UNIVERSITY of LIFE SCIENCES in Lublin

FACULTY OF PRODUCTION ENGINEERING

FIELD OF STUDY

MANAGEMENT AND PRODUCTION ENGINEERING

specialization: Management and Food Engineering

Modules
full-time first-cycle studies
for the recruitment of 2021/2022

The name of the field study	Management and Food Engineering
Course title	Physical Education
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	0/0
Academic title/degree, name and surname of the person responsible for the course	MA Piotr Lorencowicz
Didactic unit offering a course	Center for Physical Culture and Sports
Objective of the course	The aim of the module is to familiarize students with the methods, means and organizational forms used in physical education classes in order to shape fitness and physical capacity as well as health-promoting habits
Learning outcomes	Knowledge:
	1.Has basic knowledge about the health-promoting importance of physical activity. He knows the basic general development, strengthening and shaping exercises as well as the elements of techniques and rules in team games.
	Skills:
	1.Can interpret the results of physical fitness and endurance tests and formulate appropriate conclusions based on them
	Social competence:
	1.Can work in a group taking different roles in it, respecting his own and others' safety and is able to convince others to creative solutions
Pre-requisites	- good health and no medical contraindications to exercise activities; - sports outfit that allows you to exercise freely;
Course contents	Improving the elements of technique, tactics in the form of strict and small games: basketball - passing and grabs, dribbles, throw and double-strokes, zone defense and each others volleyball - top and bottom bounces, bottom and tennis play, recording, exhibition, basic attack Exercises to strengthen individual muscle groups in the gym, principles of their implementation and exercise methods Exercises with music, shaping motor coordination, sense of rhythm, strengthening and stretching the body's core muscles, the use of various accessories in fitness classes Exercises that shape the body's capacity, the use of aerobic equipment (stationary bikes, treadmills, rowing ergometers) - methods of shaping the condition through aerobic and anaerobic exercises
References	1-Volleyball: Steps to Success by Becky Schmidt Paperback – Illustrated, September 29, 2015 2-Strength Training for Basketball by Javair Gillett Human Kinetics, 2019 3-Cardio Strength Training: Torch Fat, Build Muscle, and Get Stronger Faster Paperback – Illustrated, December 22, 2009 by Robert Dos Remedios
Teaching methods	Exercises with the use of activating methods, taking place in the room: - practical classes in the form of individual and team exercises - talks promoting physical activity and the principles of a healthy lifestyle
Assessment metho	K1– discussion, answers to question during the classes

	S1 - practical skills test, final assessment on the basis of a practical test, active participation in classes and attendance. SC1- observation, participation in discussions, active participation in classes
ECTS credits balance	0/0
Workload related to classes requiring the direct participation of an academic teacher	participation in exercises - 30 hours participation in consultations - 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1-OTHER S1-OTHER SC1-OTHER

The name of the field study	Management and Production Engineering
Course title	Mathematics 1
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD. Agnieszka Kubik-Komar, Assoc. Prof.
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	To acquaint students with selected topics in the field of higher mathematics
Learning outcomes	Knowledge:
	1. A student knows the values of the basic binary operations specified in the set of logical sentences
	2. A student knows the basic operations of complex numbers
	3. A student knows the concepts of matrix calculus as well as techniques for solving systems of linear equations
	Skills:
	1. A student is able to determine the logical value of a complex sentence
	2. A student can solve matrix equations and systems of linear equations.
	3. A student can represent a complex number in trigonometric form as well as operate on complex numbers
	Social competence:
	1.A student understands the role of mathematics as well as the need to acquire knowledge in an independent way
Pre-requisites	Elementary, high school mathematics knowledge
Course contents	Elements of mathematical logic Sets and operations on sets Complex numbers Matrices and determinants Systems of linear equations
References	1. Sterling, Mary Jane. Linear algebra for dummies. John Wiley & Sons, 2009. 2. Andreescu, Titu, and Dorin Andrica. Complex Numbers from A to... Z. Vol. 165. Boston: Birkhäuser, 2006. 3. Stoll, Robert Roth. Set theory and logic. Courier Corporation, 1979.
Teaching methods	Lectures, classes, discussions
Assessment methods	K1, K2, K3, S1, S2, S3 written test, oral answers, assessment of student activity SC1 assessment of students' activity in discussions
ECTS credits balance	**Contact hours** **The form** **Number of hours** **ECTS points** Lectures 15 h 0.6 Classes 30 h 1.2 Consultation 2 h 0.08 **Total 47 hours , 1.88 ECTS points** **Non-contact hours** Homework exercises 15 h 0.6

	Studying the theory 8 h 0.32 Studying for practical tests 30 h 1.2 **Total 53 hours, 2,12 ECTS scores** **The total student workload is 100 hours which corresponds to 4 ECTS points**
Workload related to classes requiring the direct participation of an academic teacher	lectures – 15 h.; classes – 30 h.; consultations – 2 h.,
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge – ZI_W01 Skills - ZI_U04 Social competences - ZI_K03

The name of the field study	Management and Production Engineering
Course title	Chemistry /Chemia
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD Marzena Pabich
Didactic unit offering a course	Department of Chemistry
Objective of the course	To acquaint students with the structure and properties of selected inorganic and organic chemical compounds, with a description of basic chemical processes and phenomena. Practical acquaintance with the equipment used in the laboratory and the acquisition of skills in conducting chemical experiments. In addition, developing responsibility for the results of individual and team work.
Learning outcomes	Knowledge:
	K1. Has knowledge of chemical terminology, nomenclature of chemical compounds and chemical calculations.
	K2. Has knowledge of the chemical properties of selected chemical elements and compounds and their applications, knows the basics of chemical processes and phenomena and their use in various types of technologies.
	Skills:
	S1. Is able to use laboratory equipment, plan and conduct chemical experiments, selecting appropriate measurement methods and techniques. Is able to obtain information from literature, observations, experiments and other sources; interpret them and draw conclusions.
	S2. He can perform basic chemical and analytical calculations.
	Social competence:
	SC1. He is responsible for his own work, the reliability of the obtained experimental results, their interpretation and the results of team work.
	SC2. Understands the need for continuous self-education and self-improvement through systematic learning, updating knowledge in the field of one's activities and improving professional and personal competences.
Pre-requisites	Knowledge of inorganic and organic chemistry at high school level.
Course contents	The subject covers the following topics: basic concepts and chemical laws, atomic structure, periodic table of elements, chemical bonds, solutions, electrolytic dissociation, colloids, redox reactions, galvanic cells, electrolysis. Classification and nomenclature of organic compounds. Structure and properties of individual classes of organic compounds, types of functional groups, mechanisms of basic types of reactions, occurrence and application of organic compounds.
References	1. Pauling L., General Chemistry, 2000, Dover Publications INC. 2. Petrucci R., H. General Chemistry, 2006, Prentice Hall, ISBN: 0131493302

	3. Clayden J., Organic chemistry, 2012, Oxford University Press, ISBN 25944191
Teaching methods	Lectures in the form of a multimedia presentation, discussing issues based on diagrams. Auditorium classes - consolidation, extension and checking the information provided during the lecture. Laboratory classes - students perform experiments on the basics of qualitative and quantitative analysis of inorganic and organic compounds (individual work or work in small groups of approx. 2-3 people).
Assessment methods	K1,K2 - tests; final test S1, S2 - performance of experiments, written report, assessment of the implementation of experiments and reports SC1 - evaluation of the student's work as a leader and member of the team performing the experiments SC2 - evaluation of the work of the student performing the experiments
ECTS credits balance	<u>Number of contact hours</u> Lectures - 15h = 0.6ECTS Classes - 30h = 1.2 ECTS Consultation – 2h = 0.08 ECTS **Total contact hours – 47h = 1.88 ECTS** <u>Number of non-contact hours</u> - Preparation for classes – 10h= 0.4 ECTS -Preparation for passing tests – 10h= 0.4 ECTS - Preparation for Final test -15h = 0.6 ECTS - preparation of reports from classes - 10h= 0.4 ECTS - solving tasks independently at home – 8h = 0.32 ECTS **Total non-contact – 53h = 2.12 ECTS**
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures - 15 hours - participation in classes - 30 hours - participation in consultations - 2 hours Total: 47h – 1.88 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 - ZI_W01 S1, S2 - ZI_U01, ZI_U02 SC1, SC2 - ZI_K01, ZI_K02

The name of the field study	Management and Production Engineering
Course title	Physics
Language	English
Type of the course	obligatory
Level of study	first-cycle studies
Form of study	full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	5 (1.96/3.04)
Academic title/degree, name and surname of the person responsible for the course	Marta Arczewska, PhD
Didactic unit offering a course	Department of Biophysics
Objective of the course	The module aims to acquire knowledge of physics and biophysics, allowing students to understand the mechanics of phenomena observed in food at the molecular level. In addition, to familiarize students with the theoretical and practical foundations of various research methods used in food technology and to present modern solutions in the study of food products.
Learning outcomes	Knowledge:
	1. The graduate knows and understands issues related to physics that are useful to formulate and solve simple tasks in the field of Management and Production Engineering.
	2. The graduate knows the theoretical basis of applied analytical methods, research techniques, measurement methods, methods of estimating the values of selected feature, as well as the principles and methods of observation adapted for the field of study of Management and Production Engineering.
	Skills:
	1. The graduate is able to assess the validity of physical theories through the design and execution of an experiment, the analysis of uncertainties associated with the measurement of data and the interpretation of the data to draw valid scientific conclusions.
	2. The graduate applies: tools, norms and standards in the processes of planning, organising, motivating and controlling the quality as well as health and safety at work.
	Social competence:
	1. The student is able to work in a team while doing lab experiments required by the didactic program, performing various functions.
Pre-requisites	Knowledge in physics and mathematics (core curriculum for secondary schools, basic level).
Course contents	The role of biophysics in food technology. Definitions of basic physical units, SI system. Physical properties of water and its role in life. Physical interactions that stabilize the structure of bioactive molecules. Force and Newton's laws of motion. Conservation law of energy, momentum and angular momentum. Elements of fluid mechanics. Rheological properties of foods. Oscillatory motion and waves. Properties of the thermodynamic system. Concepts of internal energy, heat, temperature, work and thermodynamic potentials. Laws of thermodynamics. Geometric and wave optics. Electromagnetic spectrum. Optical characteristics of biomolecules in food materials from the point of spectroscopy – principles of UV – Vis and FTIR absorption. Structure of matter. Natural and artificial radioactivity interaction of electromagnetic radiation with matter. Biological effects of ionizing radiation. The methods used to evaluate of physical properties of food product.
References	Basic: 1. D. Halliday, R. Resnick, J. Walker, Fundamentals of Physics Parts: 1-5, Wiley & Sons, 2000.

<table>
<tr><td></td><td>2. L. O. Figura, A.A. Teixeira, Food Physics. Physical Properties - Measurement and Applications, Springer, 2007.
2. S. Sahin, S.G. Sumnu, Physical Properties of Foods, Springer, 2006.
<u>Supplementary</u>:
1. W. Moebs, S. J. Ling, J. Sanny, University Physics –by OpenStax, 2016; https://openstax.org/details/books/university-physics-volume-1,2,3.</td></tr>
<tr><td>Teaching methods</td><td>Lectures with multimedia presentation, group work in the lab, discussion and interpretation of results as well as individual student reports from laboratory classes, entry tests and final written exam.</td></tr>
<tr><td>Assessment methods</td><td>K1 – assessment of written entry tests in the form of open-ended questions (definitions to be explained), assessment of a written final exam covering the topics listed in the lecture program content in the form of no more than 14 open-ended questions requiring short, synthetic answers.
K2 – assessment of correctly completed experiments during the lab classes and the preparation of reports.
S1, S2 – assessment of entry tests in the form of open-ended questions, assessment of lab reports.
SC1 – assessment of group work and individual work.

<u>DOCUMENTING LEARNING OUTCOMES ACHIEVED</u>:
Intermediate works: partial credits - written exams, work sheets from the lab classes; final works: an final exam; archiving in paper form; teacher's logbook.</td></tr>
<tr><td>ECTS credits balance</td><td><u>Contact hours</u>
<table><tr><th>The form</th><th>Number of hours</th><th>ECTS points</th></tr><tr><td>Lectures</td><td>15h</td><td>0.6</td></tr><tr><td>Classes</td><td>30h</td><td>1.2</td></tr><tr><td>Participation in consultations related to the preparation for classes</td><td>2h</td><td>0.08</td></tr><tr><td>Written examination</td><td>2h</td><td>0.08</td></tr><tr><td>Total 49 hours</td><td colspan="2">1.96 ECTS points</td></tr></table><u>Non-contact hours</u>
<table><tr><th>The form</th><th>Number of hours</th><th>ECTS points</th></tr><tr><td>Preparing for class</td><td>13h</td><td>0.52</td></tr><tr><td>Attendance at the entry tests</td><td>6h</td><td>0.24</td></tr><tr><td>Completion of worksheets</td><td>7h</td><td>0.28</td></tr><tr><td>Preparing to the written exam</td><td>30h</td><td>1.2</td></tr><tr><td>Studying literature</td><td>20h</td><td>0.8</td></tr><tr><td>Total 76 hours</td><td colspan="2">3.04 ECTS points</td></tr></table>The total student workload is 125 hours which corresponds to 5 ECTS points</td></tr>
<tr><td>Workload related to classes requiring the direct participation of an academic teacher</td><td>Participation in lectures – 15 hours
Participation in the laboratory classes – 30 hours
Participation in consultations – 2 hours
Participation in the written exam –2 hours
Total 49 hours which is 1.96 points ECTS</td></tr>
<tr><td>Relation of course learning outcomes to the learning outcomes of the field of study</td><td>Modular effect code
K1-ZI_W01
K2-ZI_W03
S1-ZI_U05
S2- ZI_U08
SC1-ZI_K01</td></tr>
</table>

The name of the field study	Management and Production Engineering
Course title	Macroeconomics
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	4 (1.28/2.72)
Academic title/degree, name and surname of the person responsible for the course	PhD. Monika Stoma, associate professor
Didactic unit offering a course	Department of Power Engineering and Transportation/Subdepartment of Logistic and Business Management
Objective of the course	The aim of the course is to provide students with elementary knowledge in the field of macroeconomics, in particular about contemporary problems of fiscal and monetary policy, unemployment and inflation
Learning outcomes	Knowledge:
	1. The student has basic general knowledge in the field of macroeconomics.
	2. The student has the knowledge to define, describe and explain problems related to the basic macroeconomic phenomena.
	Skills:
	1. The student knows how to diagnose and solve problems related to the basic phenomena occurring in the economy.
	2. The student is able to reach the sources of knowledge related to macroeconomics and use the obtained information.
	Social competence:
	1. The student s aware of the role of macroeconomics in the process of making economic decisions and expresses an active attitude towards formulating judgments on important socio-economic matters.
Pre-requisites	There are no specific requirements in this area - the subject at the elementary level does not require prior introduction.
Course contents	<u>The lectures include:</u> issues related to the history and essence of macroeconomics, identification of differences between macro- and microeconomics, basic macroeconomic concepts and measures (including, in particular, measures of economic activity of the state), issues related to the role of the public sector (budget structure, rules and administrators), issues of deficit and debt of the public, analysis of the country's economic activity and national income, issues of business cycles, inflation and unemployment, as well as the fiscal and monetary policy of the state. <u>The exercises include:</u> Analysis of exercises in the form of case studies, tests and other similar forms in the field of introduction to macroeconomics. Solving tasks in the field of budget, money, inflation, unemployment, GDP and other measures of economic activity, business cycles
References	1. Blanchard O. Macroeconomics. A European Perspective, Pearson Education Limited, 2021. 2. Betsey Stevenson B., Wolfers J. Principles of Macroeconomics, Worth Publishers Inc.,U.S., 2020.

	3. Dornbusch R., Fischer S., Startz R. Macroeconomics, McGraw-Hill Education, 2017. 4. Mankiw G.N. Principles of Economics, Cengage Learning, 2020.
Teaching methods	discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises checking and consolidating the knowledge gained during lectures, exercises in the field of data interpretation, solving tasks, work in small groups, individual students' presentations, discussion in the forum of the whole exercise group
Assessment methods	<u>Ways of verifying the achieved learning outcomes:</u> Knowledge: W1- Final test checking the knowledge in the field covered by the learning outcomes, K 2 colloquiums checking the knowledge of the problems of contemporary macroeconomics. Skills: S1. Participation in individual and group exercises, preparation, participation in group discussions, solving tasks, tests. S2. Preparing home exercises, solving problems. Social competence: SC1 Participation in team exercises in class, oral answers in class, activity, doing home exercises. <u>Forms of documenting the achieved results:</u> Colloquiums, final test, teacher's journal
ECTS credits balance	- participation in lectures – 15 hours / 0.60 ECTS - participation in exercises – 15 hours / 0.60 ECTS - participation in consultations – 2 hours / 0.08 ECTS - preparation for classes – 15 hours / 0.60 ECTS - preparation for colloquiums – 10 hours / 0.40 ECTS - completing exercises at home, doing household chores - 10 hours / 0.40 ECTS - solving tasks independently at home – 10 hours / 0.40 ECTS - preparation for passing – 15 hours / 0.60 ECTS - studying literature – 8 hours / 0.32 ECTS The total student workload is 100 hours. which corresponds to 4 points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours / 0.60 ECTS - participation in exercises – 15 hours / 0.60 ECTS - participation in consultations – 2 hours / 0.08 ECTS Total 32 hours which is 1.28 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W02 K2 - ZI_W02, ZI_W09, ZI_W11 S1 - ZI_U04 S2 - ZI_U01, ZI_U02 SC1 - ZI_K02

The name of the field study	Management and Production Engineering
Course title	Information Technology
Language	English
Type of the course	obligatory
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	Kamila Klimek, PhD DSc
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	The aim of the module is to become familiar with software for creating, transmitting, presenting and exercising the skills of selecting a tool to perform these tasks.
Learning outcomes	Knowledge:
	K1. The student can identify the basic applications of information technology, propose and access tools in practice, knowing the selected software with sending, presenting and securing information.
	Skills:
	S1 Has the ability to use basic software packages to create relational databases.
	S2. The student is able to perform simple data analysis using selected spreadsheet tools. Has the ability to prepare a presentation of the obtained results in graphic form using multimedia media.
	Social competence:
	SC1. The student is able to independently acquire and improve his knowledge and skills
	SC2. The student is able to cooperate in a team to solve a specific problem, understands the need to plan and coordinate activities among group members and the issue of group responsibility.
Pre-requisites	Knowledge of the Windows operating system and the basics of using Word and Excel
Course contents	As part of this subject, students become familiar with selected data analysis methods in Excel and the mathematical, statistical and financial functions found in this program. Selected numerical methods used in engineering calculations will be presented, as well as selected methods and techniques for presenting experimental data in graphic form and using multimedia media.
References	Required literature: Required literature: 1. Alexander Michael, Kusleika Dick. Access 2019 PL. Bible. Helion Publishing House. 2019. 2. D. M. Bourg, Microsoft Excel 2019. APN Promise. 2019 3. M. Gonet, Excel in scientific and engineering calculations, helion, 2011. 4. T. Connolly, C. Begg, Database systems, RM Publishing House, 2004. Recommended literature: tutorial for selected programs
Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected issues using didactic models, exercises checking and consolidating knowledge acquired during exercises in the field of data interpretation, work in small groups, individual student presentations, discussion in the forum of the entire exercise group, confrontation of various student positions through practical exercises

