 16	Graded credit	1	Obligatory
Chemical-Thermal Biomass Conversion	Lecture: 7 Laboratory: 17	Exam	2	Obligatory
Environmental Impact	Lecture: 12	Graded credit	1	Obligatory
Life Cycle Assessment UCLM	Lecture: 10, including sub-activities: • Synchronous lecture: 10	Graded credit	1	Obligatory
Good Laboratory Practice	Lecture: 8 Laboratory: 16	Graded credit	2	Obligatory

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Research Methodology	Lecture: 6 Laboratory: 18	Graded credit	2	Obligatory
Chemicals Safety	Lecture: 12	Graded credit	1	Obligatory
Philosophy of Science	Lecture: 15	Graded credit	1	Obligatory
Block: Language Block Polish/Spanish and Regional Culture A or B	Classes: 30 Project: 15	Graded credit	3	Obligatory group
The student chooses one block				
Block A: Polish Language and Local Culture	Classes: 30 Project: 15	Graded credit	3	Elective
Block B: Basic Spanish Language and Local Culture	Classes: 30 Project: 15	Graded credit	3	Elective
Sport activities	Classes: 30	Graded credit	-	Obligatory group
The student chooses one subject from the university-wide offer				
Sport activities 1	Classes: 30	Graded credit	-	Elective
Sum	**404**		**30**	

Semester 2

University of Castilla-La Mancha (UCLM), Ciudad Real, Spain

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Bio-Based Materials Fabrication WUST	Lecture: 24, including sub-activities: • Synchronous lecture: 24	Graded credit	2	Obligatory
Bio-Based Materials Fabrication UCLM	Laboratory: 15	Graded credit	1	Obligatory
Operations Unit and Reactors of Biomass Treatment II	Lecture: 25 Laboratory: 25	Exam	5	Obligatory
Design and Optimization of Bioprocesses by Commercial Simulators	Classes: 35 Project: 5	Graded credit	4	Obligatory

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Dynamic and Control of Bioprocesses	Lecture: 7 Project: 15 Seminar: 7	Exam	3	Obligatory
Chemical and Mechanical Fractionation LUT	Lecture: 17, including sub-activities: • Synchronous lecture: 17 Project: 5, including sub-activities: • Synchronous project activities: 5	Graded credit	3	Obligatory
Chemical and Mechanical Fractionation UCLM	Classes: 13 Laboratory: 5	Graded credit	1	Obligatory
Bioproducts Valorization and Waste Management	Lecture: 15 Laboratory: 18 Seminar: 7	Graded credit	4	Obligatory
Knowledge Management and Communication Skills	Lecture: 11 Project: 5 Seminar: 14	Graded credit	3	Obligatory
Block: Language Block C or D	Total practical contact hours: 30	Graded credit	4	Obligatory group
The student chooses one block				
Block C: Spanish Language and Culture	Classes: 16 Laboratory: 22 Project: 2	Graded credit	4	Elective
Block D: Basic Finnish Language	Classes: 30	Graded credit	4	Elective
Sum	**298**		**30**	

Semester 3

Lappeenranta-Lahti University of Technology(LUT), Lappeenranta, Finland

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Bio-Based Sorbents, Fertilizers and Food Additives WUST	Lecture: 12, including sub-activities: • Synchronous lecture: 12	Graded credit	1	Obligatory

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Bio-Based Chemicals and Consumer Products	Lecture: 15 Classes: 15 Project: 2	Graded credit	4	Obligatory
Sustainable Bio-Products Technologies UCLM	Lecture: 17, including sub-activities: • Synchronous lecture: 17 Classes: 3, including sub-activities: • Synchronised exercises: 3	Graded credit	2	Obligatory
Lignocellulosic Bio-Refinery	Lecture: 15 Classes: 15 Project: 30	Exam	5	Obligatory
Separations by Filtration in Biorefining	Lecture: 15 Classes: 15 Laboratory: 15 Project: 2	Graded credit	4	Obligatory
Separations by Adsorption in Biorefining	Lecture: 15 Classes: 15 Project: 15	Graded credit	3	Obligatory
Business Models and Market Analysis LUT	Classes: 15 Project: 2	Graded credit	2	Obligatory
Business Models and Market Analysis UCLM	Lecture: 15, including sub-activities: • Synchronous lecture: 15	Graded credit	1	Obligatory
Design and Optimization of Experiments	Lecture: 15 Classes: 15 Project: 2	Graded credit	4	Obligatory
Finnish Language and Culture	Classes: 30 Project: 10	Graded credit	4	Obligatory
Sum	**320**		**30**	

Semester 4

Optional one from the above Universities WUST/UCLM/LUT

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Master Thesis	Laboratory: 360	Graded credit	30	Obligatory elective
Sum	**360**		**30**	

Syllabuses

Wrocław University of Science and Technology

Nature of Bio-Materials

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PC.05045.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects of basic education - chemistry
	Subject related to scientific research Yes

Semester Semester 1	**Examination** Graded credit **Activities and hours** Lecture: 12 Laboratory: 12	**Number of ECTS points** 2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	has knowledge on bio-materials and their main components.	K2_SBB_W01
PEU_W02	understands the basic chemistry and structures of materials of biological origin.	K2_SBB_W01
PEU_W03	recognizes the quality and quantity of biomaterials from different sources.	K2_SBB_W01
In terms of skills		
PEU_U01	gets knowledge about methods used for classification of bio-materials.	K2_SBB_U01

PEU_U02	evaluates, develops and presents the results of measurements used in biomass analysis.	K2_SBB_U01, K2_SBB_U06
In terms of social competences		
PEU_K01	works consciously and effectively in a sub-group during performing the experiments and results processing.	K2_SBB_K05, K2_SBB_K06
PEU_K02	understands the need for systematic knowledge replenishment.	K2_SBB_K04

Program content ensuring learning outcomes

Aim of the course is to provide students with a general knowledge of the basic components of bio-materials and familiarize them with main techniques of biomass components characterization.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Laboratory	12
Prepararation for an exam/credit	8
Preparaton for classes	5
Preparation of a report/summary/presentation/paper	13
Student workload	**Hours** 50

Wrocław University of Science and Technology

Bio-Components Characterization

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PK.05046.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 12 Laboratory: 24	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	has knowledge on methods used in analyses of biomass.	K2_SBB_W02
PEU_W02	knows the basics of analytical methods.	K2_SBB_W02
In terms of skills		
PEU_U01	is able to determine valuable bioproducts.	K2_SBB_U01, K2_SBB_U06
PEU_U02	is able to calculate the amount of valuable components in biomass.	K2_SBB_U06
In terms of social competences		

PEU_K01	works effectively in a sub-group during performing the experiments.	K2_SBB_K04, K2_SBB_K06
PEU_K02	shows initiative and supports group mates in solving problems.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the course is to familiarize students with the possibilities of evaluating valuable biomass components and to present various methods used in analysis of biocomponents.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Laboratory	24
Preparaton for classes	9
Preparation of a report/summary/presentation/paper	18
Prepararation for an exam/credit	8
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Modification of Recovered Bio-Components