Assessment methods	K1. A colloquium testing knowledge in the field covered by the learning outcomes at the end of the semester. Active participation in exercises and oral answers during classes. Preparing an independent final project. S1, S2. Participation and activity during exercises. Preparing control works and participating in individual and group discussions. SC1,SC2. Oral answer, individual and group work, preparation for final work and colloquium. Documentation of obtained results: group and individual tasks, final test, final project.
ECTS credits balance	CONTACT: Participation in laboratory classes: 30 hours. Consultations: 2 hours Total contact: 32 hours / 1.28 ECTS NON-CONTACT: Preparation for classes: 9 hours Preparation for the colloquium: 9 hours Total non-contact: 18 hours / 0.72 ECTS The total student workload is 50 hours. which corresponds to 2 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Participation in laboratory classes: 30 hours. Consultations: 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Area Code Effect W1 - ZI_W11 U1 - ZI_U02 U2 - ZI_U03 K1 - ZI_K01 K2 - ZI_K01

The name of the field study	Management and Production Engineering
Course title	Management
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	5 (1.96/3.04)
Academic title/degree, name and surname of the person responsible for the course	PhD. Monika Stoma, associate professor
Didactic unit offering a course	Department of Power Engineering and Transportation Subdepartment of Logistic and Business Management
Objective of the course	The aim of the course is to provide students with basic knowledge of organization management, primarily in the context of the basic management functions: planning and decision making, organizing, motivating and controlling. Particular emphasis will be placed on the issues of organization as a system and on the types, functions and principles of building an organization as a system. In addition, knowledge will be provided on the ways of motivating employees, methods used for this purpose by the managers of the organization. Modern management concepts and problems will also be presented.
Learning outcomes	Knowledge:
	1. The student knows the theoretical basis and is able to define the terms, concepts and functions of management.
	2. The student has the knowledge to define, describe and explain problems related to the basic functions of management and is able to explain the basic issues of planning and decision-making in various conditions of the functioning of modern organizations
	Skills:
	1. The student is able to reach the sources of knowledge related to management, use the obtained information, analyze the internal and external environment of the organization, indicate the goals of enterprises due to the specificity of the types of activities carried out.
	2. The student has the ability to characterize the goals of the organization in the context of making effective decisions in the enterprise
	Social competence:
	1. The student is able to communicate effectively with the environment and is able to interact and work in a group.
	2. The student is aware of the importance of management processes in the area of various types of economic activity.
Pre-requisites	The implementation of the course requires basic knowledge of entrepreneurship from the secondary school.
Course contents	<u>The lectures include:</u> business management issues. The essence of management is discussed, as well as issues related to the use of managerial competences in the enterprise. Attention will be paid to the essence, types and features of the process organization and its life cycle, as well as to the environment (characteristic features and classification of environmental variability types). Planning and decision making as well as human resource management will also be discussed. Some modern management methods, systems and concepts, such as human resources, financial and resource management, will also be highlighted. <u>The exercises include:</u> The realized scope of material during the lecture is then discussed in a practical context during exercises, a discussion is conducted, but also students analyze the so-called case study and carry out tasks resulting

	from the need for a practical approach to the issues discussed in the lecture.
References	1. Witzel M. Management – the basics. Taylor & Francis, 2022. 2. Koźmiński A., Jemielniak D., Jendrych E., Wiśniewska H. Management matters, Wolters Kluwer, 2014. 3. Combe C. Introduction to management, Oxford University Press, 2014. 4. Drucker P.F. Management Challenges for the 21st Century, HarperCollins, 2018.
Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises checking and consolidating the knowledge gained during lectures, case studies, techniques to stimulate creative thinking (e.g. brainstorming), work in small, approx. 2 - 4 people groups, individual students' speeches, discussion in the forum of the entire training group, confrontation of different positions of students through practical exercises.
Assessment methods	Ways of verifying the achieved learning outcomes: Knowledge: K1- Final exam checking the knowledge in the field covered by the learning outcomes, K2 - Participation in class discussions checking the knowledge of contemporary management problems and 2 tests checking the knowledge of contemporary management problems; Skills: S1. - Participation in individual and group exercises, preparation of home exercises, participation in group discussions; Preparation of a project or paper (group work of three or four people); U2 - Tests checking the knowledge of contemporary management problems - conducted twice during the whole course. Social competences: SC1 - Participation in team exercises during classes and in the preparation of a project or paper. Doing home exercises and preparing for the exam. SC2 - Oral answers in class, activity Forms of documenting the achieved results: Colloquiums, final test, teacher's journal
ECTS credits balance	- participation in lectures – 30 hours/1.2 ECTS - participation in exercises – 15 hours/0.6 ECTS - participation in consultations – 2 hours/0.08 ECTS - participation in the final test – 2 hours/0.08 ECTS - preparation for classes – 15 hours/0.6 ECTS - preparation for colloquiums – 15 hours/0.6 ECTS - completing exercises at home, doing household chores - 15 hours/0.6 ECTS - solving tasks independently at home – 10 hours/0.4 ECTS - studying literature – 21 hours/0.84 ECTS The total student workload is 125 hours which corresponds to 5 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 30 hours - participation in exercises – 15 hours - participation in consultations – 2 hours - participation in the final test – 2 hours Total 49 hours which is 1.96 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W02 K2 - ZI_W02, ZI_W07, ZI_W8 S1 - ZI_U01, ZI_U02, ZI_U09 S2 - ZI_U04, ZI_U06 SC1 - ZI_K01, ZI_K02 SC2 - ZI_K03

The name of the field study	Management and Production Engineering
Course title	Social communication
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	PhD. Milan Koszel, associate professor
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	The aim of the course is to show students the possibilities and conditions for a smooth and effective exchange of information, developing their own flexibility, choice and adaptation of communication style to the people and environment in which they will operate.
Learning outcomes	Knowledge:
	1. Has a general knowledge of information exchange methods.
	2. Knows the basics of conducting negotiations.
	Skills:
	1. Can communicate using a variety of communication channels and prepare a public speech.
	2. Be able to create a brand and work in a team.
	Social competence:
	1. Understands the need for lifelong learning, in particular to improve one's professional and personal competences.
	2. Be able to resolve conflicts and create own development.
Pre-requisites	Not required
Course contents	Teaching students the possibilities and conditions for a smooth and effective exchange of information, developing their own flexibility, choice and adaptation of communication style to the people and environment in which they will be operating. Leading teams of people. Conducting negotiations. Conflict resolution. Creating your own development. Skillful selection of public relations tools. Public speaking.
References	1. Żukowska J. „Marketing communication". Warsaw School of Economics. Warszawa. 2015. 2. Żukowska J., Pindelski M. "Processes, organization, communication in project management". Warsaw School of Economics. Warszawa. 2015. 3. Rollins P. "Facilitating Early Social Communication Skills: From Theory to Practice". AAPC Publishing. 2014. 4. Littlejohn S. W. "Theories of human communication" (wyd. 5. Wadsworth. Belmont, CA:. 1999. 6. Pearce W. B. I"nterpersonal communication: Making social worlds". HarperCollins. New York. 1994. 7. Devito J "The Interpersonal communication Book, Global Edition". Pearson Eductaion. 2015.
Teaching methods	lecture, discussion
Assessment methods	K1, K2: a test S1, S2: group discussions SC1, SC2: group discussions Forms of documentation: Written credit with a grade, instructor's journal

ECTS credits balance	- participation in lectures - 30 hrs. - preparation for discussion - 9 hrs. - participation in consultations - 2 hour. - preparation for tests - 4 hrs. - preparation for the pass - 5 hours. The total student workload is 50 hours, which corresponds to 2 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures - 30 hrs. - participation in consultations - 2 hour. A total of 32 hours which corresponds to 1.28 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W08 K2 – ZI_W08 S1 – ZI_U02 S2 – ZI_U10 SC1 – ZI_K03 SC2 – ZI_K04

The name of the field study	Management and Production Engineering
Course title	Public relations
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	PhD. Milan Koszel, associate professor
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	The aim of the course is to show students the function and social role played by public relations. To analyze public relations as a sociological phenomenon and a field of theoretical and practical knowledge in the scope of democratization of social communication processes. To mould skills of distinguishing between marketing and humanistic ethos of public relations activity, which also influences the development of various forms of communication in society.
Learning outcomes	Knowledge:
	1. Has a general knowledge of information exchange methods.
	2. Has a general knowledge of public relations in marketing communications.
	Skills:
	1. Be able to manage information in crisis situations.
	2. Be able to create a brand and work in a team.
	Social competence:
	1. Understands the need for lifelong learning, in particular to improve one's professional and personal competences.
	2. Able to organize a public relations department and press office in a company.
Pre-requisites	Not required
Course contents	Public relations in social communication. Public relations in public institutions and organizations. Internal relations. Measuring effectiveness of public relations actions. Responsibility in public relations actions - ethical rules. Integrated marketing communication. The brand and public relations. Political public relations versus information creation. Critical analysis. Public relations of financial and stock exchange institutions. Information management in crisis situations. Organization of public relations department and press office in a company. Budgeting of public relations campaigns.
References	1. Ćwiklińska J. “Public Relations Practice in English”. Oficyna Wudawnicza SGH. Warszawa. 2005. 2. Bernays E. L. “Public Relations”. Wyd. www.Snowballpublishing.Com. 2014 3. Oliver S. “Public Relations Strategy”. Kogan Page. 2009. 4. Rosenberg A. “A Modern Guide to Public Relations”. Veracity Marketing. 2021.

	5. Seitel F. “The Practice of Public Relations”. Pearson Education. 2016. 6. Parsons P. J. “Ethics in Public Realations”. Kogan Page Limited. London. 2004.
Teaching methods	lecture, discussion
Assessment methods	K1, K2: a test S1, S2: group discussions SC1, SC2: group discussions Forms of documentation: Written credit with a grade, instructor's journal
ECTS credits balance	- participation in lectures - 30 hrs. - preparation for discussion - 9 hrs. - participation in consultations - 2 hour. - preparation for tests - 4 hrs. - preparation for the pass - 5 hours. The total student workload is 50 hours, which corresponds to 2 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures - 30 hrs. - participation in consultations - 2 hour. A total of 32 hours which corresponds to 1.28 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W08 K2 – ZI_W08 S1 – ZI_U02 S2 – ZI_U10 SC1 – ZI_K03 SC2 – ZI_K04

The name of the field study	Management and Production Engineering
Course title	Microeconomics
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	4.00 (2.00/2.00)
Academic title/degree, name and surname of the person responsible for the course	Prof. Sławomir Kocira
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	The aim of the module is to familiarize students with the basic elements and concepts related to economic processes: household, enterprise, market models, markets for specific products and services basic economic laws. To familiarize students with the principles of analysis and modes of action and market behavior of individual producers and consumers, sellers and buyers. Discuss the principles of studying the factors affecting the formation of the volume of production, supply and demand for products and services and the amount of prices. Elasticity of demand and supply, household decisions, producer decisions, market models.
Learning outcomes	Knowledge:
	K1. He knows the types of economic systems and the principles of the market mechanism that determines the decision-making of households and producers.
	Skills:
	S1. Understands and is able to analyze economic phenomena occurring in an enterprise and is able to use the knowledge it has to control economic processes.
	S2. Is able to use basic theoretical knowledge and acquire data needed to analyze specific economic processes and phenomena.
	Social competence:
	Sc1. Is aware of the social shaping of economic processes and their improvement, through systematic improvement of professional competence.
Pre-requisites	No pre-requisites
Course contents	Acquisition of knowledge of the basic concepts and problems of microeconomics, the economics of production processes and organization in enterprises, methods of evaluating economic processes in an enterprise, analysis of the market for factors of production and the basis of their distribution. Ability to discuss the law of variable efficiency of inputs and elasticity of production. Analysis of statistical data on the economy and the level of inputs and valuation of the environment. Determination of linear and non-linear relationships between two economic variables (input - output) and the slope of a straight line and a curve. The subjects taught include: Introduction to economy and economics, Tools of economic analysis, Market economy, Demand-supply and market, Market structure - models and functions of the market, Factor markets: labor, Factor markets: capital and land, Basics of the theory of consumer behavior, Organization and operation of a business, Costs vs. production, Income and inputs. Monopoly, oligopoly.
References	Bade, Robin; Michael Parkin (2001). Foundations of Microeconomics (1st paperback ed.). Addison Wesley.

	Colander, David. Microeconomics. McGraw-Hill Paperback, 7th ed.: 2008 Varian, Hal R. Intermediate microeconomics: a modern approach. WW Norton & Company, wyd. 8: 2009.
Teaching methods	lectures, classes, group work, practical work
Assessment methods	K1 – colloquium, exam S1 – colloquium, exam S2 – colloquium, exam Sc1 – exam
ECTS credits balance	– Lecture – 15 hours, – Classes - 30 hours – Consultation - 2 hours – Classes preparation - 15 hours – Literature studies - 10 hours – Preparation for the exam – 25 hours – Exam – 3 hours Total student workload is 100 hours which equals 4 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	Attendance in lectures - 15 hours; in classes - 30 hours; consultations 2 hours, exam – 3 hours. What amounts to 2.00 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	Code for the modular effect - code for the specific effect K1 – ZI-W02, ZI-W09 S1 – ZI_ ZI-U02, ZI-U04 S2 – ZI-U02, ZI-U04 Sc1 – ZI-K04

The name of the field study	Management and Production Engineering
Course title	Methodology of the study
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	1
Number of ECTS credits (contact/non-contact)	0
Academic title/degree, name and surname of the person responsible for the course	Vice-Dean of the Faculty of Production Engineering
Didactic unit offering a course	Dean's Office of the Faculty of Production Engineering
Objective of the course	The aim of the course is to familiarize students with the structure of the University, its authorities, the organization of the teaching process, the rules for selecting specializations, and the system of providing financial assistance to students. In addition, knowledge regarding student rights and obligations, as well as rules of conduct and academic coexistence are provided.
Learning outcomes	Knowledge:
	1. The student has knowledge of the structure of the University and the Faculty of Production Engineering.
	2. The student knows the organization of the teaching process.
	3. The student knows the rules of behaviour during and outside classes.
	Skills:
	1. The student is able to apply the provisions of the study regulations of the University of Life Sciences in Lublin.
	2. The student is able to fulfill his obligations and exercise his rights.
	3. The student is able to behave appropriately during and outside classes.
	Social competence:
	1. The student follows ethical principles, is creative and thinks independently.
Pre-requisites	There are no specific requirements in this area - it is a subject that introduces students starting their studies to issues related to the functioning of the University.
Course contents	The lectures include: familiarizing students with the structure of the University and the Faculty of Production Engineering, presentation of the University and Faculty authorities, discussion of the organization of the teaching process and the rules for choosing specializations, as well as social and living issues. During the lectures, students will meet with an employee of the Student Social Affairs Department, a representative of the Academic Chaplaincy, a representative of the "Jawor" Song and Dance Ensemble, the academic choir and AZS UP Lublin. They will also meet with the course supervisor and an employee of the WIP Dean's Office. In addition, they will become familiar with the most important provisions of the study regulations of the University of Life Sciences in Lublin. During the lectures, the student's obligations and rights, the conditions for completing the semester and year of study, as well as the rules of appropriate student behaviour towards lecturers and colleagues will also be discussed.
References	1. Statute of the University of Life Sciences in Lublin 2. Regulations of Studies of the University of Life Sciences in Lublin

Teaching methods	Lectures, presentation of selected problems using legal acts in force at the University of Life Sciences in Lublin, presentation of selected methods of non-scientific activity by representatives of individual organizations
Assessment methods	K1, K2, K3, S1, S2, S3, SC1 - the basic effect of the classes is the development of habits of behaviour worthy of a student, which is verified and documented throughout the entire period of study
ECTS credits balance	---
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 5 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2, K3 – ZI_W09 S1, S2, S3 – ZI_U01 SC1 – ZI_K04

Field of study	Management and Production Engineering
Name of the training module including the Polish name	Język obcy – 1 -Polski A2 Foreign Language – 1 – Polish A2
Language of instruction	English/Polish
Type of the training module	obligatory
Level of the training module	first-cycle
Form of studies	full-time
Location in the programme (year)	I
Location in the programme (semester)	2
Number of ECTS credits with a division into contact/noncontact	2 (1.28/0.72)
Name and surname of the person in charge	M.A. Ewa Badurowicz
Unit offering the subject	Foreign Languages Teaching and Certification Centre
Aim of the module	The aim of the classes is to familiarise the students with the basic linguistic and communication skills: speaking, listening comprehension, reading comprehension, writing, assuming basic roles and communicating in simple and typical daily life situations and at work requiring communication.
Learning outcomes	Skills:
	S1.Creating simple sentences and short speeches about oneself and the nearest environment
	S2. Understanding short recorded dialogues and thematic speeches related to daily life situations and at work
	S3. Ability to write Polish letters, words and short massages within the minimum vocabulary range required for the level
	S4. Understanding read sentences, text fragments and short dialogues including the minimum vocabulary range required for the level, including basic management and engineering vocabulary
	Social competences:
	SC1. Understanding the importance of lifelong learning
Preliminary and additional requirements	Preliminary and additional requirements are not demanded.
Contents of the training module – a compact description	The objective of the module is: - to familiarise the students with basic forms of greetings and goodbyes, salutations, numbers 0-20, the verb „być“, „mieć“ and „mówić“ to practice the skills of introducing oneself and giving basic personal information (first name, surname, address, names of countries, nationalities, foreign languages), as well as to get to know numbers 20-100, - to familiarise the students with the pronunciation of Polish speech sounds, with basic phrases and words typical in greetings and goodbyes communication situations, both in formal and informal contexts, used to express good and bad health conditions or to describe personal qualities, bearing in mind masculine/feminine forms, -to enable the students to communicate in Polish in situations related to doing shopping as well as inviting and having visitors, to ask for prices and say them, and to get to know numbers 100-1000 and to use the verbs „kosztować“ and „kupować“, - to familiarise the students with vocabulary related to types of food, dishes, beverages used to talk about eating habits , - to get to know the conjugation of the verbs „ jeść and pić“ , prepositions „bez“ and „z“ and expressing quantity.
Recommended and obligatory reading list	1. „Start Survival Polish” K.Dembinska, A. Małyska – podręcznik do nauki języka polskiego + zeszyt ćwiczeń 2. „Start 2” Beginner Polish K. Dembińska, A. Małyska - Podręcznik do nauki języka polskiego + zeszyt ćwiczeń 3. „ Polski Krok po kroku” Iwona Stemperek, Anna Stelmach – podręcznik do nauki języka polskiego Poziom 1

	4. „Polskie czytanki" – Wioletta Gurdak, Wojciech Sosnowski – Język polski dla obcokrajowców 5. Hurra!!! Odkrywamy język polski. Gramatyka dla uczących się języka polskiego jako obcego, Liliana Madelska 6. „Gramatyka języka polskiego. Podręcznik dla cudzoziemców.", Barbara Bartnicka, Halina Satkiewicz 7. www.mfiles.pl
The intended forms/activities/ teaching methods	Teaching methods: discussion, lecture, explanation, conversation, audio recordings, direct method, communicative approach, individual and team work, language games,
Methods of verification and documentation forms of the achieved learning outcomes	S1 – assessment of oral expression during the classes S2 – assessment of oral expression during the classes S3 – assessment of written expression as a homework S4 – written test SC1 – assessment of preparation for the classes and of involvement and participation in classes Documentation forms of the achieved learning outcomes: midterm test kept for 1 year teacher's register kept for 5 years Assessment criteria are available in Foreign Languages Teaching and Certification Centre
Impact of selected compounds to final grade	The condition for passing the semester is class attendance and a passing grade verified by: - written tests - 50% - oral statements - 25% - written essays - 25%. A student may obtain a mark higher by half a grade if he/she demonstrates 100% attendance and eagerly takes part in class activities.
Balance of ECTS credits	Contact hours: Participation in classes: 30 h Office hours: 2 h **Total number of contact hours: 32 h/1.28 ECTS** Non-contact hours: Preparation for classes: 15 h Preparation for test: 3 h **Total number of non-contact hours: 18 h/0.72 ECTS** **There are 50 hours of the total student workload which is equal to 2 p. ECTS**
Number of contact hours	Participation in classes: 30h Participation in office hours: 2 h **32 hours in total which is equal to 1.28 p. ECTS**
Relating modular learning outcomes to directional learning outcomes	S1 – ZI_U01 S2 – ZI_U01 S3 – ZI_U01 S4 – ZI_U01 SC1 – ZI_K03

The name of the field study	Management and Food Engineering
Course title	Physical Education
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	0/0
Academic title/degree, name and surname of the person responsible for the course	MA Piotr Lorencowicz
Didactic unit offering a course	Center for Physical Culture and Sports
Objective of the course	The aim of the module is to familiarize students with the methods, means and organizational forms used in physical education classes in order to shape fitness and physical capacity as well as health-promoting habits
Learning outcomes	Knowledge:
	1.Has basic knowledge about the health-promoting importance of physical activity. He knows the basic general development, strengthening and shaping exercises as well as the elements of techniques and rules in team games.
	Skills:
	1.Can interpret the results of physical fitness and endurance tests and formulate appropriate conclusions based on them
	Social competence:
	1.Can work in a group taking different roles in it, respecting his own and others' safety and is able to convince others to creative solutions
Pre-requisites	- good health and no medical contraindications to exercise activities; - sports outfit that allows you to exercise freely;
Course contents	Improving the elements of technique, tactics in the form of strict and small games: basketball - passing and grabs, dribbles, throw and double-strokes, zone defense and each others volleyball - top and bottom bounces, bottom and tennis play, recording, exhibition, basic attack Exercises to strengthen individual muscle groups in the gym, principles of their implementation and exercise methods Exercises with music, shaping motor coordination, sense of rhythm, strengthening and stretching the body's core muscles, the use of various accessories in fitness classes Exercises that shape the body's capacity, the use of aerobic equipment (stationary bikes, treadmills, rowing ergometers) - methods of shaping the condition through aerobic and anaerobic exercises
References	1-Volleyball: Steps to Success by Becky Schmidt Paperback – Illustrated, September 29, 2015 2-Strength Training for Basketball by Javair Gillett Human Kinetics, 2019 3-Cardio Strength Training: Torch Fat, Build Muscle, and Get Stronger Faster Paperback – Illustrated, December 22, 2009 by Robert Dos Remedios
Teaching methods	Exercises with the use of activating methods, taking place in the room: - practical classes in the form of individual and team exercises - talks promoting physical activity and the principles of a healthy lifestyle

Assessment metho	K1– discussion, answers to question during the classes S1 - practical skills test, final assessment on the basis of a practical test, active participation in classes and attendance. SC1- observation, participation in discussions, active participation in classes
ECTS credits balance	0/0
Workload related to classes requiring the direct participation of an academic teacher	participation in exercises - 30 hours participation in consultations - 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1-OTHER S1-OTHER SC1-OTHER

The name of the field study	Management and Production Engineering
Course title	Economic law
Language	English
Type of the course	obligatory
Level of study	First cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	PhD Konrad Buczma
Didactic unit offering a course	Department of Industrial and Medicinal Plants
Objective of the course	The aim of the module is to familiarize students with the basic regulations regarding starting and running a business.
Learning outcomes	Knowledge:
	1.The student knows and understands the social, economic, legal and other non-technical conditions of engineering activities.
	Skills:
	1.The student is able to independently undertake engineering business activity, recognizing its systemic and non-technical aspects.
	Social competence:
	1.The student is ready to work in a group, organize and manage the work of teams (project, task, etc.) and organization in the work environment.
Pre-requisites	lack
Course contents	During the lecture, content regarding economic law in the legal system is presented. The following issues are explained and analyzed: The concept, subject and scope of economic law. The system of generally applicable law in Poland. Principles of economic law. The concept, subject and features of economic activity. Conditions for starting and running a business. Forms of employment. Personal data protection in the economy. Origin and basic institutions of the European Union. Entrepreneur's responsibility.
References	Required literature: 1. M. Zdyb, Community and public economic law, Warsaw 2008 2. K. Strzyczkowski, Public economic law, Warsaw 2023 Recommended literature: 1. A. Kidyba, Commercial Law, Warsaw 2022.
Teaching methods	Lecture, discussion.
Assessment methods	Verification methods: K1 - Assessment of activity during classes, solving cases, problem-solving discussions S1 - Assessment of activity during classes, solving cases, problem-solving discussions SC1 - Assessment of activity during classes, solving cases, problem-solving discussions Forms of documenting achieved learning outcomes: K1 – written work S1 – written work SC1 – written work

ECTS credits balance	Contact: lecture 30 hours (1.2 ECTS) consultations 2 hours (0.08) Total contact 32 hours (1.28 ECTS) Non-contact: Preparation for passing 8 hours (0.32 ECTS) Studying literature 10 hours (0.4 ECTS) Total non-contact 18 hours (0.72 ECTS)
Workload related to classes requiring the direct participation of an academic teacher	lecture 30 hours consultations 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Directional Effect Code K1 – ZI_W09 S1 - ZI_U06 SC1 - ZI_K01

The name of the field study	Management and Production Engineering
Course title	Materials Science
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	5 (1.88/3.12)
Academic title/degree, name and surname of the person responsible for the course	PhD Monika Krzywicka
Didactic unit offering a course	Department of Technology Fundamentals
Objective of the course	The aim of the course is to master the basic knowledge about the types of engineering materials, their structure, properties, applications, material testing methods, and procedures with optimal selection for a specific application.
Learning outcomes	Knowledge:
	1. The graduate has basic knowledge of the properties and applications of selected steels, cast irons, non-ferrous metal alloys, plastics, ceramic materials and composites.
	2. The graduate has basic knowledge of methods of producing products from metal, plastics and ceramics.
	Skills:
	1. The graduate is able to use information from various sources to prepare his/her own studies/presentations.
	2. The graduate is able to carry out microscopic metallographic examinations of selected ferrous and non-ferrous metal alloys and hardness measurements using the Brinell, Rockwell and Poldi hammer methods.
	Social competence:
	1. The graduate is ready to work in a group.
	2. The graduate is ready to pass on his knowledge.
Pre-requisites	No
Course contents	Lectures: historical outline of material development, basic properties, structure and application of selected natural (wood) and engineering materials (ferrous and non-ferrous metal alloys, ceramics, plastics, composites). Issues related to crystallography, defects of the crystal structure, heat and thermo-chemical treatment, metallurgy and casting of metals and powder metallurgy, plastic working, elements of surface engineering, corrosion and corrosion protection, methods of plastics processing, directions of material science development will be discussed. Classes: measurements of metal hardness, macro- and microscopic analysis of the structure of steel, including after heat and thermo-chemical treatments, cast iron, aluminum alloys, copper and bearing alloys, calculation of the corrosion rate in order to optimize the selection of materials in terms of reducing the corrosion rate in selected environments, identification of plastics, presentation of films on the methods of metal forming, powder metallurgy, processing of plastics, ceramics, glass and wood.
References	Basic literature: 1. Witold Brostow, Haley E. Hagg Lobland. Materials: Introduction and Applications. Wiley, 2017. 2. Michael F. Ashby, D. R. H. Jones. Engineering Materials 1: An Introduction to Properties, Applications and Design. Elsevier LTD, Oxford; 4th edition.

	3. Michael F. Ashby, D. R. H. Jones. Engineering Materials 2: An Introduction to Microstructures, Processing and Design. Elsevier LTD, Oxford; 4th edition. 4. William D. Callister, David G. Rethwisch. Materials Science and Engineering. John Wiley & Sons, 2020. Supplementary literature: 1. Michael Ashby, Materials Selection in Mechanical Design. Elsevier Books, 2016.
Teaching methods	- discussing issues based on images (from a microscope), - lecture, - techniques for stimulating creative thinking (e.g. brainstorming), - work in small groups of approx. 2-4 people, - discussion, - individual speeches by students, - practical classes (hardness measurements), - individual work, - independent task solving, - making drawings/calculations.
Assessment methods	K1, K2 – exam, preparation of a project or presentation, colloquium, oral answer. S1, S2 – homework, project, oral answers during classes, activity during classes. SC1, SC2 – participation in class discussions, group work during classes, observation of student involvement. Form of documentation: instructor's diary, reports, tests, examination papers.
ECTS credits balance	- participation in lectures – 15 hours, 0.6 ECTS, - participation in practical classes – 30 hours, 1.2 ECTS, - participation in consultations – 1 hour, 0.04 ECTS, - participation in the exam – 1 hour, 0.04 ECTS. - preparation for practical classes – 30 hours, 1.2 ECTS, - finishing reports at home – 8 hours, 0.32 ECTS, - preparation for colloquiums – 20 hours, 1 ECTS, - exam preparation – 20 hours, 0.8 ECTS. The total student workload is 125 hours. which corresponds to 5 points. ECTS.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours, 0.6 ECTS, - participation in practical classes – 30 hours, 1.2 ECTS, - participation in consultations – 1 hour, 0.04 ECTS, - participation in the exam – 1 hour, 0.04 ECTS. The total number of contacts is 47 hours, which corresponds to 1.88 ECTS.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W13 K2 – InzZI_W04 S1 – ZI_U01 S2 – ZI_U08 SC1 – ZI_K01 SC2 – ZI_K02

Type of the course	obligatory
The name of the field study	Management and Production Engineering
Course title	Engineering design
Language	English
Level of study	First cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	Marek Boryga PhD, associate professor
Didactic unit offering a course	Department of Mechanical Engineering and Automatic Control
Objective of the course	Mastering geometric basis of engineering design- ortographic and axonometric projection. Introduction to main forms of graphical notation - projecting, sectioning, dimensioning. Introduction to the principles of creating diagrams of complex technical systems in different areas of engineering. Reading drawings and schemes of machines, devices and technical systems.
Learning outcomes	Knowledge:
	K1. Has knowledge of engineering technical drawing including: standardized elements of technical drawing, methods and principles of rectangular projection, principles of simple and complex sectioning, general principles of dimensioning and its special cases
	K2. He has basic knowledge about: drawing, marking and dimensioning of threads, drawing and marking inseparable connections, marking surface roughness
	Skills:
	S1. Can obtain information from literature, norms and other sources; can combine obtained information, interpret it and draw conclusions
	S2. Is able to solve a simple engineering task and prepare documentation of its implementation
	Social competence:
	SC1. Understands the need and knows the opportunities of continuous education, improving professional competences
	SC2. Can work individually and in a team taking various roles
Pre-requisites	Engineering design is a core subject that can be taught without additional knowledge.
Course contents	Engineering design is one of the first important subjects to prepare for solving technical problems. Its main task is to master the general principles and rules of construction notation. It is also aimed at mastering and perfecting the recording technique. The subject covers the following topics: standardized elements of technical mechanical drawing, ortographic projection by European (E) method, views and simple and complex sections, axonometric projections, general and detailed principles of dimensioning, selected connections in mechanical engineering. Exercises include: drawing ortographic projections by European method (E), drawing simple cross-sections, making axonometric projection of a rotating solid, drawing and dimensioning threads, making a drawing of a simple machine part and its dimensioning, making an assembly drawing.
References	Basic literature: 1. J.D. Bethune - Engineering Graphics with AutoCAD 2014, 2014.

	2. B.V.R. Gupta, M. Raja Roy - Engineering drawing, 2008.
Teaching methods	1) making drawings, 2) lecture, 3) discussion of graphic works.
Assessment methods	K1 – test, graphical works, K2 – test, graphic work, S1 – evaluation and discussion of the works, S2 – test, SC1 – assessment of the student's work on graphic design, his preparation and activity in class, SC2 – evaluation of the work during classes. The forms of documenting the achieved results: tests, graphical works.
ECTS credits balance	**Number of contact hours:** Lectures – 15 h / 0.6 ECTS Exercises – 30 h / 1.2 ECTS Consultations – 2 h / 0.08 ECTS **Number of non-contact hours:** Preparation for exercise – 20 h / 0.8 ECTS Completion of work in progress – 20 h / 0.8 ECTS Literature studies – 13 h / 0.52 ECTS **The total student workload is 100 h which corresponds to 4 ECTS credits.**
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 h / 0.6 ECTS Participation in exercises – 30 h / 1.2 ECTS Participation in consultations – 2 h / 0.08 ECTS Total – 47 h / 1.88 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W05 K2 – ZI_W14 S1 – ZI_U01 S2 – ZI_U07 SC1 – ZI_K01 SC2 – ZI_K03

The name of the field study	Management and Production Engineering
Course title	Finance and accounting
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD Artur Przywara
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	Understanding the sources of financing of a company (equity and foreign capital). Acquainting with accounting principles, assets and their financing sources, business operations. Skills of accounting for economic operations. Reading balance sheet and determining financial result. Performing cash flow analysis. Ability to make financial analysis of an enterprise using selected indicators.
Learning outcomes	Knowledge:
	1. economic, legal and social issues that enable the description and analysis of the processes of production; the student has the knowledge of management including quality management, project management, strategic management and business management
	2. trends and methods of research related to particular areas of activities of companies: market research, financial analysis, levels of product quality, etc.
	Skills:
	1. prepare, with the assistance of a research supervisor, analyses and projects related to Management and Production Engineering
	2. independently undertake engineering business activities, recognising their systemic and non-technical aspects; the student has the ability to self-educate
	Social competence:
	1. work in a team, is able to organise and supervise the work of groups of people (projects, tasks, etc.) in a working environment
	2. demontrate ethical behaviour within assigned organisational and social roles, is able to take responsibility for assigned tasks
Pre-requisites	Management
Course contents	Principles and legal bases of accounting. Sources and principles of company financing - foreign capital and conditions of its acquisition. The cost of equity and debt. Financial leverage. Assets and capitals of an enterprise - balance sheet. Profit and loss account. Cash flow. Financial statement as a source of information about the condition of an enterprise. Financial result - the way of determining it and its meaning in the assessment of company's financial condition. Cash flow - principles of preparation and ability to analyze. Financial analysis of companies - introductory analysis. Financial analysis of companies - ratio analysis.
References	Obligatory:

	1. M. Karwowski, Accounting and Financial Reporting, Szkoła Główna Handlowa w Warszawie, 2015. 2. M. Glautier , B. Underdown, M. Deigan, Accounting. Theory and Practice, Finance Times/Prentice Hall, New York 2011. 3. International Financial Reporting Standards www.iasb.org Recommended: 1. D.E. Kieso, J.J. Weygandt, T.D. Warfield, Intermediate Accounting, 13th ed., John Wiley&Sons, 2009. 2. C.T. Horngren, W.T. Harrison, M.S. Oliver, Financial and Managerial Accounting, 3rd ed., Pearson/Prentice-Hall, 2011.
Teaching methods	Didactic methods: lecture with the use of presentations multimedia presentations, discussion, execution of the project, solving problem tasks
Assessment methods	K - written test (lectures) S - control paper (project), written colloquium (classes) SC - control paper (project), written test (classes)
ECTS credits balance	Contact: Lecture - 15 hours (0.6 ECTS) Auditory classes – 10 hours (0.4 ECTS) Laboratory classes – 20 hours (0.8 ECTS) Consultation - 2 hours (0.08 ECTS) Non-contact: Project preparation - 16 hours (0.64 ECTS) Literature study - 10 hours (0.4 ECTS) Preparation for classes and auditory classes - 12 hours (0.48 ECTS) Preparation for colloquium - 15 hours (0.6 ECTS) The total student workload is 100 hours, which corresponds to 4 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Lecture - 15 hours (0.6 ECTS) Auditory classes – 10 hours (0.4 ECTS) Laboratory classes – 20 hours (0.8 ECTS) Consultation – 2 hours (0.08 ECTS) The total academic teacher workload is 47 hours, which corresponds to 1.88 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W02 K2 - ZI_W12 S1 - ZI_U03 S2 - ZI_U06 SC1 - ZI_K01 SC2 - ZI_K04

The name of the field study	Management and Production Engineering
Course title	Business financing
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD Artur Przywara
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	The purpose of teaching the subject is to provide students with knowledge of financing options for businesses in Poland. Students acquire knowledge of new alternative sources of financing especially for individual business activity.
Learning outcomes	Knowledge:
	1. trends and methods of research related to particular areas of activities of companies: market research, financial analysis, levels of product quality, etc.
	2. issues related to materials, processes of production, production management, transport and services, entrepreneurship, quality management, finance and accounting
	Skills:
	1. independently undertake engineering business activities, recognising their systemic and non-technical aspects; the student has the ability to self-educate
	2. apply health and safety regulations at work, manage personnel and finances
	Social competence:
	1. demontrate ethical behaviour within assigned organisational and social roles, is able to take responsibility for assigned tasks
Pre-requisites	Management
Course contents	Meaning, nature and importance of business finance. Classification the various sources of business finance. Evaluation merits and limitations of various sources of finance. Identification the international sources of finance. Factors that affect the choice of an appropriate source of finance. Introduction to sources of corporate finance - equity and debt, long and short term. Investment and working capital loans for companies. Leasing. Venture Capital. Business Angels. Crowdfunding. Factoring. Corporate stocks and bonds. Forfaitng. Franchising. Loan and guarantee funds. Advantages and disadvantages of key sources of financing.
References	Obligatory: 1. Business finance. Theory and practice. McLaney E. 2021. 2. Business finance. Watts B.1997. 3. Financial Planning & Analysis and Performance Management. Wiley J., A. 2018. Recommended: 1. The Intelligent Investor. Graham B., Zweig J., Buffett W. 2005. 2. Found Money: Simple Strategies for Uncovering the Hidden Profit and Cash Flow in Your Business. Wilkinghoff S. 2019.