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PK.05047.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester Semester 1	**Examination** Graded credit **Activities and hours** Lecture: 12 Laboratory: 12	**Number of ECTS points** 2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	gets knowledge on methods used in treatment of bio-mass.	K2_SBB_W03
PEU_W02	knows how to change the properties of the recovered bio-components.	K2_SBB_W03
PEU_W03	knows the basics of chemical engineering processes.	K2_SBB_W03
In terms of skills		
PEU_U01	is able to run modifications of valuable bioproducts.	K2_SBB_U01, K2_SBB_U06

PEU_U02	is able to calculate the effect of biomass treatment.	K2_SBB_U01, K2_SBB_U06
In terms of social competences		
PEU_K01	works effectively in a sub-group during performing the experiments	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the course is to provide knowledge about valuable components available in various sources of biomass and their useful modification techniques. During the course, the student will become familiar with methods bio-components modification used in the industry to change basic properties.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Laboratory	12
Preparaton for classes	4
Prepararation for an exam/credit	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 50

Wrocław University of Science and Technology

Recovery of Bio-Components

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.51PK.05048.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 12 Laboratory: 24	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	gets knowledge on methods used in treatment of biomass.	K2_SBB_W03
PEU_W02	knows the basics of chemical engineering processes	K2_SBB_W03
In terms of skills		
PEU_U01	is able to run recovery of valuable bioproducts.	K2_SBB_U02, K2_SBB_U06
PEU_U02	is able to calculate the effect of biomass treatment.	K2_SBB_U02, K2_SBB_U06

PEU_U03	recognizes and understands the significance of the impact of scientific and engineering activities on the environment, as well as the responsibilities associated with this	K2_SBB_U10
In terms of social competences		
PEU_K01	works effectively in a sub-group during performing the experiments.	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the course is to provide knowledge about valuable components available in various sources of biomass. During the course, the student will become familiar with methods of recovery and purification of various bio-components for industrial applications.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Laboratory	24
Preparaton for classes	10
Prepararation for an exam/credit	10
Preparation of a report/summary/presentation/paper	15
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Operations Unit and Reactors of Biomass Treatment I WUST

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PK.05049.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 12 Classes: 12 Laboratory: 36	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student defines and explains chemical engineering unit operations.	K2_SBB_W05
PEU_W02	The student explains the principles of conducting unit operations in biomass processing.	K2_SBB_W05
In terms of skills		
PEU_U01	The student calculates the parameters of bioreactors and separation processes.	K2_SBB_U03

PEU_U02	The student interprets, develops and presents measurement results.	K2_SBB_U03, K2_SBB_U06, K2_SBB_U12
PEU_U03	The student handles and performs selected unit operations.	K2_SBB_U03, K2_SBB_U06, K2_SBB_U12
In terms of social competences		
PEU_K01	The student is open to work collectively in a group	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Students get familiar with the unit operations in biomass treatment
Students know how to recover some valuable components from biomass

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Classes	12
Laboratory	36
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	20
Prepararation for an exam/credit	12
Self-study of class topics	10
Credit/Exam	8
Student workload	**Hours** 125

Wrocław University of Science and Technology

Operations Unit and Reactors of Biomass Treatment I UCLM

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.51PK.05050.25

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 12 h, 1 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 12

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the fundamentals of the design of biochemical reactors	K2_SBB_W05
PEU_W02	The student explains the fundamentals of membrane separation	K2_SBB_W05
PEU_W03	The student explains the fundamentals of ion exchange processes	K2_SBB_W05
PEU_W04	The student explains the basics of distillation and its application in biprocesses	K2_SBB_W05
In terms of skills		
PEU_U01	The student calculates bioreactor parameters	K2_SBB_U03
PEU_U02	The student calculates the parameters of the separation processes	K2_SBB_U03

PEU_U03	The student interprets the rules for performing selected unit operations.	K2_SBB_U06
In terms of social competences		
PEU_K01	The student is open to work in a group	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06
PEU_K02	The student identifies problems in biomass processing.	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Students get familiar with the unit operations in biomass treatment
Students know how to recover some valuable components from biomass

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Preparation of a report/summary/presentation/paper	11
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Lignocellulosic Resources LUT

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PK.05051.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Major-specific subjects
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 16 h, 1 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 16

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To know the globally most common lignocellulosic raw materials for production of biobased materials, chemicals, and fuels in biorefineries.	K2_SBB_W07
PEU_W02	To be familiar with the structure and properties of lignocellulosic raw materials.	K2_SBB_W07
PEU_W03	To have an overview of the issues and opportunities regarding the availability and logistics of lignocellulosic raw materials	K2_SBB_W07

Program content ensuring learning outcomes

Most common lignocellulosic raw materials.
Structure and properties of lignocellulosic raw materials.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	16
Self-study of class topics	3
Preparation of a report/summary/presentation/paper	3
Prepararation for an exam/credit	2
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Chemical-Thermal Biomass Conversion

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PK.05052.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 7 Laboratory: 17	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	PEU_W01 – knows thermochemical conversion processes of biomass	K2_SBB_W04
PEU_W02	PEU_W02 – knows the basics of thermochemical conversion processes modelling and reactors design;	K2_SBB_W04
In terms of skills		
PEU_U01	PEU_U01 – is able to design and carry out selected thermochemical conversion processes;	K2_SBB_U04, K2_SBB_U06

PEU_U02	PEU_U02 – is able to process research findings, critically analyse them and formulate conclusions	K2_SBB_U04, K2_SBB_U06
In terms of social competences		
PEU_K01	PEU_K01 – is ready to critically evaluate his knowledge and perceived content	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06
PEU_K02	PEU_K02 – interacts responsibly in a group, taking various roles within it, including leadership	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The subject is devoted to biomass conversion by thermo-chemical processes. The course covers issues related to fermentation and biogas production, biomass valorization by pyrolysis, torrefaction and gasification, as well as aspects related to the safety of biomass processing and the use of biomass valorization products, including energy purposes. Students are introduced to the subject theoretically, through lectures, and practically, by carrying out thermo-chemical biomass conversion processes on laboratory test stands. The products obtained by these processes are then analyzed using analytical equipment, allowing insight into the properties of the obtained products and analysis and potential use.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	7
Laboratory	17
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	8
Prepararation for an exam/credit	4
Credit/Exam	4
Student workload	**Hours** 50

Wrocław University of Science and Technology

Environmental Impact

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.51PK.05053.25

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 12 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student knows the goals of sustainable development related to environmental issues and methods of their implementation	K2_SBB_W08
PEU_W02	The student knows some of the most common environmental impacts – air pollution, water pollution (seas, rivers, groundwater), soil pollution, waste production, waste management	K2_SBB_W08
PEU_W03	The student knows the future trends aimed at minimizing the negative impact of pollution on humans and the environment	K2_SBB_W08
In terms of skills		
PEU_U01	The student is able to think critically about the negative impact of pollution on human functioning and the condition of the natural environment	K2_SBB_U07
PEU_U02	The student is able to think critically about the solutions used in the prevention of pollution	K2_SBB_U07