Teaching methods	Didactic methods: lecture with the use of presentations multimedia presentations, discussion, execution of the project, solving problem tasks
Assessment methods	K - written test (lectures) S - control paper (project), written colloquium (classes) SC - control paper (project), written test (classes)
ECTS credits balance	Contact: Lecture - 15 hours (0.6 ECTS) Auditory classes – 10 hours (0.4 ECTS) Laboratory classes – 20 hours (0.8 ECTS) Consultation - 2 hours (0.08 ECTS) Non-contact: Project preparation - 16 hours (0.64 ECTS) Literature study - 10 hours (0.4 ECTS) Preparation for classes and auditory classes - 12 hours (0.48 ECTS) Preparation for colloquium - 15 hours (0.6 ECTS) The total student workload is 100 hours, which corresponds to 4 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Lecture - 15 hours (0.6 ECTS) Auditory classes – 10 hours (0.4 ECTS) Laboratory classes – 20 hours (0.8 ECTS) Consultation – 2 hours (0.08 ECTS) The total academic teacher workload is 47 hours, which corresponds to 1.88 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W12 K2 – ZI_W13 S1 – ZI_U06 S2 – ZI_U10 SC1 – Z1_K04

The name of the field study	Management and Production Engineering
Course title	Ecology and environmental management
Language	English
Type of the course	obligatory
Level of study	First cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	PhD. Artur Serafin, associate professor
Didactic unit offering a course	Department of Environmental Engineering and Geodesy
Objective of the course	Transfer of programmatic contents concerning issues of interactions between anthroposphere and biosphere and mutual interactions between all components of biotic and abiotic environment, acquiring abilities to apply ecological laws in practice, perceiving relations between degree of pollution of the natural environment and ecological condition of the biosphere. Familiarizing students with selected areas of environmental management and introducing basic principles of creating and functioning environmental management systems in enterprises (EMAS), shaping ethical and social sensitivity and a sense of responsibility for the environment in connection with decisions and processes of living and economic activities.
Learning outcomes	Knowledge:
	1. The student knows and can define basic terms and principles of functioning of the natural environment on the level of autecology, synecology, branch ecology and in relation to protection and shaping of the environment.
	2. He has knowledge and can identify and recognize the relationship of the biosphere with the geospheres: atmosphere, hydrosphere and lithosphere and has knowledge about the basic types of aquatic, wetland and terrestrial ecosystems and can characterize them.
	3. Has knowledge about the processes of implementation and operation of environmental management systems in organizational units.
	Skills:
	1. The student is able to make calculations and is able to show the ability of correct inference and make simple meaning analysis as classification, comparison, distinction of basic notions, processes or ecological schemes.
	2. Is able to use the knowledge in practice to identify, describe and analyze aspects and environmental problems concerning the activity of the organizational unit and functioning of its natural environment.
	3. Is able to analyze the habitat features of a given natural object on the basis of species composition, indicator numbers of vascular plants and indices of habitat anthropophytization. Student can also select and use the tools of environmental management, including: searching and processing information, interpreting legal regulations, assumptions of ecological policy and recognize and characterize environmental programs, norms and standards in the functioning of organizational units in order to justify specific actions and decisions.
	Social competence:
	1. Student is able to undertake discussion on ecological issues and defend his opinions basing on rational arguments, he is aware of

<table>
<tr><td></td><td>the significance of components of living and non-living nature in shaping of anthroposphere and influence of human activity on shape of geospheres and biosphere.</td></tr>
<tr><td></td><td>2. Student is aware of the significance of professional responsibility for environmental management processes and accepts the necessity of taking environmental protection aspects into account when making decisions and in economic activity.</td></tr>
<tr><td></td><td>3. Recognizes and explains the role of modern environmentally friendly systems (strategies, technologies) in the processes of transformation of modern organizations.</td></tr>
<tr><td>Pre-requisites</td><td>biology, chemistry, environmental protection at the high school level</td></tr>
<tr><td>Course contents</td><td>Definition of ecology, typological division and place of ecology within the natural sciences. Basic ecological processes in autecology and synecology. Ecological systems and the circulation of matter and energy flow. Food chains and the problem of ecological succession. Problems of protection and formation of the atmosphere, lithosphere and hydrosphere. Functioning of the basic types of ecosystem. Fire as an ecological factor. Relationships between man and the environment. Ecological economy - ecology versus economics, building ecological economy (eco-development), dysfunctions. Analysis of macrosystem environment-society-economy. Basic concepts and theoretical basis of building environmental management system. Review of tools and analysis of national institutions of environmental management. Environment as a natural capital in enterprise activity. Environmental protection in the structure of company goals. Legal and economic conditions of pro-environmental companies. Benefits, barriers and costs of environmental management system. Responsibility of employers and employees in environmental management. Principles of functioning: Clean Production Programme, Responsibility and Care Programme, EMAS, ISO 14001 environmental management standards. Identification and evaluation of environmental aspects and problems related to the activities of enterprises. Safety and ecological risk management Integrated permits. Environmental charges. Analysis of selected environmentally friendly techniques and technologies. LCA.</td></tr>
<tr><td>References</td><td>1.Begon M., Townsend C.R., Harper J. L. Ecology: From Individuals to Ecosystems. Willey-Blackwell Publ., 2004;
2.Odum E.P., Barret. 2004. Fundamentals of Ecology. Hardbook, 2004;
3.Pallister J. Environmental Management. Oxford University Press, 2017;
4.Sankar A.R.N. Environmental Management. Oxford University Press, 2015.</td></tr>
<tr><td>Teaching methods</td><td>lectures, classes, group work, field work, projects, presentations</td></tr>
<tr><td>Assessment methods</td><td>completion of reports and classes, preparation of the elaboration, oral discussion, grade from the thematic colloquium, subject exam.
K1, K2, K3 – classes, thematic colloquium, subject exam,
S1, S2, S3 – elaboration, discussion and field work,
SC1, SC2, SC3 – group work and presentations.</td></tr>
<tr><td>ECTS credits balance</td><td>
<table>
<tr><td colspan="3">CONTACT</td></tr>
<tr><td>Form of course</td><td>Number of hours</td><td>ECTS credits</td></tr>
<tr><td>Lectures</td><td>15</td><td>0.60</td></tr>
<tr><td>Classes</td><td>30</td><td>1.2</td></tr>
<tr><td>Consultations</td><td>2</td><td>0.08</td></tr>
<tr><td>Exam</td><td>2</td><td>0.08</td></tr>
<tr><td>Total contact</td><td>49</td><td>1.96</td></tr>
<tr><td colspan="3">NON-CONTACT</td></tr>
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	preparation for classes	12	0.48
	preparation of reports	11	0.44
	literature study	12	0.48
	preparation for the exam	16	0.64
	TOTAL non-contacts/ ECTS credits	**51**	**2.04**
Workload related to classes requiring the direct participation of an academic teacher	Lectures	15	0.60
	Classes	30	1.2
	Consultations	2	0.08
	Exam	2	0.08
	TOTAL with direct involvement of the teacher	**49**	**1.96**
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2, K3 - ZI_W01; ZI_W02 ; ZI_W04; ZI_W05; ZI_W07; S1, S2, S3 - ZI_U01; ZI_U05; ZI_11; SC1, SC2, SC3 - ZI_K01; ZI_K02		

The name of the field study	Management and Production Engineering
Course title	Informatics and computer-aided engineering
Language	English
Type of the course	obligatory
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	I
Semester of study	2
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	Elżbieta Kubera, PhD
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	The objectives of the module are: • Obtaining general knowledge about computer science and its fields. Acquiring theoretical foundations and skills to perform calculations and data analysis in Python and Excel spreadsheets Acquiring the ability to create simple algorithms and write Python programs with the use of basic control instructions, file operations and external modules
Learning outcomes	Knowledge:
	1. The graduate knows and understand standardised methods and tools of information technology to collect, analyse and present economic and social data in the field of Management and Production Engineering
	2. The graduate knows the fundamentals of algorithmization and programming
	3. He or she knows basic methods, techniques and computer tools that are used to solve simple engineering tasks in the field of production systems engineering
	Skills:
	1. The graduate can plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions
	2. The student is able to use analytical, simulation, and experimental methods to formulate and solve engineering tasks and simple research problems. He or she is able to use appropriate methods and tools to solve engineering tasks characteristic of the studied field, including the limitations of these methods and tools.
	3. The graduate is able to program simple and some more complex algorithms in Python. He or she can use advanced functions of spreadsheets to analyze, visualize data and solve optimization tasks. He or she can use information obtained from various sources - also in a foreign language - to prepare own works with respect to copyright
	Social competence:
	1. The graduate is aware of the level of their knowledge and skills. He or she is ready for continuous training and independent acquisition of knowledge, as well as improvement of professional and personal competences
	2. The graduate is aware that a complex problem can often be solved in stages by splitting it into a number of simpler tasks.
Pre-requisites	Knowledge of: the Windows operating system, basic mathematical facts, and theories, nowadays information technologies
Course contents	1. Excel - advanced functions 2. Solver add-in - optimization tasks

	3. Python syntax 4. Strings 5. Conditional statement, lists, random numbers 6. for and while loops 7. NumPy library 8. File operations and graphs 9. Operations on polynomials. Approximation and interpolation of functions 10. Numerical analysis in Python 11. Time series 12. Complex types 13. Subprograms, procedures and user functions, recursive functions 14. Object-oriented programming - classes and objects
References	1. Eric Matthes, 2016. Python Crash Course, No Starch Press. (*) 2. Bourg David M., 2006, Excel Scientific and Engineering Cookbook, O'Reilly. (*) 3. Paul Barry. 2016. Head-First Python, 2nd edition, O'Reilly. Anthony Scopatz, Kathryn D. Huff. 2015. Effective Computation in Physics: Field Guide to Research with Python, O'Reilly
Teaching methods	Didactic forms: lecture (15h), tutorials (10h), and laboratory exercises with computers (20h). Activities: development and access to course resources on the e-learning platform. Teaching methods: demonstration, instruction, task implementation, discussion
Assessment methods	K1, K2, K3 . The test checking the knowledge in the field covered by the learning effects at the end of the semester. Active participation in exercises, and oral answers in class. S1, S2, S3. Participation and activity during exercises. Preparation of homework, participation in group discussions. SC1, SC2. Performing homework and preparing for the final test. Documentation of the results achieved: group and individual tasks, final test.
ECTS credits balance	Workload related to the activities requiring the direct participation of academic teachers: - participation in lectures - 15 hours/0.6 ECTS points - participation in tutorials and laboratory classes - 30 hours/1.2 ECTS points - participation in consultations - 2 hours/0.08 ECTS points A total of 47 hours, corresponding to 1.88 ECTS points Workload related to the activities not requiring the direct participation of academic teachers: - preparation for exercises - 20 hours/0.8 ECTS points - finishing laboratory exercises at home - 20 hours/0.8 ECTS points - preparation for tests - 13 hours/0.52 ECTS points A total of 53 hours, corresponding to 2.12 ECTS points The total student workload is 100 hours, which corresponds to 4 ECTS credits
Workload related to classes requiring the direct participation of an academic teacher	Workload related to the activities requiring the direct participation of academic teachers: - participation in lectures - 15 hours - participation in tutorials and laboratory classes - 30 hours

	- participation in consultations - 2 hours A total of 47 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W11 K2, K3 - ZI_W14 S1, S2, - ZI_U02, ZI_U04, ZI_U05 S3 - ZI_U01 SC1, SC2 - ZI_K01, ZI_K03

Field of study	Management and Production Engineering
Name of the training module including the Polish name	Język obcy – 2 -Polski A2 Foreign Language – 2 – Polish A2
Language of instruction	English/Polish
Type of the training module	obligatory
Level of the training module	first-cycle
Form of studies	full-time
Location in the programme (year)	II
Location in the programme (semester)	3
Number of ECTS credits with a division into contact/noncontact	2 (1.28/0.72)
Name and surname of the person in charge	M.A. Ewa Badurowicz
Unit offering the subject	Foreign Languages Teaching and Certification Centre
Aim of the module	The aim of the classes is to familiarise the students with the basic linguistic and communication skills: speaking, listening comprehension, reading comprehension, writing, assuming basic roles and communicating in simple and typical daily life situations and at work requiring communication.
Learning outcomes	Skills:
	S1.Creating simple sentences and short speeches about oneself and the nearest environment
	S2. Understanding short recorded dialogues and thematic speeches related to daily life situations and at work
	S3. Ability to write Polish letters, words and short massages within the minimum vocabulary range required for the level
	S4. Understanding read sentences, text fragments and short dialogues including the minimum vocabulary range required for the level, including basic management and engineering vocabulary
	Social competences:
	SC1. Understanding the importance of lifelong learning
Preliminary and additional requirements	Preliminary and additional requirements are not demanded.
Contents of the training module – a compact description	The objective of the module is: - to familiarise the students with basic words and phrases enabling to realise the following communication functions: inviting to a meeting, arranging and negotiating the time and place of a meeting, ordering in a cafe or in a restaurant, as well as paying compliments; students know the names of days, months, seasons and weather, can use, e. g. the verbs, „zamawiać", płacić, ustalać, przesuwać i odwoływać termin, ordinal numbers 1-31 and express dates, - to teach the students the use of clauses of reason with connections: „ponieważ, bo, dlatego, że…", - to familiarise the students with basic words and phrases related to the means of transport, naming various city places, and determining their location, as well as practicing asking for and giving directions; students can use the verb „iść" and „jechać" prepositions „w' and „do" and questions: Kiedy?, Gdzie?, Dokąd?, Z kim?, - to enable the students to ask for the time (formal), understand and say, what time is it? – questions: Która godzina? O której godzinie?, -to enable the students to tell about the family and pets, to say, what you and others like and dislike doing, to ask about and say one's age and to get to know the vocabulary related to family members and leisure activities, the words: rok, lat, lata. Grammar: possessive pronouns in nominative case
Recommended and obligatory reading list	1. „Start Survival Polish" K.Dembinska, A. Małyska – podręcznik do nauki języka polskiego + zeszyt ćwiczeń 2. „Start 2" Beginner Polish K. Dembińska, A. Małyska - Podręcznik do nauki języka polskiego + zeszyt ćwiczeń 3. „ Polski Krok po kroku" Iwona Stemperek, Anna Stelmach – podręcznik do nauki języka polskiego Poziom 1

	4. „Polskie czytanki" – Wioletta Gurdak, Wojciech Sosnowski – Język polski dla obcokrajowców 5. Hurra!!! Odkrywamy język polski. Gramatyka dla uczących się języka polskiego jako obcego, Liliana Madelska 6. „Gramatyka języka polskiego. Podręcznik dla cudzoziemców.", Barbara Bartnicka, Halina Satkiewicz 7. www.mfiles.pl
The intended forms/activities/ teaching methods	Teaching methods: discussion, lecture, explanation, conversation, audio recordings, direct method, communicative approach, individual and team work, language games,
Methods of verification and documentation forms of the achieved learning outcomes	S1 – assessment of oral expression during the classes S2 – assessment of oral expression during the classes S3 – assessment of written expression as a homework S4– written test SC1 – assessment of preparation for the classes and of involvement and participation in classes Documentation forms of the achieved learning outcomes: midterm test kept for 1 year teacher's register kept for 5 years Assessment criteria are available in Foreign Languages Teaching and Certification Centre
Impact of selected compounds to final grade	The condition for passing the semester is class attendance and a passing grade verified by: - written tests - 50% - oral statements - 25% - written essays - 25%. A student may obtain a mark higher by half a grade if he/she demonstrates 100% attendance and eagerly takes part in class activities.
Balance of ECTS credits	Contact hours: Participation in classes: 30 h Office hours: 2 h **Total number of contact hours: 32 h/1.28 ECTS** Non-contact hours: Preparation for classes: 15 h Preparation for test: 3 h **Total number of non-contact hours: 18 h/0.72 ECTS** **There are 50 hours of the total student workload which is equal to 2 p. ECTS**
Number of contact hours	Participation in classes: 30 h Participation in office hours: 2 h **32 hours in total which is equal to 1.28 p. ECTS**
Relating modular learning outcomes to directional learning outcomes	S1 – ZI_U01 S2 – ZI_U01 S3 – ZI_U01 S4 – ZI_U01 SC1 – ZI_K03

The name of the field study	Management and Production Engineering
Course title	Art of negotiation
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	2 (1.24/0.76)
Academic title/degree, name and surname of the person responsible for the course	Paweł Krzaczek, PhD
Didactic unit offering a course	Department of Power Engineering and Transportation
Objective of the course	The aim of the course is to discuss the issues of conducting and resolving conflicts of interest in negotiation situations. Specific goals include the student's acquisition of knowledge regarding the negotiation process, its phases, analysis of solutions and goals in negotiations, and assessment of the impact of external and internal conditions on the negotiation process. Additionally, emphasis will be placed on acquiring knowledge and skills in using negotiation techniques and strategies in order to achieve the intended negotiation goals.
Learning outcomes	Knowledge:
	K1. Has knowledge of the negotiation process, its phases, analysis of solutions and negotiation goals.
	K2. Knows the issues of interpersonal interactions and behawior
	Skills:
	S1. Is able to recognize conflict situations and define the interests of the parties and present proposals for solving the problem.
	S2. Is able to choose an adequate strategy and negotiation techniques in relation to the conditions of the negotiation process.
	S3. Is able to diagnose and solve problems related to manipulative situations in interpersonal contacts.
	Social competence:
	Sc1. Is able to communicate effectively with co-workers and the environment and to argue for his reasons - he is able to cooperate and work in a group.
	Sc2. Is willing to express opinions and convey his knowledge using various media.
	Sc3. Is aware of the need to undertake self-education, update knowledge and improve skills in the field of negotiation techniques.
Pre-requisites	They are not necessary
Course contents	The subject of education is the issue of conducting and resolving conflicts of interest in negotiation situations. Specific goals include the student's acquisition of knowledge regarding the negotiation process, its phases, analysis of solutions and goals in negotiations, and assessment of the impact of external and internal conditions on the negotiation process. The aim is also to acquire knowledge and skills in using negotiation techniques and strategies in order to achieve the intended negotiation goals. Aspects of levels of representation in negotiations, verbal and non-verbal communication will be discussed. Additionally, attention will be paid to the mechanisms of psychomanipulation.
References	Only optional literature R.J. Lewicki, D.M. Sunders, B. Barry. Essentials of Negotiation. McGraw-Hill Education, 2020 T. Castle. The Art of Negotiation. Timothy Castle 2018

Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises in the interpretation of situations, techniques for stimulating creative thinking (e.g. brainstorming), work in small groups, individual presentations by students, discussion in the forum of the entire exercise group, confrontation of different student positions through practical exercises, e.g. role-playing.
Assessment methods	K 1-2. A colloquium testing knowledge of negotiation processes S 1-2. Participation in individual and group discussions. Performing tasks and notes on an online platform supporting the course. Sc. 1-3. Participation in workshops, making voluntary reports and presentations. Oral answers during classes, activity. Detailed criteria for assessing exams and control papers 1) the student demonstrates a sufficient (3.0) degree of knowledge or skills when he or she obtains from 51 to 60% of the total points determining the maximum level of knowledge or skills in a given subject (respectively, in the case of a partial pass - its part), 2) the student demonstrates a sufficient plus (3.5) degree of knowledge or skills when he or she obtains from 61 to 70% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 3) the student demonstrates a good degree (4.0) of knowledge or skills when he obtains from 71 to 80% of the total points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 4) the student demonstrates a plus good degree (4.5) of knowledge or skills when he or she obtains from 81 to 90% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 5) a student demonstrates a very good degree (5.0) of knowledge or skills when he or she obtains more than 91% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part)
ECTS credits balance	**CONTACT** **Form of classes Number of hours. ECTS points** Lecture 30 h. 1.20 points. ECTS Consultations 1 h 0.04 points. ECTS **Total contact time 31 h. 1.24 points. ECTS** **NON-CONTACT** Preparation presentation 10 h. 0.40 points. ECTS Preparation to the colloquium 5 h. 0.20 points. ECTS Studying literature 4 h. 0.16 points. ECTS **Total non-contact 19 h. 0.76 points. ECTS** **The total student workload is 50 hours. which corresponds to 2 points. ECTS**
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 30 h. Participation in consultations –1 h **Total 31 hours which is 1.24 points. ECTS**
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W02, ZI_W07 K2 – ZI_W09 S1 – ZI_U02 S2 – ZI_U02, ZI_U09 S3 – ZI_U06 Sc1 - ZI_K01 Sc2 – ZI_K02 Sc3 – ZI_K03, ZI_K04

The name of the field study	Management and Production Engineering
Course title	Business negotiations
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	2 (1.24/0.76)
Academic title/degree, name and surname of the person responsible for the course	Paweł Krzaczek, PhD
Didactic unit offering a course	Department of Power Engineering and Transportation
Objective of the course	The aim of the course is to discuss the issues of conducting the negotiation process in business activity. Attention will be paid to issues related to resolving internal and external conflicts of companies. Specific goals include the student's acquisition of knowledge regarding recognizing and anticipating conflict situations, adopting negotiation styles, working at individual stages of negotiations, and assessing the impact of internal and external organizational conditions. Additionally, emphasis will be placed on acquiring knowledge and skills in using negotiation techniques and strategies to achieve strategic and tactical negotiation goals.
Learning outcomes	Knowledge:
	K1. Has knowledge of the negotiation process in enterprises, its stages, negotiation techniques and the adoption of goals
	K2. Knows the issues of interpersonal and intra-organizational interaction and behavior
	Skills:
	S1. Is able to recognize and anticipate conflict situations, define the interests of the parties and present proposals for solving the problem.
	S2. Is able to choose an adequate strategy and negotiation techniques in relation to internal and external conditions
	S3. Is able to diagnose and solve problems related to manipulative situations in interpersonal contacts in business and everyday life
	Social competence:
	SC1. Is able to communicate effectively with co-workers and the economic environment, convince people to support their arguments, and is able to cooperate in a group.
	SC2. Is willing to express opinions and convey his knowledge using various media.
	SC3. Is aware of the need to undertake self-education and update knowledge as well as improve skills in the field of negotiation techniques in the economic sphere
Pre-requisites	They are not necessary
Course contents	The subject of education is the issue of conducting and resolving conflicts of interest in economic reality. Specific goals include the student's acquisition of knowledge regarding the negotiation process, its individual stages, strategic goals and objectives in negotiations, and assessment of the impact of external and internal conditions on the negotiation process. The aim is also to acquire knowledge and skills in using negotiation techniques and strategies in order to maintain one's own interests and the company's. Aspects of representation at the level of a sole proprietorship, medium-sized enterprise and

	large entities will be discussed. Discussion of the communication process at the level of verbal and non-verbal communication. Additionally, attention will be paid to the mechanisms of psychomanipulation.
References	Only optional literature R.J. Lewicki, D.M. Sunders, B. Barry. Essentials of Negotiation. McGraw-Hill Education, 2020 T. Castle. The Art of Negotiation. Timothy Castle 2018
Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises in the interpretation of situations, techniques for stimulating creative thinking (e.g. brainstorming), work in small groups, individual presentations by students, discussion in the forum of the entire exercise group, confrontation of different student positions through practical exercises, e.g. role-playing.
Assessment methods	K 1-2. A colloquium testing knowledge of negotiation processes S 1-3. Participation in individual and group discussions. Performing tasks and notes on an online platform supporting the course. Sc. 1-3. Participation in workshops, making voluntary reports and presentations. Oral answers during classes, activity. Detailed criteria for assessing exams and control papers 1) the student demonstrates a sufficient (3.0) degree of knowledge or skills when he or she obtains from 51 to 60% of the total points determining the maximum level of knowledge or skills in a given subject (respectively, in the case of a partial pass - its part), 2) the student demonstrates a sufficient plus (3.5) degree of knowledge or skills when he or she obtains from 61 to 70% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 3) the student demonstrates a good degree (4.0) of knowledge or skills when he obtains from 71 to 80% of the total points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 4) the student demonstrates a plus good degree (4.5) of knowledge or skills when he or she obtains from 81 to 90% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part), 5) a student demonstrates a very good degree (5.0) of knowledge or skills when he or she obtains more than 91% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part)
ECTS credits balance	**CONTACT** **Form of classes Number of hours. ECTS points** Lecture 30 h. 1.20 points. ECTS Consultations 1 h 0.04 points. ECTS **Total contact time 31 h. 1.24 points. ECTS** **NON-CONTACT** Preparation presentation 10 h. 0.40 points. ECTS Preparation to the colloquium 5 h. 0.20 points. ECTS Studying literature 4 h. 0.16 points. ECTS **Total non-contact 19 h. 0.76 points. ECTS** **The total student workload is 50 hours. which corresponds to 2 points. ECTS**

Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 30 h. Participation in consultations –1 h **Total 31 hours which is 1.24 points. ECTS**
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W02, ZI_W07 K2 – ZI_W09 S1 – ZI_U02 S2 – ZI_U02, ZI_U09 S3 – ZI_U06 Sc1 - ZI_K01 Sc2 – ZI_K02 Sc3 – ZI_K03, ZI_K04

The name of the field study	Management and Production Engineering
Course title	Ergonomics, work safety and protection of intellectual property
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	3 (1.84/1.16)
Academic title/degree, name and surname of the person responsible for the course	PhD Anna Pecyna
Didactic unit offering a course	Department of Technology Fundamentals
Objective of the course	The aim of the module is to familiarize students with interdisciplinary ergonomic knowledge and regulations relating to the legal basis of labor protection and occupational health and safety regulations in Poland and the European Union. Presentation of legal regulations in the field of intellectual property (elements of copyright and related rights and industrial property rights).
Learning outcomes	Knowledge:
	1. Has general knowledge of ergonomics, understands the role of humans in the work process and knows the principles of operation of the man-machine-environment system, taking into account workload. Has knowledge of methods for determining occupational risk and threats in the work environment.
	2. Knows and understands the basic concepts and principles of intellectual property and copyright protection.
	Skills:
	1. Has the ability to independently evaluate the ergonomics of workstations and interpret the human role in the work process
	2. Analyzes technical solutions and working environment conditions in terms of meeting ergonomics and health and safety requirements.
	3. Is able to use patent and registration information resources (literature, databases and other selected sources).
	Social competence:
	1. Is aware of the need to comply with the principles of teamwork and be responsible for jointly implemented activities.
	2. Understands the need to respect the rights of creators and other authorized entities.
Pre-requisites	No modules are required
Course contents	Lectures include: Ergonomics as an interdisciplinary science, subject, scope, tasks and goals, genesis and development. Human-technical object system - basic functions of the system. Mental and physical burden on the employee. Diagnostics in ergonomics, optimization of working conditions. Spatial structure of workplaces - requirements for the transmission and reception of information. Work organization and working time. Fatigue – causes, forms, consequences, prevention. Legal protection of work. Identification of threats and assessment and analysis of occupational risk. Dangerous, harmful and burdensome factors in the work environment. Analysis of the causes and circumstances of accidents. Intellectual property protection - basic concepts. Copyright and related rights. Exclusive rights to inventions, utility models, industrial designs, trademarks. Patent protection.

	Classes include: Estimated methods for assessing physical and mental load. The capacity and efficiency of the employee's body. Diagnostics in ergonomics. Practical use of ergonomic principles in designing the spatial structure of workplaces, anthropometric measurements, organization of the visual field. Physical, chemical and biological factors in the work environment - division and measurements. Management of occupational health and safety, the use of legal acts in organizing working conditions. Occupational risk assessment at workplaces. Protection of geographical indications of origin. Patent protection – procedure for acquiring protection rights/exclusive rights.
References	Garry Hunt "Health and Safety Pocket Book" Taylor & Francis Ltd, 2018 Jeremy Stranks "Health and Safety at Work" Kogan Page Ltd, 2016 Chrimes John "Safety First: English for Health and Safety Resource Book with Audio CDs B1" Garnet Publishing Ltd. Robert Bridger "Introduction to Human Factors and Ergonomics" Knowledge Sharing Events 2017. Piotr Machnikowski, Agnieszka Górnicz-Mulcahy, Justyna Balcarczyk „Intellectual property law in Poland" Kluwer Law International 2020 Additional literature: Labor Code, implementing regulations
Teaching methods	lecture, classes, discussion, individual student presentations, exercise report
Assessment methods	K1, K2 – final grade, preparation of presentation, oral answers during classes S1, S2 – preparation of worksheets/exercise reports, activity during classes, oral answers during classes S3 – evaluation of presentations, activity during classes SC1, SC2 – participation in class discussions, group work during classes, observation of student involvement. Forms of documenting achieved learning outcomes: archiving final tests, worksheets/class reports, presentations, instructor's diary.
ECTS credits balance	- participation in lectures – 15 hours 0.6 ECTS, - participation in classes – 30 hours 1.2 ECTS, - participation in consultations – 1 hour 0.04 ECTS, - preparation for classes – 8 hours 0.32 ECTS, - studying literature – 7 hours 0.28 ECTS, - preparation for passing – 14 hours. 0.56 ECTS. The total student workload is 75 hours. which corresponds to 3 points. ECTS.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours 0.6 ECTS, - participation in classes – 30 hours 1.2 ECTS, - participation in consultations – 1 hour 0.04 ECTS, Total 46 hours which corresponds to 1.84 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W04, InzZI_W01 K2 – ZI_W08 S1 – ZI_U08 S2 – ZI_U10 S3 – ZI_U01 SC1 – ZI_K01 SC2 – Zi_K04

The name of the field study	Management and Production Engineering
Course title	Application software packages
Language	English
Type of the course	obligatory
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	3 (1.28/1.72)
Academic title/degree, name and surname of the person responsible for the course	Kamila Klimek, PhD DSc
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	The aim of the module is to provide general knowledge about cloud computing, selected application programs for creating documents, calculation sheets, and in particular selected tools available on Google Drive. Getting to know how to model and analyze data in Microsoft Power Pivot.
Learning outcomes	Knowledge:
	K1. Has basic knowledge enabling the use of selected application programs. Knows and understands the concept of software licenses.
	Skills:
	S1. Is able to select and use the appropriate program to accomplish a specific task.
	S2. Has the ability to acquire information in order to self-educate in the use of selected application programs.
	Social competence:
	SC1. Able to work independently and in a group; is aware of responsibility for jointly performed tasks related to teamwork.
	SC2. Is aware of independently acquiring and improving knowledge and skills in the field of application software.
Pre-requisites	Completing the subject Information technology
Course contents	This subject covers issues related to the idea of the cloud. Selected tools available in Google Drive: Google Docs, Sheets and Slides, Google Drawings, Google Forms, GeoGebra, PDF to Word Converter, PDF Merge and PDF Split, ProjectWork. Data modeling and analysis with Microsoft Power Pivot.
References	Required literature: 1. ECDL. Word processing. Kopertowska-Tomczak Mirosława. PWN Scientific Publishing House. 2009. 2. Cloud security. Dotson Chris. PWN Scientific Publishing House. 2020. 3. Systems analyst. Preparation for the requirements engineering exam. Zmitrowicz Karolina. PWN Scientific Publishing House. 2015. 4. Software testing in practice. Roman Adam, Zmitrowicz Karolina. PWN Scientific Publishing House. 2017. Recommended literature: tutorial for selected programs
Teaching methods	Didactic forms: auditorium excersises (10 hours) and laboratory excersises with a computer (20 hours). Activities: development and access to course resources on the e-learning platform. Teaching methods: demonstration, instruction, task implementation, discussion

Assessment methods	K1. A colloquium testing knowledge in the field covered by the learning outcomes at the end of the semester. Active participation in exercises and oral answers during classes. Preparing an independent final project. S1, S2. Participation and activity during exercises. Preparing control work and participating in individual and group discussions. SC1,SC2. Oral answer, individual and group work, preparation for final paper and colloquium. Documentation of obtained results: group and individual tasks, final project.
ECTS credits balance	**CONTACT:** Participation in laboratory exercises: 30 hours. Consultations: 2 hours **Total contact:** 32 hours / 1.28 ECTS **NON-CONTACT:** Preparation for classes: 23 hours Preparation for the colloquium: 20 hours **Total non-contact:** 43 hours / 1.72 ECTS The total student workload is 75 hours. which corresponds to 3 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Participation in auditorium and laboratory classes: 30 hours. Consultations: 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Area Code Effect K1 - ZI_W11 S1 - ZI_U01 S2 - ZI_U09 SC1 - ZI_K04 SC2 - ZI_K05

The name of the field study	Management and Production Engineering
Course title	**Labor market**
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	full-time study
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	Assoc. Prof. Magdalena Kachel-Górecka
Didactic unit offering a course	Department of Machine Operation and Production Processes Management
Learning outcomes	The aim of the course is to introduce issues related to the contemporary labour market. The knowledge obtained in the lectures will enable students to successfully enter the labour market, analyse current problems and manage their own careers in a conscious and responsible manner.
Learning outcomes	Knowledge:
	K1. It has a basic knowledge of the functioning of the labour market and knows the relationships and dependencies between its basic categories.
	K2. The student will be able to distinguish and describe conditions and key trends of contemporary changes on the labour market in Poland and other European and non-European countries.
	Skills:
	S1. Using information obtained from various sources. Student is able to describe, analyse and discuss various processes/problems in the labour markets and assess the links between processes in the economy and the labour market situation.
	Social competence:
	SC1. Student is ready to navigate the labour market, define priorities for the implementation of various tasks and understands the need for independent knowledge acquisition and possesses professional and research skills, as well as inspiring others to improve their professional, personal and social competences, regardless of their age.
Pre-requisites	No pre-requisites
Course contents	The concept and functions of the labour market. Demand for labour. Supply of labour. Equilibrium in the labour market. Resource and stream analysis of the labour market. Basic indicators of the labour market. Comparative analysis of indicators in Poland and other European Union countries. Unemployment - essence, types, causes, effects of unemployment in Poland and in the world - comparative analysis. Theory of human capital. Labour market policy in the European Union. European Employment Strategy. Discrimination and segmentation in the labour market. Labour market institutions. Labour market regulations. Types of employment contracts. Employment contracts. Job searching. Principles of a correct CV. Cover letter. The job interview.
References	Primary literature: 1. HBR Guide to Coaching Employees Search, HBR guids, Harvard Business Review Press, 2014, Boston

	2. Human Resource Management, Ivancevich J.M., Konopaske R. McGraw Hill Book CO, 2013, New York Supplementary literature: 3. Reports prepared by Statistics Poland https://stat.gov.pl/en/topics/labour-market/?contrast=default 4. Reports and data prepared by the european commission, https://eures.ec.europa.eu/living-and-working/labour-market-information/labour-market-information-poland_en 5. Reports prepared by the Ministry of Mamily and Social Policy Republic of Poland https://www.gov.pl/web/family/the-labour-market-is-changing
Teaching methods	Lecture
Assessment methods	Knowledge: K1 – writting test K2 – writting test Skills: S1 – writing test Social competence: SC1 – discussion during lectures and activity
ECTS credits balance	Number of contact hours: Participation in lectures – 30 hours Participation in consultations – 2 hour Total contact hours: 32 hours/1.28 ECTS Number of non-contact hours: Literature study – 14 hours Preparation for the test – 4 hours Total no contact 18 hours/0.72 ECTS The total student workload is 50 hours which is 2 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 30 hours Participation in consultations – 2 hour Total contact hours: 32 hours/1.28 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI-W09 K2 – ZI-W12 S1 – ZI-U01 SC1 – ZI-K03