PEU_U03	The student has the ability to integrate knowledge in the field of environmental protection, chemical engineering, biotechnology, etc.	K2_SBB_U07
PEU_U04	The student can acquire knowledge (available literature databases, official websites, etc.) about sustainable development related to environment	K2_SBB_U07
In terms of social competences		
PEU_K01	The student tries to implement the goals of sustainable development related to environmental issues in everyday life	K2_SBB_K04
PEU_K02	The student understands the need to apply innovations in environment protection	K2_SBB_K04
PEU_K03	The student is aware of the importance of the acquired theoretical knowledge and is ready to put acquired skills into practice	K2_SBB_K03, K2_SBB_K04
PEU_K04	The student is able to identify and evaluate the impact of scientific and engineering activities on the environment, as well as the responsibilities associated with them.	K2_SBB_K03, K2_SBB_K08

Program content ensuring learning outcomes

Introduction to the environmental impact: Human impact on the environment, Sustainable development, Goals of Sustainable development; Industrial ecology
Water pollution: Sources of water pollution, Common types of water pollutants, Prevention of water pollution, Wastewater treatment
Soil pollution: Origin of soil pollutants, Soil pollutants, Fertilizers, Pesticides, Bioremediation of polluted soil
Air pollution: Classes of air pollutants, Primary and secondary air pollutants, Air pollution effects, Renewable sources of energy

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Self-study of class topics	4
Prepararation for an exam/credit	8
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Life Cycle Assessment UCLM

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PC.05054.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Subjects of basic education - chemistry
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 10 h, 1 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 10

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student conceptualizes engineering models, apply innovative methods in problem solving and appropriate software applications, for analyzing proscesses under an invironmental point of view.	K2_SBB_W09
PEU_W02	The student analyzes products, processes, systems and services of the chemical or environmental industries, being capable to identify environmental impacts and other aspects needed for the Life Cycle Assessment protocols.	K2_SBB_W09
PEU_W03	The student adapts to changes, being able to apply new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit.	K2_SBB_W09
In terms of skills		

PEU_U01	The student is able to identify their own training needs in the field of study of LCA or environmental engineering and to organize their own learning with a high degree of autonomy in all kinds of contexts (structured or unstructured).	K2_SBB_U07
PEU_U02	The Student possess the skills of autonomous learning in order to maintain and improve the competences of chemical engineering that allow the continuous development of the profession, being capable to apply to LCA.	K2_SBB_U07
PEU_U03	The student has acquired advanced knowledge and demonstrated an understanding of the theoretical and practical aspects and of the working methodology in the field of LCA with a depth that reaches the forefront of knowledge.	K2_SBB_U07
PEU_U04	The student is be able to deal with complex situations or those that require the development of new solutions in the academic, work or professional field of study of Chemical Processes in general and LCA in particular.	K2_SBB_U07
PEU_U05	The student adapts to changes, being able to apply new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit.	K2_SBB_U07
In terms of social competences		
PEU_K01	The student is be able, through arguments or procedures developed and supported by themselves, to apply their knowledge, understanding and problem-solving skills in complex or professional and specialized work environments that require the use of creative or innovative ideas.	K2_SBB_K04
PEU_K02	The student has the ability to collect and interpret data and information on which to base their conclusions including, where necessary and relevant, reflection on social, scientific or ethical issues in the field of LCA.	K2_SBB_K04
PEU_K03	The student knows how to communicate to all types of audiences (specialized or not) in a clear and precise way, knowledge, methodologies, ideas, problems and solutions in the field of the study of LCA.	K2_SBB_K04

Program content ensuring learning outcomes

1. To acquire the basic therorical knowledge about Life Cycle Assesment (LCA).
2. To identify correctly Goals, Scopes, Uncertainities and Sensitivities for LCA.
3. To apply such theory in specific case studies.
4. To have skills identifying critical points and bottlenecks in LCA.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	10
Self-study of class topics	8
Prepararation for an exam/credit	6
Credit/Exam	1

Student workload	**Hours** 25

Wrocław University of Science and Technology

Good Laboratory Practice

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PC.05055.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects of basic education - chemistry
	Subject related to scientific research Yes

Semester Semester 1	**Examination** Graded credit **Activities and hours** Lecture: 8 Laboratory: 16	**Number of ECTS points** 2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student gained knowledge on the application of GLP principles in the laboratory.	K2_SBB_W10
PEU_W02	The student gained information on the methods of implementing SOP into laboratory routine.	K2_SBB_W10
PEU_W03	The student gained knowledge on ensuring the quality of laboratory operation.	K2_SBB_W10
In terms of skills		
PEU_U01	Student is able to evaluate the quality of an experimental result.	K2_SBB_U06

PEU_U02	Student knows to plan and implement an experiment.	K2_SBB_U06
PEU_U03	Student is able to report the results of the work according to GLP.	K2_SBB_U06
PEU_U04	The student recognizes and understands the significance of the impact of scientific and engineering activities on the environment, as well as the responsibilities associated with this.	K2_SBB_U10
In terms of social competences		
PEU_K01	Student is able to interact in a group and to plan an experiment.	K2_SBB_K05
PEU_K02	Student is able to discuss the quality of an experimental result.	K2_SBB_K04, K2_SBB_K06
PEU_K03	Student works consciously and effectively in a sub-group to searches information and can subject them to critical analysis.	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

1. Gaining knowledge on the fundamental principles of GLP.
2. Acquaintance with the rules of Globally Harmonized System (GHS).
3. Gaining knowledge in the field of Standard Operating Procedures (SOPs) and quality assurance of the functioning of the laboratory.
4. Acquaintance with the rules of methods validation and instruments qualification.
5. Acquiring the ability to present work results.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	8
Laboratory	16
Conducting literature research	8
Preparation of a report/summary/presentation/paper	7
Preparaton for classes	6
Credit/Exam	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Research Methodology

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PM.05021.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects of basic education - mathematics
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 6 Laboratory: 18	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student gained knowledge in the field of strategies of defining research problems, planning an experiment, and data collecting, according to Design Thinking process	K2_SBB_W10
PEU_W02	Student has information about data analysis methods with aid of statistics	K2_SBB_W10
PEU_W03	Student gained knowledge on possibilities of mathematical models utilization in experiment optimization – including analysis, interpretation of data, and methods of presentation of them	K2_SBB_W10
In terms of skills		