The name of the field study	Management and Production Engineering/Management and Food Engineering
Course title	Cost calculation for engineers
Language	English
Type of the course	~~obligatory~~/elective
Level of study	First cycle studies
Form of study	S-full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	4.00 ECTS (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Prof. Edmund Lorencowicz
Didactic unit offering a course	Department of Machine Operation and Production Process Management
Objective of the course	The aim of the module is to familiarize students with the basic dependencies and factors influencing costs as well as various methods of calculating production and service costs.
Learning outcomes	Knowledge:
	K1. Basic economic knowledge enabling the description and analysis of factors influencing costs.
	K2. Basic knowledge about costs calculation.
	Skills:
	S1. Ability to use information obtained from various sources to conduct cost analyses
	Social competence:
	SC1. Team work, organization and management of teams
Pre-requisites	Subjects: „Macroeconomics" & „Microeconomics"
Course contents	Cost definition, classification criteria and variability analysis. Valuation of consumption of production factors. Assessment of operating costs of technical means. Cost calculation methods. Cost calculation for seasonal and coupled production. Cost calculation systems. Using variable costing to make decisions and short-term assessment of their effectiveness. Sensitivity analysis and determination break-even point. Analysis of the break-even point of multi-assembly production (segment analysis)
References	1. Hunt D. Farm power and machinery management. 2001. Iowa State University Press, pp.367 2. Hunt D. 1986. Engineering model for agricultural production. The AVI Publishing Company, pp.260 3. Landers A. 2000. Farm machinery selection, investment and management. Farming Press, Kent, pp.152 4. Theunissen Ph. 2002. An economical approach to agricultural machinery management. Computus Management Information (pty) Ltd, Betlehem, pp.256
Teaching methods	Lectures; classes; team/group work; the calculation classes; discussion
Assessment methods	K1, K2 – written colloquiums, written exam S1- Project – analysis of machinery operation costs SC1 - Activity and participation in discussions
ECTS credits balance	- participation in lectures - 15 h - participation in classes – 30 h - preparing to classes – 15 h - completing tasks - 5 h - solving tasks independently at home – 10 h - studying literature – 5 h - preparation for the colloquiums – 6 h - preparation for the exam – 10 h - consultations - 2 h - participation in the exam – 2 h

	Total 100 h it means 4.00 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Lectures - 15 h Classes - 30 h Consultations – 2 h Participation in the exam – 2 h Total 49 h – 1.96 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 - ZI_W01, ZI_W02 S1 - ZI_U01 SC1 - ZI_K01

The name of the field study	Management and Production Engineering/Management and Food Engineering
Course title	Cost analysis
Language	English
Type of the course	~~obligatory~~/elective
Level of study	First cycle studies
Form of study	S-full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	4.00 ECTS (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Prof. Edmund Lorencowicz
Didactic unit offering a course	Department of Machine Operation and Production Process Management
Objective of the course	The aim of the module is to familiarize students with the basic dependencies and factors influencing costs as well as various methods of calculating production and service costs.
Learning outcomes	Knowledge:
	K1. Basic economic knowledge enabling the description and analysis of factors influencing costs.
	K2. Basic knowledge about costs calculation.
	Skills:
	S1. Ability to use information obtained from various sources to conduct cost analyses
	Social competence:
	SC1. Team work, organization and management of teams
Pre-requisites	Subjects: „Macroeconomics" & „Microeconomics"
Course contents	Cost definition. Estimation of depreciation processes and costs. Valuation of consumption of production means. Methods of cost calculation. Cost calculation for seasonal production. Cost calculation for coupled production. Using variable costing to make decisions and short-term assessment of their effectiveness. Sensitivity analysis and determination break-even point. Analysis of the break-even point of multi-assembly production (segment analysis)
References	5. Hunt D. Farm power and machinery management. 2001. Iowa State University Press, pp.367 6. Hunt D. 1986. Engineering model for agricultural production. The AVI Publishing Company, pp.260 7. Landers A. 2000. Farm machinery selection, investment and management. Farming Press, Kent, pp.152 8. Theunissen Ph. 2002. An economical approach to agricultural machinery management. Computus Management Information (Pty) Ltd, Betlehem, pp.256
Teaching methods	Lectures; classes; team/group work; the calculation classes; discussion
Assessment methods	K1, K2 – written colloquiums, written exam S1 - Project – analysis of machinery operation costs SC1 - Activity and participation in discussions
ECTS credits balance	- participation in lectures - 15 h - participation in classes – 30 h - preparing to classes – 15 h - completing tasks - 5 h - solving tasks independently at home – 10 h - studying literature – 5 h - preparation for the colloquiums – 6 h - preparation for the exam – 10 h - consultations - 2 h

	- participation in the exam – 2 h Total 100 h it means 4.00 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Lectures - 15 h Classes - 30 h Consultations – 2 h Participation in the exam – 2 h Total 49 h – 1.96 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 - ZI_W01, ZI_W02 S1 - ZI_U01 SC1 - ZI_K01

The name of the field study	Management and Production Engineering
Course title	Mathematical Statistics
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	3 (1.28/1.72)
Academic title/degree, name and surname of the person responsible for the course	Urszula Bronowicka-Mielniczuk, PhD
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	The aim of the course is to provide students with a basic knowledge of probability and statistics area. Topics such as the statistical description of empirical data, point and interval estimation, and an introduction to the statistical testing of hypotheses will be presented. The subject is designed to prepare students for the independent development of research results in engineering sciences. Students will also be introduced to the capabilities of the spreadsheet program and the Statistica package in terms of their application to descriptive statistics and statistical inference.
Learning outcomes	Knowledge:
	1. The student has an understanding of the most important concepts of statistics, an understanding of their meaning and an awareness of their practical applications.
	2. The student has knowledge of the statistical description of a sample, estimation and hypothesis testing, and understands the application of these tools in other scientific fields.
	3. The student understands the principles of selecting appropriate statistical tools depending on the research objectives and the nature of the observed features; he/she knows statistical packages useful for statistical analysis of problems related to management and production engineering.
	Skills:
	1. The student will be able to summarise empirical data using descriptive statistics: tabular and graphical presentation, analysis of statistical measures. He/she will be able to determine and interpret the basic statistical parameters of distributions.
	2. The student will be able to construct confidence intervals and determine estimators for selected statistical parameters and use the statistical tools he/she has learnt to test hypotheses. The student will be able to interpret the results obtained.
	1. The student will be able to summarise empirical data using descriptive statistics: tabular and graphical presentation, analysis of statistical measures. He/she will be able to determine and interpret the basic statistical parameters of distributions.
	Social competence:
	1. The student understands the necessity of collaboration, of carrying out analyses reliably so that reliable results can be obtained, of the precision and logic of explanations.
	2. The student recognises the role and the need of using statistical tools in different fields of knowledge.
Pre-requisites	Basic knowledge of mathematics and information technology is required to complete the course.

Course contents	Descriptive statistics and graphical tools for data analysis (measures of position, dispersion and asymmetry, box-and-whisker plots, stem-and-leaf plots, histograms). Distributions of discrete and continuous random variables. Statistical inference: point estimation, interval estimation and hypothesis testing. Bivariate population (scatterplot, correlation). The problem of regression as a tool for testing relationships between characteristics. Test of independence. Exercises include solving a variety of problems based on the methods presented in the lectures.
References	Literature: 1. Amir D. Aczel. Complete Business Statistics. McGraw Hill Education; 7th edition (2017) 2. Kieth A. Carlson, Jennifer R. Winquist. Introduction to Statistics. SAGE Publications Inc (2017) Supplementary literature: 1. Matt Foster. Statistics for beginners: Fundamentals of probability and statistics for data science and business applications, made easy for you. Independently Published (2020) 2. Robert S. Witte, John S. Witte. Statistics, 11th Edition. Wiley (2017)
Teaching methods	Teaching methods: Lecture, auditory exercises, laboratory exercises, demonstration, instruction, carrying out assigned tasks, discussion, independent work, group work. Activities: Development and provision of teaching materials for the module on the Moodle virtual learning environment; Carrying out statistical analysis on a chosen topic using a computer programme and presenting it in a report.
Assessment methods	K1, K2, K3 - Tests S1, S2 - work in class, completion of homework assignments, class activities, tests SC1, SC2 - class activity and participation in class discussions, tests Forms of Documentation - tests, written assignments, statistical analysis report
ECTS credits balance	Attendance at lectures - 15hrs. Participation in exercises and auditorium classes - 15 hrs. Attendance at consultations - 2 hrs. Preparation for a laboratory - 10 hrs. Work at home - 9 hrs. Study of literature - 9 hrs. Preparation for a test - 10 hrs. Credit test preparation - 5 hrs. The total student workload is 75 hours, which is equivalent to 3 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	Attendance at lectures - 15hrs. Participation in exercises and auditorium classes - 15 hrs. Attendance at consultations - 2 hrs. Total of 32 hours, equivalent to 1.28 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	K1– ZI_W01, ZI_W11, ZI_W12 K2– ZI_W01, ZI_W11 K3– ZI_W01, ZI_W11 S1– ZI_U01, ZI_U03 , ZI_U04 , ZI_U05, ZI_U08, InzZI_U02, InzZI_U03 S2– ZI_U01, ZI_U04, ZI_U05, ZI_U08, InzZI_U02, InzZI_U03 SC1– ZI_K01, ZI_K02 SC2–ZI_K03

The name of the field study	Management and Production Engineering
Course title	Operations research
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	3 (1.36/1.64)
Academic title/degree, name and surname of the person responsible for the course	PhD Zbigniew Kobus, associate professor
Didactic unit offering a course	Department of Technology Fundamentals
Objective of the course	The aim of the module is to familiarize students with the principles of analysis and modelling of production processes. Optimization conceptualization of decision problems.
Learning outcomes	Knowledge:
	1. Knows the principles of formalization and description of the optimization problem in terms of decision variables, objective functions, constraints, feasible solutions and the optimal solution depending on the problem domain and decision problem.
	2. Knows the basic subject types of optimization problems, including linear optimization problems, multi-criteria optimization, optimal sequences of actions (based on the example of the traveling salesman problem) and the rules for solving them.
	Skills:
	1. Is able to present a mathematical description (including matrix notation) of a linear optimization problem and make an objective and mathematical interpretation of decision variables, objective functions and constraints. Is able to carry out a geometric interpretation of the set of feasible solutions and the optimal solution, as well as perform a sensitivity analysis of the optimal solution in the case of a linear optimization problem.
	2. Is able to determine the decision and search criteria space and find Pareto-optimal solutions in the case of complex optimization problems.
	Social competence:
	1. The graduate is ready to work in a group.
	2. The graduate is ready to pass on his knowledge.
Pre-requisites	Elements of applied mathematics, basics of computer science, basic knowledge of production processes and the management of these processes
Course contents	Lectures include: Modelling and optimization of production process management. Formalization and description of the problem in terms of decision variables, objective functions, constraints, acceptable solutions, optimal solutions. Linear optimization models, mathematical form (including matrix notation) and objective and mathematical interpretation of decision variables, objective functions and constraints. Subject types of optimization problems. Multi-criteria optimization, the concept of optimality in the sense of a set of non-dominated solutions. Combinatorial optimization problems reduced to the traveling salesman problem. The use of programs available online that use heuristic algorithms. Classes include: Methods of solving linear programming problems - graphical method, simplex method. Dual tasks. Solving linear problems

	using MS Excel. Transport issue. Solving the traveling salesman problem. Multi-criteria optimization.
References	Basic literature: W. L. Winston. Operations Research: Applications and Algorithms, Cengage Learning, 2022. Supplementary literature: H.A. Taha. Operations Research: An Introduction, Pearson Education, 2013.
Teaching methods	Lecture in the form of a multimedia presentation Classes - solving accounting problems, using the MS Excel package in linear programming problems, Teaching methods - discussion, demonstration of performing subject tasks
Assessment methods	K1, K2 – exam, colloquium, oral answer. S1, S2 – assessment of correct calculations and proper reasoning during exercises and tests SC1, SC2 – participation in class discussions, group work during classes, observation of student involvement. Form of documentation: instructor's diary, reports, tests, examination papers.
ECTS credits balance	- participation in lectures – 15 hours, 0.6 ECTS, - participation in practical classes – 15 hours, 0.6 ECTS, - participation in consultations – 2 hours, 0.08 ECTS, - participation in the exam – 2 hours, 0.08 ECTS. - preparation for practical classes – 15 hours, 0.6 ECTS, - literature study – 15 hours, 0.6 ECTS, - exam preparation – 11 hours, 0.44 ECTS. The total student workload is 75 hours. which corresponds to 3 points of ECTS.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours, 0.6 ECTS, - participation in practical classes – 15 hours, 0.6 ECTS, - participation in consultations – 2 hour, 0.08 ECTS, - participation in the exam – 2 hour, 0.08 ECTS. The total number of contacts is 34 hours, which corresponds to 1.36 ECTS.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W01 K2 – ZI_W14 S1 – ZI_U04 S2 – ZI_U03 SC1 – ZI_K01 SC2 – ZI_K02

The name of the field study	Management and Production Engineering
Course title	Logistics in enterprise
Language	English
Type of the course	Obligatory
Level of study	First cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	Sławomir Juściński, PhD
Didactic unit offering a course	Department of Power Engineering and Transportation Subdepartment of Logistic and Business Management
Objective of the course	To familiarize students with the tasks assigned to logistics and to present the organizational structure, interdependencies and relationships between individual logistics subsystems in the enterprise. Determining comprehensive assumptions and conditions affecting the efficiency of logistics processes, description of the construction of the logistics organizational system in companies. The analysis includes the processes of purchasing, moving, processing and distribution, as well as cost analysis in subsystems. Automatic material identification systems, integrated management systems and electronic data exchange systems will be presented.
Learning outcomes	Knowledge:
	K1. Knows the theoretical foundations of the functioning of logistics systems in the enterprise.
	K2. Understands and is able to explain the tasks of supply logistics and planning of material needs, storage and inventory handling, transport systems, product distribution and logistics management of services.
	K3. Has knowledge of logistics costs, automatic material identification and computerization in logistics processes.
	Skills:
	S1. Is able to analyse and diagnose problems related to basic logistics functions in the enterprise.
	S2. Is able to use the information obtained on the purchase, movement, storage and distribution of materials and products, interpret the results and formulate opinions.
	S3. Participate in the basic tasks of integrated logistics management systems and electronic data exchange.
	Social competence:
	SC1. He has an active attitude in expressing opinions and transferring his knowledge using various media, and is willing to cooperate.
	SC2. Is aware of the need to undertake self-education and update knowledge in the field of logistics.
Pre-requisites	No requirements
Course contents	The subject describes the structure and tasks of logistics systems in the enterprise. The subject covers issues related to: supply logistics and planning of material needs, storage and inventory management, packaging circulation and labeling, logistic transport networks and internal transport systems, and production logistics services, including tools such as TQM, JIT, outsourcing, Lean Management. Additionally, issues related to: distribution logistics management, structures and functions of distribution channels, logistics management of services and stages of logistics service design are discussed. Topics presented include automatic identification of materials in logistics systems, data collection methods, barcode

	standardization, as well as analysis, shaping and reduction of logistics costs in the enterprise, controlling and indicators and measures of the effectiveness of logistics activities. Topics covered include the computerization of logistics: integrated management systems (MRP/ERP), supply chain management systems (SCM), electronic data interchange (EDI), the Internet in logistics, the waste disposal system and the competences, qualifications and skills of logistics employees.
References	Required literature: 1. Robert A. Novack, Brian Gibson, C. John Langley, John J. Coyle: Supply Chain Management: A Logistics Perspective, Cenage Learning, Inc., 2021 2. Martin Christopher: Logistics and Supply Chain Management, Pearson Business, ISBN 9781292416182, 2022. 3. Paul Murphy Jr., A. Knemeyer: Contemporary Logistics, Contemporary Logistics, ISBN 9780134519258, 2017. Recommended literature: 1. Pierre David: International Logistics : the Management of International Trade Operations, Cicero Books, ISBN 9780989490641, 2017.
Teaching methods	Lecture: - transfer of information using slides (projector multimedia). Explanatory implementation method - illustrative. Classes: - use of illustrative materials and slides (multimedia projector). Analytical and problem-based implementation method.
Assessment methods	Method of verifying the student's learning outcomes: two written tests (open descriptive questions) during the semester. Test graded on a scale of 2 to 5. K1, K2, K3 - final test, S1,S2,S3 - oral answers during classes, SC1, SC2 - activity during classes
ECTS credits balance	Lecture: - participation in lectures - contribution of 1 hour. per week (15 x 1 hour = 15 hours) - reading recommended literature (5 hours), Classes - participation in classes - exercises carried out for 1 hour. per week (15 x 1 hour = 15 hours) - preparation for classes (5 hours) - consultations (2 hours) Preparation for tests (two tests per semester) 4 hours. + 4 hours = 8 hours Total: 50 hours which corresponds to 2 points ECTS
Workload related to classes requiring the direct participation of an academic teacher	Workload related to classes requiring the direct participation of academic teachers: - participation in lectures – 15 hours, - participation in classes – 15 hours, - consultations - 2 hours Total 32 hours which corresponds to 1.28 point ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Directional effects: K1-ZI_W06, K2-ZI_W09, K3-ZI_W13 S1-ZI_U04, S2- ZI_U04 , S3-ZI_U08 SC1-ZI_K01, SC2-ZI_K04

The name of the field study	Management and Production Engineering
Course title	Marketing
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	PhD. Monika Stoma, associate professor
Didactic unit offering a course	Department of Power Engineering and Transportation/Subdepartment of Logistic and Business Management
Objective of the course	The aim of the course is to give students an elementary knowledge of marketing. Particular emphasis will be placed on issues related to marketing-mix tools - product, promotion, price and distribution. Marketing management concepts will also be presented, as well as issues related to the consumer and behaviour on the market.
Learning outcomes	Knowledge:
	1. The student has basic general knowledge of marketing.
	2. The student has the knowledge to define, describe and explain problems related to the basic marketing concepts, instruments and methods in contemporary enterprises.
	Skills:
	1. The student can reach sources of knowledge related to marketing, use the information obtained and present and analyse their synthesis.
	2. The student is able to perceive the role of conducting marketing research and market segmentation in order to best adapt the offer of the enterprise to the requirements and expectations of the contemporary customer.
	Social competence:
	1. The student is willing to express judgements and communicate knowledge using a variety of media.
Pre-requisites	Possessing basic knowledge of mathematics, management and economics.
Course contents	The lectures include: issues related to the essence, development, laws and functions of marketing, the place of marketing in the functioning of modern companies, the consumer and behaviour in the market, market segmentation and positioning, and the marketing-mix, by discussing 4 of its elements: product (with particular emphasis on brand), price, distribution and promotion, signalling some contemporary marketing concepts (e.g. product placement). Exercises include: Realization and analysis of exercises in the form of case studies, tests and other such forms from the scope included in the lectures. Realisation of a market segmentation project. Realisation of 1 final test.
References	1. Kotler P., Marketing, Rebis, 2020. 2. White D., The Smart Marketing Book: The Definitive Guide to Effective Marketing Strategies, LID Publishing; 2020. 3. Godin S., This is Marketing: You Can't Be Seen Until You Learn To See, Penguin Books Ltd (UK), 2018.
Teaching methods	Discussion of issues based on diagrams and illustrations, presentation of selected trends using didactic models, solving

	practical marketing problems, exercises to check and consolidate knowledge obtained in lectures, exercises in data interpretation, practical exercises and projects, case studies, techniques for stimulating creative thinking (e.g. brainstorming), work in small groups, individual speeches by students, confrontation of different student positions through practical exercises, discussion in the whole exercise group.
Assessment methods	Ways of verifying the achieved learning outcomes: Knowledge: K1 - A test to check the knowledge of the learning outcomes, K2 - 1 colloquium verifying the knowledge of problems in the field of marketing and a project concerning market segmentation (realised in 2-4 personal teams). Skills: S1. Participation in individual and group exercises, preparation for classes, participation in group discussions, colloquium, realisation of the project. S2. Realisation of the market segmentation project. Social competences: SC1. Participation in team exercises in class, oral answers in class, activity, completion of homework exercises. Forms of documentation of achieved results: Colloquium, project, credit test, lecturer's journal
ECTS credits balance	- participation in lectures – 15 hours / 0.60 ECTS - participation in exercises – 15 hours / 0.60 ECTS - participation in consultations – 2 hours / 0.08 ECTS - preparation for colloquium – 5 hours / 0.20 ECTS - completing exercises at home – 5 hours / 0.20 ECTS - finishing the project – 3 hours / 0.12 ECTS - preparation for final test – 5 hours / 0.20 ECTS The total student workload is 50 hours. which corresponds to 2 points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours / 0,60 ECTS - participation in exercises – 15 hours / 0,60 ECTS - participation in consultations – 2 hours / 0,08 ECTS Total 32 hours which is 1.28 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W12 K2 - ZI_W09, ZI_W12 S1 - ZI_U01 S2 - ZI_U01, ZI_U03 SC1 - ZI_K01, ZI_K02

The name of the field study	Management and Production Engineering
Course title	Production processes
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	3
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD Leszek Rydzak, assistant professor
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technologies
Objective of the course	Familiarizing the student with the principles of operation of the production and production system as an element of the global economic system, its structure and the influences affecting this system from its environment. Moreover, the module aims to demonstrate the sources of internal threats and those coming from the environment and to indicate methods of their neutralization and adaptation to the environment.
Learning outcomes	Knowledge, the graduate knows and understands:
	1. economic, legal and social issues that enable the description and analysis of the processes of production, in particular system analysis. Student has the knowledge of system management
	Skills:
	1. evaluate processes taking into account many aspects and situations and is able to system analysis and take actions to solve expected problems in the future
	Social competence:
	1. act with awareness of the risk of various events occurring and is able to assess the effects of activities conducted in risky conditions
Pre-requisites	no entry requirements
Course contents	Basics of cybernetics. Process as an informational and/or energy-material change of the system. The market as an autonomous and dependent system and the principles of its operation. Functions of the state in the economy. Markets for production factors: resources, labor and capital. Production and production system. Possibilities of controlling manufacturing and production systems. New tools for automating information processes in production systems. The role of ethics in economic life. Selected contemporary economic problems of entrepreneurs. Presentation of selected production processes of food industry products. Specification of the selected food industry product.
References	1. L. Rydzak. Market system control. Libropolis 2014. 2. L. von Mises. Human action.Mises Institute 2014.
Teaching methods	lecture, discussion, case studies
Assessment methods	Learning outcomes: Knowledge – pass Skill – pass Social competence - activity

ECTS credits balance	**<u>Contacts</u>** Lectures - 15h – 0.6 ECTS credits Exercises – 30h – 1.2 ECTS credits Consultations – 2h – 0.08 ECTS credits **Total – 47h – 1.88 ECTS credits** **<u>Non contacts</u>** Literature study – 28h – 1.12 ECTS credits Preparation for classes – 25h – 1 ECTS credits **Total – 53h – 2.12 ECTS credits** **The total student workload is 100 hours. which corresponds to 4 ECTS credits**
Workload related to classes requiring the direct participation of an academic teacher	Lectures - 15h Exercises – 30h Consultations – 2h **Total – 47h**
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge 1 – ZI_W02 Skills 1 – ZI_U09 Social competence – 1 – ZI_K04

Field of study	Management and Production Engineering
Name of the training module including the Polish name	Język obcy – 3 -Polski A2 Foreign Language – 3 – Polish A2
Language of instruction	English/Polish
Type of the training module	obligatory
Level of the training module	first-cycle
Form of studies	full-time
Location in the programme (year)	II
Location in the programme (semester)	4
Number of ECTS credits with a division into contact/noncontact	4 (2.0/2.0)
Name and surname of the person in charge	M.A. Ewa Badurowicz
Unit offering the subject	Foreign Languages Teaching and Certification Centre
Aim of the module	The aim of the classes is to familiarise the students with the basic linguistic and communication skills: speaking, listening comprehension, reading comprehension, writing, assuming basic roles and communicating in simple and typical daily life situations and at work requiring communication.
Learning outcomes	Skills:
	S1.Creating simple sentences and short speeches about oneself and the nearest environment
	S2. Understanding short recorded dialogues and thematic speeches related to daily life situations and at work
	S3. Ability to write Polish letters, words and short massages within the minimum vocabulary range required for the level
	S4. Understanding read sentences, text fragments and short dialogues including the minimum vocabulary range required for the level, including basic management and engineering vocabulary
	Social competences:
	SC1. Understanding the importance of lifelong learning
Preliminary and additional requirements	Preliminary and additional requirements are not demanded.
Contents of the training module – a compact description	The objective of the module is: - to familiarise the students with vocabulary related to the days of the week and the times of the day, so that the student learns how to describe the time as well as routine daily activities and to use the pronouns od…do…, to conjugate the verbs ending with -am, -asz and -em, -esz, - to familiarise the students with basic words and phrases used to describe different ways of spending leisure time and doing sports, preferences and habits in this respect, to get to know the structures: „interesować się" + ablative, „lubić" + accusative + infinitive, the adverbs of frequency and the question: Jak często? and the conjugation of verbs ending with „-ować", - to familiarise the student with vocabulary used to express wishes and congratulations, as well as celebrating holidays in Poland, to get to know the structure of the verb „życzyć"+ dative + genitive, personal pronoun: dative and genitive cases, - to familiarise the student with vocabulary to talk about their personality and about qualities needed for different jobs, - to enable the students to talk about what they did last weekend, last week etc. and to get to know past tense and acpect in past tense, time adverbs and the verbs „wiedzieć" and „znać", - to familiarise the students with basic words and phrases used to talk about health, healthy lifestyle, conditions, illnesses at the doctor, to get to know the parts of body and the structures: imperative, „boli/bolą mnie" and personal pronouns in dative case, - to familiarise the students with vocabulary used to talk about reasons for traveling to describe places, to express duties, wishes and future plans to write greetings card from holiday and to get to know congratulations, as well as celebrating holidays in Poland, to get to know the conjugation of the verbs: móc, chcieć, musieć, as well as the conjugation of irregular

	verbs: „jeść, iść, móc“ in the past and forming and using of future tense(perfective and imperfective aspect), - to enable the students how to use clauses of purpose with connection „żeby“ and conditionals with connection „jeżeli“.
Recommended and obligatory reading list	1. „Start Survival Polish” K.Dembinska, A. Małyska – podręcznik do nauki języka polskiego + zeszyt ćwiczeń 2. „Start 2” Beginner Polish K. Dembińska, A. Małyska - Podręcznik do nauki języka polskiego + zeszyt ćwiczeń 3. „ Polski Krok po kroku” Iwona Stemperek, Anna Stelmach – podręcznik do nauki języka polskiego Poziom 1 4. „Polskie czytanki” – Wioletta Gurdak, Wojciech Sosnowski – Język polski dla obcokrajowców 5. Hurra!!! Odkrywamy język polski. Gramatyka dla uczących się języka polskiego jako obcego, Liliana Madelska 6. „Gramatyka języka polskiego. Podręcznik dla cudzoziemców.”, Barbara Bartnicka, Halina Satkiewicz 7. www.mfiles.pl
The intended forms/activities/ teaching methods	Teaching methods: discussion, lecture, explanation, conversation, audio recordings, direct method, communicative approach, individual and team work, language games,
Methods of verification and documentation forms of the achieved learning outcomes	S1 – assessment of oral expression during the classes S2 – assessment of oral expression during the classes S3 – assessment of written expression as a homework S4– written test SC1 – assessment of preparation for the classes and of involvement and participation in classes Documentation forms of the achieved learning outcomes: midterm test kept for 1 year teacher’s register kept for 5 years Assessment criteria are available in Foreign Languages Teaching and Certification Centre
Impact of selected compounds to final grade	The condition for passing the semester is class attendance and a passing grade verified by: - written tests - 50% - oral statements - 25% - written essays - 25%. A student may obtain a mark higher by half a grade if he/she demonstrates 100% attendance and eagerly takes part in class activities.
Balance of ECTS credits	Contact hours: Participation in classes: 45 h Office hours: 2 h exam: 3 h **Total number of contact hours: 50 h/2 ECTS** Non-contact hours: Preparation for classes: 30 h Preparation for test: 20 h **Total number of non-contact hours: 50 h/2 ECTS** **There are 100 hours of the total student workload which is equal to 4 p. ECTS**
Number of contact hours	Participation in classes: 45 h Participation in office hours: 2 h Exam: 3 h **50 hours in total which is equal to 2 p. ECTS**
Relating modular learning outcomes to directional learning outcomes	S1 – ZI_U01 S2 – ZI_U01 S3 – ZI_U01 S4 – ZI_U01 SC1 – ZI_K03

The name of the field study	Management and Production Engineering
Course title	**Water and wastewater technology**
Language	English
Type of the course	obligatory
Level of study	First cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	2 (1.28/0.72)
Academic title/degree, name and surname of the person responsible for the course	Professor Krzysztof Jóźwiakowski
Didactic unit offering a course	Department of Environmental Engineering and Geodesy
Objective of the course	The aim of the course is to familiarize students with the processes of removing contaminants occurring in water and sewage treatment devices, as well as with the basic principles of designing devices used for water and sewage treatment.
Learning outcomes	Knowledge:
	1. Has knowledge about the types of intakes used for water abstraction and technologies used for water treatment and sewage treatment
	2. Knows and understands the basic processes of removing contaminants taking place in water and sewage treatment devices
	Skills:
	1. Is able to determine and design the scope of protection zones around water intakes and select appropriate devices, processes and methods of water treatment
	2. Is able to select and configure a system of devices used for sewage treatment in order to create a complete collective or home sewage treatment plant
	3. Is able to analyze and assess the efficiency of a sewage treatment plant and indicate basic ways to optimize its operation
	Social competence:
	1. Is aware of how important it is to follow the principles of professional ethics and professionally design appropriate wastewater treatment technologies to protect the natural environment
	2. Is aware of responsibility for his own work and is ready to comply with the principles of teamwork and take responsibility for jointly performed tasks
	3. Able to think and act in an entrepreneurial manner and establish cooperation with specialists in other fields of knowledge
Pre-requisites	mathematics 1 i 2, chemistry, physics, information technology, mathematical statistics
Course contents	Water balance. Water resources and possibilities of increasing their quantity. Functions and types of water reservoirs. Water demand and water consumption structure in Poland. Water intakes and their types. Water treatment processes and methods. Types of sewage. Quantity, composition and loads of pollutants in sewage. Processes and methods of mechanical and biological wastewater treatment and removal of biogenic compounds. Shot protection. Quality of water for drinking and domestic needs. Basic physicochemical analyzes of water and sewage. Water treatment devices and plants. Types, structure, principle of operation and basic dimensions of grates, sand traps, primary settling tanks, biological beds and activated sludge chambers. Household sewage treatment plants. Determining the efficiency of

<table>
<tr><td></td><td colspan="3">operation and impact of sewage treatment plants on the environment.</td></tr>
<tr><td>References</td><td colspan="3">1. Rumana Riffat, 2013. Fundamentals of Wastewater Treatment and Engineering, p. 400.
2. Chaubey Mritunjay, 2021. Wastewater Treatment Technologies, p.256
3. The American Water Works Association (AWWA), The American Society of Civil Engineers (ASCE), 2012. Water Treatment Plant Design,</td></tr>
<tr><td>Teaching methods</td><td colspan="3">lectures, classes, group work, field work, projects, presentations</td></tr>
<tr><td>Assessment methods</td><td colspan="3">preparation of the project for evaluation, oral presentation of the project, written test
K1, K2 – written test,
S1, S2, S3 – assessment of calculation and design tasks,
SC1, SC2, SC3 – assessment of the student's work as a leader and member of the team performing project tasks,</td></tr>
<tr><td rowspan="13">ECTS credits balance</td><td colspan="3">CONTACT</td></tr>
<tr><td>Form of course</td><td>Number of hours</td><td>ECTS credits</td></tr>
<tr><td>Lectures</td><td>15</td><td>0.60</td></tr>
<tr><td>Classes</td><td>15</td><td>0.60</td></tr>
<tr><td>Consultations</td><td>2</td><td>0.08</td></tr>
<tr><td>Total contact</td><td>32</td><td>1.28</td></tr>
<tr><td colspan="3">NON-CONTACT</td></tr>
<tr><td>preparation for classes</td><td>4</td><td>0.16</td></tr>
<tr><td>preparation of reports</td><td>4</td><td>0.16</td></tr>
<tr><td>literature study</td><td>4</td><td>0.16</td></tr>
<tr><td>preparation for the credit</td><td>6</td><td>0.24</td></tr>
<tr><td>TOTAL non-contacts/ ECTS credits</td><td>18</td><td>0.72</td></tr>
<tr><td rowspan="4">Workload related to classes requiring the direct participation of an academic teacher</td><td>Lectures</td><td>15</td><td>0.60</td></tr>
<tr><td>Classes</td><td>15</td><td>0.60</td></tr>
<tr><td>Consultations</td><td>2</td><td>0.08</td></tr>
<tr><td>TOTAL with direct involvement of the teacher</td><td>32</td><td>1.28</td></tr>
<tr><td>Relation of course learning outcomes to the learning outcomes of the field of study</td><td colspan="3">K1, K2: ZI_W01; ZI_W02; ZI_W04; ZI_W05; ZI_W11
S1, S2, S3: ZI_U01; ZI_U04; ZI_U5; ZI_U7
SC1, SC2, SC3: ZI_K01; ZI_K02</td></tr>
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The name of the field study	Management and Production Engineering
Course title	Industrial Process Control
Language	English
Type of the course	Optional
Level of study	First
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	4 (1.84/2.16)
Academic title/degree, name and surname of the person responsible for the course	Waldemar Samociuk, PhD
Didactic unit offering a course	Department of Mechanical Engineering and Automation
Objective of the course	The purpose of the module is to provide knowledge in the field of IT support for production - production management as part of the first level of a modern control system, i.e. real-time control. General knowledge about IT systems used in industry is provided, with particular emphasis on software for process visualization, controller programming and ERP/MRP systems. Transferring knowledge in the field of process security (PBCS as one of the security layers)
Learning outcomes	Knowledge:
	1. Has knowledge in the field of information techniques and technologies allowing to model (identify), monitor, evaluate and control industrial processes.
	2. Demonstrates knowledge of the principles and knowledge in the implementation of integrated production processes in conditions of increasing degree of mechanization (automation). Knows control components, methods of tuning and programming them. Has knowledge of the life cycle of a device, object or system functioning, also in terms of its safe operation at the control layer.
	Skills:
	1. The student has the ability to use modern information technologies to obtain and process information in the field of agricultural, agri-food, industrial production and the provision of services. He can program industrial PLC controllers from GE, create simple synoptics and reports in InTouch software from Wonderware.
	2. The student is able to apply appropriate forecasting and alarming techniques to solve current problems in production processes, using InTouch software from Wonderware and a system of interlocks programmed in the PLC controller.
	Social competence:
	1. The student is able to think and act in an entrepreneurial way and understands the need to constantly learn and inspire others.
Pre-requisites	Mathematics2, Physics, Electrical Engineering
Course contents	The lecture includes: discussion of comprehensive IT systems for planning and managing ERP production processes; SCADA systems enabling visualization and control of industrial processes; programming PLCs and industrial controllers; selected issue in the field of statistical process control (SPC); central and decentralized control; basic concepts and classification of SISO and MIMO control systems; BPCS and SIS control systems in the aspect of process safety. Laboratory exercises include programming VersMax PLC controllers from GE in ladder language and functional blocks, creating synoptics and process simulations in InTouch by Wonderware, integration of these systems, SQL databases,

	creating programs in Visal Basic, modeling and simulations in Matlab, data analysis and calculations in the field of statistical process control (SPC), programming of LB600 microprocessor controllers (fuzzy logic).
References	1. William C. Dunn. Fundamentals of Industrial Instrumentation and Process Control. The McGraw-Hill Companies DOI: 10.1036/0071466932 2. Fundamentals of Control 2006 PAControl.com 3. Johnson, C. D., Process Control Instrumentation Technology, 2nd ed., Prentice Hall, 2003 4. Gregory K. McMillan. Process/Industrial Instruments And Controls Handbook, McGRAW-HILL 5. Simulation and visualization of industrial processes in unity. SummerSim '15: Proceedings of the Conference on Summer Computer Simulation July 2015. 6. Data visualization for Industry 4.0:A stepping-stone toward a digital future,bridging the gap between academia and industry, https://doi.org/10.1016/j.patter.2021.100266 7. Vitalii Ivanov, Ivan Pavlenko, Artem Evtuhov & Justyna Trojanowska. Visualization of Engineering Products. https://doi.org/10.1007/978-3-031-44641-2_3
Teaching methods	Lectures, laboratory exercises in the form of real experiments at laboratory stations (PLC controllers, InTouch program)
Assessment methods	K1, K2 - written test. S1, S2 - assessment of the exercise and report, SC1 - assessment of the student's work as a leader and member of the team performing the exercise and report.
ECTS credits balance	Contact • lecture (15 hours/0.6 ECTS), • classes (30 hours/1.2 ECTS), • consultations (1 hours/0.08 ECTS), Total – 46 hours/1.84 ECTS Non-contact • preparation for classes (40 hours/0.6 ECTS), • preparation of reports (14 hours/0.52 ECTS), A total of 54 hours/2.16 ECTS
Workload related to classes requiring the direct participation of an academic teacher	participation in: lectures – 15 hours; in classes – 30 hours; in consultations – 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W05 K1 – ZI_W05 S1 – ZI_U03, InzZI_U01 S2 – ZI_U07, InzZI_U01 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Reliability and Safety of Industrial Systems
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	4 (1.84/2.16)
Academic title/degree, name and surname of the person responsible for the course	Prof. Gołacki Krzysztof Eng, PhD, DSc
Didactic unit offering a course	Department of Mechanical Engineering and Automation
Objective of the course	The aim of the course is to provide knowledge in the field of reliability of engineering systems and risk reduction methods, including functional safety. The presented methods allow conducting risk analyses at all stages of the technical object life cycle. The knowledge provided will allow decisions to be taken to introduce technical subsystems or organizational solutions related to security.
Learning outcomes	Knowledge:
	K1. Student knows the basic functional and numerical indicators of reliability, selected reliability models, object reliability structures, human reliability issues.
	K2. Student knows international legal acts in the field of process and functional safety. Knows the basic causes of accidents in industry as well as mechanisms of accidents.
	K3. Student knows the principles of risk management and methods of determining the safety integrity level (SIL).
	Skills:
	S1. Student uses concepts of system reliability. He makes simple calculations and models basic reliability structures.
	S2. Student process risk management algorithms taking into account the principles of functional safety.
	S3. Specifies the safety integrity level for the selected safety function.
	Social competence:
	SC1. Is aware of the need for a rational risk reduction of each process.
	SC2. Is aware of the necessity of teamwork when conducting identification and risk assessment analyses.
Pre-requisites	Other modules: physics, mathematics
Course contents	The lecture includes: introduction to system reliability, numerical and functional indicators, reliability modeling, reliability structures. Tree methods of risk analysis. Introduction into legal acts in the field of functional safety, basic diagnostic systems, determination of the required safety integrity level, LOPA analysis, analysis of human factors in system security. Classes include: characteristics of hazards and their causes, calculations of measures of reliability for practical examples of objects, creation and calculations for reliability structures, determining the safety integrity level for selected safety functions, conducting LOPA analysis and estimating the impact of human activity on object safety.