PEU_U01	Student is able to prepare research project/scientific publication	K2_SBB_U08
PEU_U02	Student is able to choose the appropriate database of research articles in order to collect the required literature	K2_SBB_U08
PEU_U03	Student is able to perform statistical analysis of the obtained results – application of the correct statistical tests to analyze, model and visualize the results	K2_SBB_U08
PEU_U04	Student is able to correctly plan the experiment (RSM)	K2_SBB_U08, K2_SBB_U09
PEU_U05	Student is able to discuss and summarize the obtained results as well as present them in the form of summary multimedia presentation	K2_SBB_U08
In terms of social competences		
PEU_K01	Student is aware of the importance of the acquired practical knowledge and is ready to put this skill into practice (e.g., preparation of scientific publication, Master thesis, etc.)	K2_SBB_K04, K2_SBB_K06
PEU_K02	Student understands the need for systematic knowledge replenishment	K2_SBB_K04, K2_SBB_K06
PEU_K03	Student works consciously and effectively in a sub-group during performing the data collection and results processing	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06
PEU_K04	Student is able to interact in a group and to discuss on a complex research problem	K2_SBB_K04, K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Acquainting the student with the strategies of defining the research problem, planning the experiment, and data collecting
Acquainting the student with possibilities of mathematical models utilization in experiment optimization – including analysis, interpretation of data, and methods of presentation of them
Getting acquainted with the methodology of preparation of research project (topic selection, analysis of the current state of knowledge, collection of data, data processing and presentation, interpretation, drawing conclusions, etc.)
Getting acquainted with the possibilities of using Statistica software in the statistical analysis of the obtained research results (selection of statistical test, correlations, data modeling, data visualization, descriptive statistics etc.)
Getting acquainted with the structure of a scientific publication and the methodology of its preparation

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	6
Laboratory	18
Prepararation for an exam/credit	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	8
Credit/Exam	4

Student workload	Hours 50

Wrocław University of Science and Technology

Chemicals Safety

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51PC.05056.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Subjects of basic education - chemistry
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 12 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Attendees will gain expertise on the safe, secure and healthy management of potentially hazardous chemicals.	K2_SBB_W11
PEU_W02	Attendees will be able to identify and classify hazardous substances according to their risks to human health and environment.	K2_SBB_W11
PEU_W03	Attendees will develop preparedness in facing and managing emergency situations involving hazardous chemical and biological materials during biomass processing.	K2_SBB_W11
PEU_W04	Attendees will gain knowledge about international guidelines and regulations for the assessment of chemical risk in laboratories, small production sites and industrial facilities.	K2_SBB_W11
In terms of social competences		

PEU_K01	Attendees will enhance their ethical approach towards a sustainable and safe chemistry in working environments.	K2_SBB_K04
PEU_K02	Attendees will aware of the need to act in the public interest and to protect life and health.	K2_SBB_K03
PEU_K03	Participants are able to identify and evaluate the environmental impact of scientific and engineering activities, their non-technical outcomes, and their associated responsibilities.	K2_SBB_K03, K2_SBB_K08

Program content ensuring learning outcomes

1. Providing essential know-how about hazards and risks related to the management, handling, transport and disposal of potentially hazardous chemical and biological substances.
2. Raising awareness on the potential risks related to the handling, management and processing of biomass-related chemicals.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	6
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Philosophy of Science

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.51HS.05057.25

Lecture languages
English

Mandatoriness
Obligatory

Block
Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Identifies, recognises and characterises the fundamental dilemmas of modern civilisation, in particular those related to the phenomenon of science; identifies fundamental issues in the philosophy of science, explains their importance and significance.	K2_SBB_W12
In terms of social competences		
PEU_K01	Appreciates the importance of knowledge in solving cognitive and practical problems and of consulting experts when having difficulty solving a problem independently.	K2_SBB_K04

Program content ensuring learning outcomes

The course will present the basic issues in the philosophy of science. Among other things, issues related to the very definition of the phenomenon of science, the problem of rationality and correctness of inference, criteria for distinguishing science from pseudoscience, and the issue of the development of science and its relationship to the real world will be

presented. This will enable participants to acquire the tools to understand and analyse the non-technical aspects of an engineer's work.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Prepararation for an exam/credit	3
Self-study of class topics	6
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Block A: Polish Language and Local Culture

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51JO.05059.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Foreign languages

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Classes: 30 Project: 15	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	understands basic Polish phrases and words	K2_SBB_U11
PEU_U02	is able to effectively communicate at basic level in Polish	K2_SBB_U11

Program content ensuring learning outcomes

Program content is structured to ensure the achievement of the intended learning outcomes, focusing on the foundational elements of the Polish language and an introduction to Polish culture. The language component covers essential grammar, vocabulary, and communication skills necessary for everyday interactions, enabling students to build a solid linguistic foundation. The cultural component emphasizes key aspects of Polish traditions, history, and contemporary life, with particular attention to the cultural heritage of Wrocław. Together, these elements aim to provide students with both practical

language skills and a deeper understanding of the sociocultural context in which they are studying.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Project	15
Preparaton for classes	7
Preparation of a report/summary/presentation/paper	3
Self-study of class topics	5
Credit/Exam	5
Prepararation for an exam/credit	3
Self-development of practical skills	5
Preparation of a project	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Block B: Basic Spanish Language and Local Culture

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.51JO.05060.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Foreign languages

Semester Semester 1	**Examination** Graded credit **Activities and hours** Classes: 30 Project: 15	**Number of ECTS points** 3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	PEU_W01 knowing the vocabulary and phrases for common everyday situations	K2_SBB_U11
PEU_U02	PEU_W02 ability to talk about oneself and understand basic questions	K2_SBB_U11
PEU_U03	PEU_W03 student develops a basic knowledge of speaking and listening skills in Spanish language.	K2_SBB_U11
PEU_U04	PEU_W04 student knows the cultural and social evolution in Poland and Lower Silesia region and our main traditions	K2_SBB_U11
PEU_U05	PEU_W05 student knows the natural and cultural places of the Lower Silesia region	K2_SBB_U11

Program content ensuring learning outcomes

relating to knowledge:
PEU_W01 knowing the vocabulary and phrases for common everyday situations
PEU_W02 ability to talk about oneself and understand basic questions
PEU_W03 student develops a basic knowledge of speaking and listening skills in Spanish language.
PEU_W04 student knows the cultural and social evolution in Poland and Lower Silesia region and our main traditions
PEU_W05 student knows the natural and cultural places of the Lower Silesia region

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Project	15
Preparaton for classes	26
Credit/Exam	4
Student workload	**Hours** 75

Sport activities 1

Educational subject description sheet

Basic information

Field of study wychowanie fizyczne	**Education cycle** 2025/2026
Speciality -	**Subject code** PWRSWFS.91WF.04468.25
Organizational unit Wrocław University of Science and Technology	**Group of classes** Yes
Study level second degree	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Physical education classes

Semester Semester 1	**Examination** Graded credit **Activities and hours** Classes: 30	**Number of ECTS points** 0.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	The participant knows how to organize health-promoting training according to his or her interests, using the principles of a selected sports discipline or form of recreation.	SWF_S2_U01
PEU_U02	The student knows training methods that develop motor skills using their own body weight and various equipment.	SWF_S2_U01
PEU_U03	The student knows the basic technique of shaping exercises needed to prepare the body for physical exercise.	SWF_S2_U01
PEU_U04	The student knows the basic rules of safe behavior during physical activity.	SWF_S2_U01
PEU_U05	The student is able to develop a short- and long-term training plan adequate to his or her abilities.	SWF_S2_U01

PEU_U06	The student knows the principles of strengthening the deep and peripheral stabilization apparatus and the technique of basic exercises shaping aerobic and strength capacity.	SWF_S2_U01

Program content ensuring learning outcomes

Sports activities – ABT, aikido, badminton, bodyART, body ball, Brazilian Jiu Jitsu, Callanetics, cuban salsa fit, futsal, yoga, jogging, judo, karate, basketball, bodybuilding, athletics, body shaping, skiing, Nordic walking, pilates, football, handball, volleyball, swimming, pump, rugby, self-defense, shape, squash, stretch-one, ballroom dancing, table tennis, tennis, functional training, health-promoting training, mountain hiking, cycling tourism, floorball, rowing, climbing, corrective classes, Zumba, corrective classes for students with disabilities.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Student workload	**Hours** 30

Wrocław University of Science and Technology

Bio-Based Materials Fabrication WUST

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05061.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Major-specific subjects
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 24 h, 2 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 24

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	gets knowledge on methods used in treatment of bio-mass for material purposes.	K2_SBB_W01
PEU_W02	knows the basics of technology processes used in bio-mass treatment used for fabrication of materials with natural components.	K2_SBB_W01
In terms of social competences		
PEU_K01	identifies problems related to the lecture topic and is able to propose solutions based on the acquired knowledge	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the lecture is to provide knowledge on the recovery of valuable biomass components for material applications in

various fields of engineering. The course presents the possibilities of formation materials built or containing components of natural origin - (nano)composites and polymer mixtures, materials inspired by nature, biopolymers and biosurfactants, biodegradable materials.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	24
Preparaton for classes	10
Prepararation for an exam/credit	14
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Bio-Based Materials Fabrication UCLM

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05062.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Major-specific subjects
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	is able to run transformation of bioproducts into new materials.	K2_SBB_U01, K2_SBB_U06
PEU_U02	can perform the necessary calculations to carry out the process and analyze the results.	K2_SBB_U06, K2_SBB_U12
In terms of social competences		
PEU_K01	works effectively in a sub-group during performing the experiments.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the course is to provide knowledge on the recovery of valuable biomass components for material applications in various fields of engineering. The laboratory enables familiarization with biomaterials popular in engineering - their production, modification, possibilities of use.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	15
Preparation of a report/summary/presentation/paper	8
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Operations Unit and Reactors of Biomass Treatment II

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05063.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 25 Laboratory: 25	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the basics of biochemical reactor design	K2_SBB_W05
PEU_W02	The student explains the basics of aeration and mixing in bioreactors	K2_SBB_W05
PEU_W03	Student explains basics of drying and lyophilization	K2_SBB_W05
PEU_W04	The student explains the advanced principles of ion exchange design.	K2_SBB_W05
PEU_W05	The student explains the basics of membrane separation process design	K2_SBB_W05

PEU_W06	The student explains the basics of distillation	K2_SBB_W05
PEU_W07	The student explains with the basics of adsorption	K2_SBB_W05
PEU_W08	The student presents the basics of the practical operation of separation processes and bioreactors.	K2_SBB_W05
In terms of skills		
PEU_U01	The student calculates bioreactor parameters	K2_SBB_U03
PEU_U02	The student calculates the parameters of the separation processes	K2_SBB_U03
PEU_U03	The student designs processes of biomass transformation in reactors and its separation.	K2_SBB_U03, K2_SBB_U06
In terms of social competences		
PEU_K01	Student has the ability to work in a group	K2_SBB_K06
PEU_K02	Student has the skills to achieve common goals	K2_SBB_K05

Program content ensuring learning outcomes

C1 Understanding the fundamentals of the design and operation of bioreactors
C2 Acquiring the skills for designing advanced separation processes
C3 Understanding the current trends in the application of separation processes
C4 Acquiring abilities on the practical operation of separation processes and bioreactors

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	25
Laboratory	25
Preparation of a report/summary/presentation/paper	23
Preparaton for classes	48
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Design and Optimization of Bioprocesses by Commercial Simulators

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05064.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Classes: 35 Project: 5	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	The student solves problems with initiative, decision-making, creativity, and critical reasoning and communicates and transmits knowledge, skills, and abilities in the field of Chemical Engineering	K2_SBB_U03
PEU_U02	The student analyzes problems, thinks critically, and makes decisions	K2_SBB_U03
PEU_U03	The student creates schemes of processes and has a synthesis capacity	K2_SBB_U03
PEU_U04	The student analyzes and solves problems	K2_SBB_U03

PEU_U05	The student independently develops, explores and tests solutions.	K2_SBB_U03
PEU_U06	The student applies theoretical knowledge in practice	K2_SBB_U03
In terms of social competences		
PEU_K01	The student is capable of proper oral and written communication.	K2_SBB_K06
PEU_K02	The student is capable of working in a team	K2_SBB_K05
PEU_K03	The student shows initiative in solving problems.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

C1 Be able to improve your simulation capabilities with HYSYS tools.
C2 Be able to use the Aspen simulator in the simulation of basic fluid operations, heat and mass transfer and in the calculation of reactors.
C3 Be able to simulate known chemical and environmental processes with the two simulators listed above and compare the results.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	35
Project	5
Preparation of a project	30
Prepararation for an exam/credit	26
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Dynamic and Control of Bioprocesses

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05065.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 7 Project: 15 Seminar: 7	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student selects the way to design products, processes, systems, and services of the chemical industry as well as to optimize those already developed, taking as a technological base the diverse areas related to chemical engineering.	K2_SBB_W14
PEU_W02	The student formulates engineering models, applies innovative problem-solving methods, and uses appropriate software for the design, simulation, optimization, and control of processes and systems.	K2_SBB_W14

PEU_W03	The student explains new directions and adapts to changes, being able to apply new and advanced technologies and other relevant developments with initiative and entrepreneurial spirit.	K2_SBB_W14
In terms of skills		
PEU_U01	The student interprets their own training needs in the field of study of Chemical Engineering and their work or professional environment and organizes their own learning with a high degree of autonomy in all kinds of contexts (structured or unstructured).	K2_SBB_U01
PEU_U02	The student demonstrates the skills of autonomous learning in order to maintain and improve the competences of chemical engineering that allow the continuous development of the profession.	K2_SBB_U01
PEU_U03	The student demonstrates advanced knowledge and understanding of the theoretical and practical aspects and the working methodology in the field of Chemical Engineering with a depth that reaches the forefront of knowledge.	K2_SBB_U01
PEU_U04	The student demonstrates the ability to deal with complex situations or those that require the development of new solutions in the academic, work, or professional field of study of Chemical Engineering.	K2_SBB_U01
PEU_U05	The student demonstrates the ability to adapt to changes and apply new and advanced technologies and other relevant developments with initiative and entrepreneurial spirit.	K2_SBB_U01
In terms of social competences		
PEU_K01	The student is capable of applying their knowledge, understanding, and problem-solving skills in complex or professional and specialized work environments that require the use of creative or innovative ideas through arguments or procedures developed and supported by themselves.	K2_SBB_K05, K2_SBB_K06
PEU_K02	The student is capable of collecting and interpreting data and information on which to base their conclusions, including, where necessary and relevant, reflection on social, scientific, or ethical issues in the field of chemical engineering.	K2_SBB_K05, K2_SBB_K06
PEU_K03	The student is capable of communicating to all types of audiences (specialized or not) in a clear and precise way, with knowledge about methodologies, ideas, problems, and solutions in the field of the study of Chemical Engineering.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

C1 To be proficient in the use of commercial simulators for dynamic process simulation.
C2 To achieve the skills to instrument and operate chemical processes at scale.
C3 To have the ability to design the automation of a complex industrial process.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	7
Project	15

Seminar	7
Preparaton for classes	8
Preparation of a project	13
Preparation of a report/summary/presentation/paper	15
Self-study of class topics	5
Credit/Exam	5
Student workload	**Hours** 75

Wrocław University of Science and Technology

Chemical and Mechanical Fractionation LUT

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05066.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 17, including sub-activities: • Synchronous lecture: 17 Project: 5, including sub-activities: • Synchronous project activities: 5	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To be familiar with methods to modify particle size and release desired structures from biomass.	K2_SBB_W04
PEU_W02	To know common equipment for grinding and classification of fibrous particles.	K2_SBB_W04
PEU_W03	To know chemical engineering principles in dissolution of biomass using acids, bases, and novel solvents.	K2_SBB_W04
In terms of skills		

PEU_U01	Have skills to analyze fractionation processes.	K2_SBB_U04, K2_SBB_U06
In terms of social competences		
PEU_K01	Is able to interact in a group and to plan an experiment.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Biomass particle size modification.
Understanding the methods for releasing the desired structures from biomass.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	17
Project	5
Preparation of a project	10
Self-study of class topics	20
Prepararation for an exam/credit	15
Preparation of a report/summary/presentation/paper	4
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Chemical and Mechanical Fractionation UCLM

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.52PK.05067.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Classes: 13 Laboratory: 5	1.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Have skills to analyze, perform, and design fractionation processes.	K2_SBB_U04, K2_SBB_U06
In terms of social competences		
PEU_K01	Is able to interact in a group and to plan an experiment.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Biomass particle size modification.
Understanding the methods for releasing the desired structures from biomass.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	13
Laboratory	5
Conducting empirical studies	2
Self-study of class topics	4
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Bioproducts Valorization and Waste Management

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52PK.05068.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 18 Seminar: 7	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student gains knowledge about the Environmental Management System.	K2_SBB_W08
PEU_W02	The student learns about valorization of solid wastes.	K2_SBB_W08
PEU_W03	The student obtains kwowledge on practical operation of waste valorization.	K2_SBB_W08
PEU_W04	The student gains basic knowledge for using a software tool to carry out the LCA.	K2_SBB_W08

In terms of skills		
PEU_U01	The student obtains capacity for critical thinking and decision making.	K2_SBB_U05
PEU_U02	The student gains synthesis capacity.	K2_SBB_U05
PEU_U03	The student has the ability to analyze and solve problems.	K2_SBB_U05, K2_SBB_U06
PEU_U04	The student obtains the ability to learn and work autonomously.	K2_SBB_U05, K2_SBB_U06
PEU_U05	The student gains the ability to apply theoretical knowledge to practice.	K2_SBB_U05, K2_SBB_U06
In terms of social competences		
PEU_K01	The student gains the ability to work in group.	K2_SBB_K05
PEU_K02	The student has the ability for getting common objectives.	K2_SBB_K05, K2_SBB_K06
PEU_K03	The student obtains leader skills.	K2_SBB_K05

Program content ensuring learning outcomes

1. Understanding the fundamental aspects of the Enviromental Managment System.
2. Acquiring abilities on the use of a software tool for Life Cycle Assessment.
3. Understanding the current trends in waste valorization.
4. Understanding the concepts for producing high-valued bioproducts.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	18
Seminar	7
Prepararation for an exam/credit	18
Credit/Exam	4
Preparation of a report/summary/presentation/paper	16
Preparation of a project	22
Student workload	**Hours** 100

Wrocław University of Science and Technology

Knowledge Management and Communication Skills

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52HS.05069.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects from the fields of humanities or social sciences

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 11 Project: 5 Seminar: 14	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	use of the scientific information tools	K2_SBB_W13
PEU_W02	develop the communication abilities: verbal and non-verbal	K2_SBB_W13
PEU_W03	know the fundamentals of the Project Management	K2_SBB_W13
PEU_W04	is able to perform the managing tasks of a chemical engineer board	K2_SBB_W13
In terms of skills		
PEU_U01	can direct and manage environmental and/or energy activities	K2_SBB_U08

PEU_U02	is able to communicate using different media	K2_SBB_U08
In terms of social competences		
PEU_K01	can lead and define multidisciplinary teams capable of solving technical changes and management needs in national and international contexts	K2_SBB_K02, K2_SBB_K04, K2_SBB_K05

Program content ensuring learning outcomes

Student knows and are able to use the basis scientific information tools: Scifinder, Scopus, Mendley, Spacenet
Student knows the peculiarities and is able to elaborate technical reports, scientific articles, Thesis, patents and other technical documents
Student can plan, organize and deliver a talk, debate or a class in the field of material production or chemical engineering
Student has knowledge about the fundamentals of the management of a project for the construction of a commercial plant for bioproduct production

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	11
Project	5
Seminar	14
Preparaton for classes	22
Preparation of a project	10
Prepararation for an exam/credit	7
Credit/Exam	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Block C: Spanish Language and Culture

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52JO.05071.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Foreign languages

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Classes: 16 Laboratory: 22 Project: 2	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	The student uses basic vocabulary and structures to communicate in daily life.	K2_SBB_U11
PEU_U02	The student uses basic grammatical rules to write short texts.	K2_SBB_U11
PEU_U03	The student develops a basic knowledge of speaking and listening skills in the Spanish language thanks to activities in places important for natural heritage, as well as cultural and social development in Spain and the Castilla La Mancha region.	K2_SBB_U11

Program content ensuring learning outcomes

- To know the evolution and development of the Spanish Language and some basic concepts.
- Understanding the basic grammar and simple texts in the local language.
- To be able to keep basic conversations of daily life in the local language.
- Understanding the cultural heritage and traditions related to Industrial Development.
- Identifying some Natural Patrimony and Protected Areas.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	16
Laboratory	22
Project	2
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	14
Prepararation for an exam/credit	10
Self-development of practical skills	15
Credit/Exam	6
Student workload	**Hours** 100

Wrocław University of Science and Technology

Block D: Basic Finnish Language

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.52JO.05072.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Elective
Study form full-time studies	**Block** Foreign languages
Education profile general academic profile	

Semester	Activities, hours, ECTS and examination
Semester 2	• Classes: 30 h, 4 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	ability to use the vocabulary and phrases for common everyday situations	K2_SBB_U11
PEU_U02	ability to talk about oneself and understand basic questions in Finnish	K2_SBB_U11

Program content ensuring learning outcomes

Basics of Finnish language

Calculation of ECTS points

Activity form	Activity hours

Classes	30
Preparaton for classes	24
Self-development of practical skills	24
Prepararation for an exam/credit	20
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Bio-Based Sorbents, Fertilizers and Food Additives WUST

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.54PK.05073.25

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 12 h, 1 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 12

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	knows the characteristic and production methods of bio-based sorbents, polymers, fertilizers, biostimulats, bioregulators and food additives,	K2_SBB_W03
PEU_W02	knows the basics of bio-based materials applications.	K2_SBB_W03
PEU_W03	knows organizational, market, technological, raw materials and basic legal regulations concerning functioning of chemical industry in knowledge-based economy.	K2_SBB_W03
PEU_W04	knows trends and development directions of bio-based materials applications.	K2_SBB_W03

Program content ensuring learning outcomes

Aims of the course are:

1. To introduce the student to practical bio-based materials examples in the chemical industry.
2. To introduce the student to new trends in bio-based materials applications.
3. To acquaint students with the mission of chemical and biological sciences in the development of modern sustainable agriculture.
4. To acquaint the students with the organization of the research and development cycle and its role in implementing process and product innovations in the production of agrochemicals.
5. To acquaint the students with new civilization challenges related to sustainable development, raw materials and energy problems in the chemical industry.
6. To acquaint the students with the principles and problems of the development of the innovative fertilizer industry in the EU and Poland.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	12
Self-study of class topics	6
Prepararation for an exam/credit	5
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Bio-Based Chemicals and Consumer Products

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PK.05074.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 15 Classes: 15 Project: 2	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	is familiar with commercially viable use of fibers, cellulose derivatives, and lignin in various non-paper applications.	K2_SBB_W03
PEU_W02	has adequate knowledge for tailoring the functionalities of bio-based polymers to meet functionality needed for specific application such as barriers in packaging and hygiene products.	K2_SBB_W03
PEU_W03	is familiar with production of biochemicals from secondary sources such as tall oil.	K2_SBB_W03
In terms of skills		

PEU_U01	to be able to design transformation of bioproducts.	K2_SBB_U02, K2_SBB_U06
PEU_U02	is able to calculate the effect of biomass transformation.	K2_SBB_U02, K2_SBB_U06, K2_SBB_U09
In terms of social competences		
PEU_K01	works effectively in a small group.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

The aim of the course is to familiarize students with the possibility of evaluating valuable biomass components useful for preparation of various industrial and consumer products. During the course students will learn how two desing and produce bio-based chemicals for defined purposes like packaging or hygiene product.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Project	2
Preparaton for classes	20
Preparation of a project	25
Prepararation for an exam/credit	9
Self-study of class topics	8
Credit/Exam	6
Student workload	**Hours** 100

Wrocław University of Science and Technology

Sustainable Bio-Products Technologies UCLM

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PK.05075.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 17, including sub-activities: • Synchronous lecture: 17 Classes: 3, including sub-activities: • Synchronised exercises: 3	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains how pollutants contained in the soil can be transported under the application of electric fields	K2_SBB_W03
PEU_W02	The student explains how pollutants contained in the soil can be degraded by different types of microorganisms and how their action can be promoted.	K2_SBB_W03, K2_SBB_W04
PEU_W03	The student explains the basic apparatus and devices for electrochemical and biologically assisted soil remediation and how technologies can be efficiently combined	K2_SBB_W03, K2_SBB_W04

PEU_W04	The student explains student has in-depth knowledge of development trends and new achievements in the field of soil remediation using electrochemical and biological technology	K2_SBB_W03, K2_SBB_W04
PEU_W05	The student explains the actual challenges and future prospects of industrial wastewater treatment	K2_SBB_W04
PEU_W06	The student explains how pollutants contained in different types of industrial wastewater can be degraded by biological treatments.	K2_SBB_W04
PEU_W07	The student explains the fundamentals of different wastewater treatment procedures and factors affecting technology selection depending on the characteristics of the industrial effluent.	K2_SBB_W04
In terms of skills		
PEU_U01	The student selects and proposes a simple electrobioremediation treatment for polluted soil	K2_SBB_U02, K2_SBB_U06
PEU_U02	The student selects and proposes a management and treatment strategy for the treatment of a given industrial effluent.	K2_SBB_U02

Program content ensuring learning outcomes

C1 Understanding the fundamentals and technology needed for the application of electrochemically and biologically assisted soil remediation processes
C2 Understanding the current trends in the electro-bioremediation processes
C3 Understanding the fundamentals and technology needed for the application of bioremediation of industrial effluents
C4 Understanding the current trends in bioremediation processes to treat industrial effluents

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	17
Classes	3
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	5
Self-study of class topics	5
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 50

Wrocław University of Science and Technology

Lignocellulosic Bio-Refinery

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PK.05076.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Exam **Activities and hours** Lecture: 15 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To know the major lignocellulosic biorefining processes (including Kraft pulping) as well as selected future processes.	K2_SBB_W07
PEU_W02	To know the process conditions and understands the raw materials behavior in the process.	K2_SBB_W07
PEU_W03	Understands the constraints and benefits in integration of biorefineries to other industrial processes such as bioenergy production.	K2_SBB_W07
In terms of skills		

PEU_U01	Can carry out feasibility analysis of biorefinery processes.	K2_SBB_U02, K2_SBB_U06, K2_SBB_U09
In terms of social competences		
PEU_K01	Is able to interact in a group and to plan an experiment.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Concept of a biorefinery and most common biorefinery concepts for production of fibre and material products, fuel and chemical products from biomass.
How biorefineries can be integrated to energy production and oil refineries.
Knowledge and skills to solve common process problems in biorefinery processes and understanding of factors that affect the feasibility of biorefinery processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Project	30
Preparation of a project	19
Prepararation for an exam/credit	10
Self-study of class topics	30
Credit/Exam	6
Student workload	**Hours** 125

Wrocław University of Science and Technology

Separations by Filtration in Biorefining

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PK.05077.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 15 Classes: 15 Laboratory: 15 Project: 2	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To be familiar with fundamentals of solid-liquid separation processes and their applications in biorefining.	K2_SBB_W07
PEU_W02	To be familiar with micro-, ultra- and nanofiltration techniques and applications in biorefining.	K2_SBB_W07
In terms of skills		

PEU_U01	Have practical experience in operating membrane filtration units with biobased feedstocks.	K2_SBB_U02, K2_SBB_U06, K2_SBB_U09
In terms of social competences		
PEU_K01	Is able to interact in a group and to plan an experiment.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

C1. Membrane processes for treating different biorefinery streams.
C2. Membrane materials and modules.
C3. Basic phenomena in membrane processes (fouling, concentration polarization, osmotic pressure)

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Laboratory	15
Project	2
Preparation of a project	10
Conducting empirical studies	14
Prepararation for an exam/credit	10
Self-study of class topics	14
Credit/Exam	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Separations by Adsorption in Biorefining

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PK.05078.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Major-specific subjects
	Subject related to scientific research Yes

Semester Semester 3	**Examination** Graded credit **Activities and hours** Lecture: 15 Classes: 15 Project: 15	**Number of ECTS points** 3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To understand the periodic nature of adsorption-based separation processes (adsorption, ion exchange, chromatography).	K2_SBB_W07
PEU_W02	To know the operating principles of most important industrial chromatographic separation process configurations.	K2_SBB_W07
In terms of skills		
PEU_U01	To have skills to designing adsorption/chromatographic separation processes based on experimental data and theory.	K2_SBB_U02, K2_SBB_U06, K2_SBB_U09

In terms of social competences		
PEU_K01	Is able to interact in a group and to plan an experiment.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Concept and mathematical treatment of adsorption column dynamics.
Design of adsorption-based processes using propagation velocities of concentration waves.
Applications of adsorption, ion exchange, and chromatography in biorefining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Project	15
Prepararation for an exam/credit	5
Self-study of class topics	14
Preparation of a project	8
Credit/Exam	3
Student workload	**Hours** 75

Wrocław University of Science and Technology

Business Models and Market Analysis LUT

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54HS.05079.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects from the fields of humanities or social sciences

Semester Semester 3	**Examination** Graded credit **Activities and hours** Classes: 15 Project: 2	**Number of ECTS points** 2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	The student is able to make an economic forecast and a business plan of a business project in the chemical sector.	K2_SBB_U06
PEU_U02	The student knows tools for financial analysis.	K2_SBB_U06
PEU_U03	Student is able to use different SWOT analysis approaches to a chosen business case.	K2_SBB_U09
In terms of social competences		
PEU_K01	The student is able to work responsibly in a group, taking on various roles, including managerial ones, using the knowledge and experience of experts in the event of difficulties in solving a problem, and is able to use specialist literature.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

1. Basic concepts of financial analysis and business plan.
2. Ability to study a previously unknown product or market.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	15
Project	2
Self-development of practical skills	10
Prepararation for an exam/credit	10
Credit/Exam	3
Preparation of a project	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Business Models and Market Analysis UCLM

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54HS.05080.25
Organizational unit Faculty of Chemistry	**Lecture languages** English
Study level second degree 4 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Subjects from the fields of humanities or social sciences
Education profile general academic profile	

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit; including sub-activities: ◦ Synchronous lecture: 15

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student is able to make an economic forecast and a business plan of a business project in the chemical sector.	K2_SBB_W13
PEU_W02	The student knows tools for financial analysis.	K2_SBB_W13
PEU_W03	The student knows different SWOT analysis approaches to a chosen business case.	K2_SBB_W13
In terms of social competences		
PEU_K01	The student is able to work responsibly in a group, taking on various roles, including managerial ones, using the knowledge and experience of experts in the event of difficulties in solving a problem, and is able to use specialist literature.	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

1. Basic concepts of financial analysis and business plan.
2. Ability to study a previously unknown product or market.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Design and Optimization of Experiments

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54PM.05081.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Subjects of basic education - mathematics
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 15 Classes: 15 Project: 2	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	understand the importance of designed experiments	K2_SBB_W06
PEU_W02	has knowledge of effective experimentation, regression analysis and basic analysis of variance (ANOVA)	K2_SBB_W06
In terms of skills		
PEU_U01	can optimize an engineering process using design of experiments and data analysis	K2_SBB_U03, K2_SBB_U06, K2_SBB_U09

In terms of social competences		
PEU_K01	The student is able to cooperate in a group and discuss complex research problems.	K2_SBB_K05, K2_SBB_K06
PEU_K02	The student works consciously and effectively in a subgroup during data collection and processing of results	K2_SBB_K05, K2_SBB_K06

Program content ensuring learning outcomes

Concept of design of experiments
Origin and mitigation of uncertainty in experiments
Factorial design methods and analysis of variance

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Project	2
Preparation of a project	8
Prepararation for an exam/credit	25
Preparaton for classes	30
Credit/Exam	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Finnish Language and Culture

Educational subject description sheet

Basic information

Field of study Sustainable Biomass and Bioproducts Engineering	**Education cycle** 2025/2026
Speciality -	**Subject code** W3SBBS.54JO.05082.25
Organizational unit Faculty of Chemistry	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory
Education profile general academic profile	**Block** Foreign languages

Semester Semester 3	**Examination** Graded credit **Activities and hours** Classes: 30 Project: 10	**Number of ECTS points** 4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	ability to use the vocabulary and phrases for common everyday situations	K2_SBB_U11
PEU_U02	ability to talk about oneself and understand basic questions in Finnish	K2_SBB_U11
PEU_U03	ability to use knowledge about Finnish culture and society in practice	K2_SBB_U11

Program content ensuring learning outcomes

- Finnish culture and ways of living in Finland
- Basics of Finnish language

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Project	10
Preparaton for classes	15
Self-development of practical skills	28
Prepararation for an exam/credit	13
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Sustainable Biomass and Bioproducts Engineering

Speciality
-

Organizational unit
Faculty of Chemistry

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W3SBBS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Laboratory: 360 h, 30 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knows the types of sources of scientific and professional knowledge	K2_SBB_W05
PEU_W02	|Has in-depth knowledge of the subject of the diploma thesis	K2_SBB_W05
In terms of skills		
PEU_U01	Can collect and verify information useful for learning a specific issue	K2_SBB_U06
PEU_U02	Can combine and generalize information from various sources	K2_SBB_U08
PEU_U03	Is able to synthetically and critically process the collected information	K2_SBB_U08
PEU_U04	Can prepare a written study on a selected scientific or practical issue	K2_SBB_U08, K2_SBB_U12

PEU_U05	Can carry out experiments / make a project / create software as well as process the results and draw conclusions from his achievements	K2_SBB_U08, K2_SBB_U12
In terms of social competences		
PEU_K01	Is ready to critically evaluate the knowledge he possesses and the content he receives	K2_SBB_K01
PEU_K02	Is aware of the importance of the acquired theoretical and practical knowledge and is ready to apply the possessed general and engineering skills in practice.	K2_SBB_K04
PEU_K03	Is able to work in a team of several people.	K2_SBB_K07
PEU_K04	Is ready to observe the principles of professional ethics and respect the law, including copyright.	K2_SBB_K09

Program content ensuring learning outcomes

C1 Acquiring the ability to use scientific literature and other sources of knowledge.
C2 Learning to select and organize knowledge in terms of a specific topic.
C3 Acquiring the ability to create a written study on a selected scientific or practical topic.
C4 Expanding knowledge in a specialized field within the field of study
C5 Acquainting with the basic methodology of scientific work

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	360
Preparation of the thesis	100
Conducting literature research	100
Prepararation for an exam/credit	49
Self-development of practical skills	140
Credit/Exam	1
Student workload	**Hours** 750