<table>
<tr><td>References</td><td colspan="3">Paul Gruhn, Harry Cheddie: Safety instrumented systems: Design, Analysis and Justification. ISA, USA, 2006.
E. Scharpf, H. Thomas, T Stauffer: Practical SIL Target Selection. Risk Analysis per the ICE 61511 Safety Lifecycle. Exida, Sellersville, PA USA, 2016.
Functional Safety Standards – Collection in English, ULS Library – access on line.
Webpages and materials given by lecturer.</td></tr>
<tr><td>Teaching methods</td><td colspan="3">Lectures, calculation exercises, elaboration and presentation of the projects</td></tr>
<tr><td>Assessment methods</td><td colspan="3">Detailed criteria when evaluating exams and control work

1) the student demonstrates a sufficient (3.0) level of knowledge or skills when he / she obtains from 51 to 60% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively, with partial credit - its parts),
2) the student shows a satisfactory plus (3.5) degree of knowledge or skills when he / she obtains 61 to 70% of the sum of points determining the maximum level of knowledge or skills in a given subject (parts thereof respectively),
3) a student demonstrates a good level (4,0) of knowledge or skills when he / she obtains from 71 to 80% of the sum of points determining the maximum level of knowledge or skills in a given subject (parts thereof respectively),
4) a student demonstrates a good (4.5) level of knowledge or skills when he / she obtains from 81 to 90% of the sum of points determining the maximum level of knowledge or skills in a given subject (parts thereof respectively),
5) a student shows a very good degree (5.0) of knowledge or skills when he or she obtains more than 91% of the sum of points determining the maximum level of knowledge or skills in a given subject (parts thereof respectively)
Knowledge:
K1 - tests,
K2 - tests,
K3 - tests,
Skills:
S1 - tests, active participation in classes,
S2 - tests, active participation in classes, project,
S3 - tests, active participation in classes, project
Social competences:
SC1 - class participation, project,
SC2 - class participation, project.
Forms of documenting achieved results: tests, projects, lecturer's diary</td></tr>
<tr><td rowspan="11">ECTS credits balance</td><td colspan="3">CONTACT</td></tr>
<tr><td></td><td>Hours</td><td>ECTS</td></tr>
<tr><td>lectures</td><td>15</td><td>0.6</td></tr>
<tr><td>classes</td><td>30</td><td>1.2</td></tr>
<tr><td>consultation</td><td>1</td><td>0.04</td></tr>
<tr><td>TOTAL contacts</td><td>46</td><td>1.84</td></tr>
<tr><td colspan="3">NONCONTACT</td></tr>
<tr><td>preparation for classes</td><td>10</td><td>0.4</td></tr>
<tr><td>Elaborating of the projects</td><td>18</td><td>0.72</td></tr>
<tr><td>literature studies</td><td>10</td><td>0.4</td></tr>
<tr><td>preparation for tests</td><td>16</td><td>0.64</td></tr>
<tr><td>TOTAL non-contact / ECTS points</td><td>54</td><td>2.16</td></tr>
<tr><td rowspan="2">Workload related to classes requiring the direct participation of an academic teacher</td><td>participation in lectures</td><td>15</td><td>0.6</td></tr>
<tr><td>participation in classes</td><td>30</td><td>1.2</td></tr>
</table>

	consultation	*1*	*0.04*
	TOTAL with direct teacher participation	***46***	***1.84***
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge: K1 – ZI_W04, ZI_W05, ZI_W14, InzZI_W01, InzZI_W04, K2 – ZI_W07, InzZI_W01, InzZI_W04, K3 - ZI_W07, ZI_W09, InzZI_W01, InzZI_W04 Skills: S1 – ZI_U04, ZI_U08, InzZI_U01, InzZI_U03, S2 - ZI_U03, ZI_U04, ZI_U08, ZI_U11, InzZI_U01, InzZI_U03, S3 - ZI_U03, ZI_U04, ZI_U08, ZI_U11, InzZI_U01, InzZI_U03 Social competences: SC1 – ZI_K03, ZI_K04, SC2 – ZI_K01		

The name of the field study	Management and Production Engineering
Course title	Statistical process control
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	3 (1.28/1.72)
Academic title/degree, name and surname of the person responsible for the course	Urszula Bronowicka-Mielniczuk, PhD
Didactic unit offering a course	Department of Applied Mathematics and Computer Science
Objective of the course	The module aims to familiarise students with statistical quality control methods and their use in quality management.
Learning outcomes	Knowledge:
	1. The student will have a knowledge of the statistical methods of quality control and their use in quality management.
	2. The student will know the different types of control charts and the graphical tools used in quality control.
	3. The student will be able to define and characterise process quality capability indicators.
	Skills:
	1. The student will be able to select and apply in practice the appropriate statistical quality control tools according to the type of production process and the characteristics controlled.
	2. The student will be able to calculate and interpret indicators of the quality capability of the process and to indicate the main causes of low quality of the production process.
	Social competence:
	1. Understand the need for appropriate presentation of research and analysis results, and communicate knowledge of statistical quality control to others in an understandable way.
	2. The student will understand the need for lifelong learning and the improvement of professional competences through the updating of his/her knowledge in the field of statistical process control.
Pre-requisites	Basic knowledge of statistics and information technology is required to complete the course.
Course contents	The module is an introduction to traditional quality management tools and techniques. They become familiar with the general structure of control charts and learn how to interpret them using configuration tests. They will be introduced to the issues involved in analysing the quality capability of a process and how to carry this out. Students will learn the principles of constructing control charts for numerically assessed characteristics (X-R/S charts) and attribiute characteristics (p, np, c, u charts). The students will be introduced to other types of control charts: the short-run control charts and the small shift control charts. During the course, they will create the control charts they have learnt using the *Industrial Statistics* module of the *Statistica* programme and analyse the measurement data using traditional graphical tools such as: box and whisker diagram, stem-and-leaf, Pareto, histogram, etc.
References	Literature: 3. Douglas C. Montgomery. Introduction to Statistical Quality Control 8th Edition. Wiley 8 edition (2020)

	4. Amir D. Aczel. Complete Business Statistics. McGraw Hill Education; 7th edition (2017) Supplementary literature: 1. Donald J. Wheeler. Understanding Statistical Process Control. 3rd Edition. SPC PRESS (2010) 2. Paul Keller. Statistical Process Control Demystified. McGraw Hill 1st Edition (2011)
Teaching methods	Teaching methods: Lecture, auditory exercises, laboratory exercises, demonstration, instruction, carrying out assigned tasks, discussion, independent work, group work. Activities: Development and provision of teaching materials for the module on the Moodle virtual learning environment; Carrying out spc analysis on a chosen topic using a computer programme and presenting it in a report.
Assessment methods	K1, K2, K3 - Tests S1, S2 - work in class, completion of homework assignments, class activities, tests SC1, SC2 - class activity and participation in class discussions, tests Forms of Documentation - tests, written assignments, spc analysis report
ECTS credits balance	Attendance at lectures - 15hrs. Participation in exercises and auditorium classes - 15 hrs. Attendance at consultations - 2 hrs. Preparation for a laboratory - 10 hrs. Work at home - 9 hrs. Study of literature - 9 hrs. Preparation for a test - 10 hrs. Credit test preparation - 5 hrs. The total student workload is 75 hours, which is equivalent to 3 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	Attendance at lectures - 15hrs. Participation in exercises and auditorium classes - 15 hrs. Attendance at consultations - 2 hrs. Total of 32 hours, equivalent to 1.28 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	K1–ZI_W12, ZI_W13 K2– ZI_W11 K3– ZI_W11 S1– ZI_U01, ZI_U03 , ZI_U04 , ZI_U05, ZI_U08, InzZI_U02 S2– ZI_U01, ZI_U04, ZI_U05, ZI_U08, InzZI_U02 SC1– ZI_K01, ZI_K02 SC2–ZI_K03

The name of the field study	Management and Production Engineering
Course title	Control Systems
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Karolina Beer-Lech PhD Eng.
Didactic unit offering a course	Department of Mechanical Engineering and Automation
Objective of the course	The aim of the course is to provide general knowledge of control theory industrial processes and knowledge of control devices allowing for the assessment of the purposefulness of their use and implementation decision to introduce them. Transfer of knowledge from scope of process robotization and their safety (PBCS as one of the security layers).
Learning outcomes	Knowledge:
	K1. Student knows the structure of a typical control system and description methods of static and dynamic properties of basic Automatic Regulation Systems. Learns methods of identifying engineering objects production systems. Knows the importance of automation as a layer safety for both employees and the environment.
	K2. Student knows the requirements for control systems stability and quality, also as one of the basic layers process safety that has a significant impact on the processes occurring risk of failure.
	K3. Student knows the basic methods and techniques used in solving engineering tasks related to the selection of controllers and their settings. Knows the basic issues of robotics in the field implementing integrated production processes.
	Skills:
	S1. Student is able to computer model and discuss properties typical industrial facility.
	S2. Student is able to synthesize and implement a simple logical circuit combinational and sequential controlling the z process using a PLC controller.
	S3. Student has the ability to design new and correct existing control systems. He knows how to conduct an experiment at the laboratory station and computer simulation of the system control and tune the PID controller.
	Social competence:
	SC1. Student is aware of the need to obey the rules working in a team and taking joint responsibility implemented activities.
Pre-requisites	Mathematics 1, Mathematics 2, Physics, Electrical Engineering
Course contents	The lecture includes: Basic concepts, classification of systems automation, static and dynamic properties of linear elements, signal classification, description of Automatic Regulation Systems structures, characteristics frequency, stability of linear systems, accuracy static and dynamic quality, characteristics of typical objects regulation and linear regulators. Two-position regulation, three-position and impulse. Basic issues of robotization industrial processes. Industrial applications of automatic control systems, manipulators and robots in industrial processes.

	The practice lessons include the study and analysis of static properties and dynamic elements of automation systems. Stability testing of Automatic Regulation Systems. and PID controller tuning. Synthesis and implementation logical system. Laboratory testing of continuous control systems fixed-value, two-state, three-state and cascade. Programming of locks to improve security both people and the environment.
References	Basic literature: Practice lessons instructions. Ming Rao, Haiming Qiu: Process control Engineering. A Textbook for chemical, Mechanical and Electrical Engineers. Gordon and Breach Science Publishers 1993. Additional literature: Åström K. J., Murray R.M., Feedback Systems, Princeton University Press, 2008.
Teaching methods	Lectures, practice lessons in the form of experiments simulations (Matlab, Classic, Scilab programs), and in the form of real experiments on sites laboratory (PLC controllers, InTouch program).
Assessment methods	Knowledge: K1- written test, K2- written test, K3- written test, Skills: S1 - assessment of the exercise and report, S2 - assessment of exercise performance and reports, S3 - assessment of exercise performance and reports, Social competence: SC1- assessment of the student's work as a leader and team member performing the exercise and reporting. Detailed criteria for assessing control works: - sufficient (3.0) degree of knowledge or skills when obtains from 51 to 60% of the total determining points maximum level of knowledge or skill and respectively: - sufficient plus (3.5) – from 61 to 70% - good (4.0) – from 71 to 80% - plus good (4.5) – from 81 to 90% - very good (5.0) – above 91%. DOCUMENTING ACHIEVED LEARNING OUTCOMES In the form of: partial assessments, reports in the form paper or digital; instructor's diary. Detailed criteria for assessing credit and control work: - the student demonstrates a sufficient (3.0) degree of knowledge, skills or competencies when it scores from 51 to 60% of the sum of points determining the maximum level of knowledge or skills in a given subject (respectively, at partial credit – part thereof), - the student demonstrates a sufficient plus (3.5) degree of knowledge, skills or competencies when it scores from 61 to 70% of sum of points determining the maximum level of knowledge or skills in a given subject (respectively – its part), - the student demonstrates a good degree (4.0) of knowledge, skills or competences when he obtains from

	71 to 80% of the total points specifying the maximum level of knowledge or skill with a given item (respectively – its parts), - the student demonstrates plus a good degree (4.5) of knowledge and skills or competences when he obtains from 81 to 90% of the total points specifying the maximum level of knowledge or skill with a given item (respectively – its parts), - the student demonstrates a very good level (5.0) of knowledge, skills or competencies when obtained above 91% of sum of points determining the maximum level of knowledge or skills in a given subject (respectively - its part).
ECTS credits balance	Contact - lecture (15 hours/0.6 ECTS), - practice lessons (30 hours/1.2 ECTS), - exam (2 hours/0.08 ECTS - consultations (2 hours/0.08 ECTS), Total – 49 hours/1.96 ECTS Non-contact - preparation for classes (21 hours/0.84 ECTS), - preparation of reports (10 hours/0.40 ECTS), - preparation for the exam (20 hours/0.8 ECTS), A total of 51 hours/2.04 ECTS
Workload related to classes requiring the direct participation of an academic teacher	participation in lectures – 15 hours; in practice lessons – 30 hours; exam - 2 hours; consultations – 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – InzZI_W01, ZI_W13 K1 – InzZI_W05, ZI_W14 K2 – InzZI_W05, ZI_W14 S1 – InzZI_U04 S2 – InzZI_U01, ZI_U04 S3 –ZI_U04, ZI_U11 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Production management and services
Language	English
Type of the course	obligatory
Level of study	First cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	PhD. Agnieszka Dudziak
Didactic unit offering a course	Department of Power Engineering and Transportation Subdepartment of Logistics and Business Management
Objective of the course	The aim of the course is to provide students with basic knowledge in the field of organization management, taking into account its production or service aspect, primarily in the context of the production process management function. Particular emphasis will be placed on the issues of organization as a system and on the types, functions and principles of building an organization as a production system in the modern market reality. Modern management concepts and problems will also be presented, with emphasis on modern methods of production planning and control in the so-called "lean production management".
Learning outcomes	Knowledge:
	1. Knows the theoretical foundations and is able to define terms, concepts and models of production and service management from a process perspective.
	2. Understands and is able to recognize processes and phenomena occurring in the organization, characterize the production system and explain the fundamental differences between the production and manufacturing cycles.
	Skills:
	1. Is able to indicate forecasting methods in the enterprise and classify them.
	2. Is able to access sources of knowledge related to management, use the information obtained, analyze the problem of optimizing the company's production program due to internal (resource) and external (market demand) constraints using the linear programming model, using the gross margin method.
	Social competence:
	1. Is able to communicate effectively with the environment and convince people of their reasons - they can cooperate and work in a group, but also have the necessary analytical skills to implement assumptions in planning production processes.
Pre-requisites	Completing the course requires having basic knowledge in the field of organizational management, marketing and economics.
Course contents	<u>Lectures include:</u> The subject covers the issues outlined in the program. This subject covers issues related to business management from a process perspective. The essence of production and service management is discussed, as well as issues related to the development of production and production processes in the enterprise. Attention will be paid to the essence, types, features of the process organization and its life cycle, as well as to the environment (characteristic features and classification of types

	of environmental variability). Issues related to planning and control of production and service implementation, as well as production capacity management and scheduling will also be discussed. Some modern methods, systems and concepts of production and service management will also be highlighted, such as the lean management method, lean manufacturing, kaizen, 5S, MRP and ERP production systems. Classes include: The scope of material covered during the lecture is then discussed in a practical context during exercises, there is a discussion, but also students analyze case studies and carry out tasks resulting from the need for a practical approach to the issues raised during the lecture.
References	Basic literature: 1. MR William R Puckett, *Production Management*, Createspace Independent Publishing Platform, 2014. 2. Newton Richard, *The Management Book*, Pearson Education Limited, The book X, 2021. Additional literature: 2. Frederick Winslow Taylor, *The Principles of Scientific Management*, Suzeteo Enterprises, 2020.
Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises checking and consolidating knowledge acquired during lectures, exercises in data interpretation, case studies, techniques for stimulating creative thinking (e.g. brainstorming), work in small groups, individual speeches by students, discussion in the forum of the entire exercise group, confrontation of various student positions through practical exercises, e.g. calculations performed on examples.
Assessment methods	Ways to verify the achieved learning outcomes: Knowledge: 1. 2 colloquia testing knowledge of contemporary management problems. 2. Implementation of the final project. Skills: 1. Participation in individual and group classes. 2. Participation in group discussions, colloquia. Social competence: 1. Student's activity during classes, performing classes. Forms of documenting achieved results: Colloquium, final test, instructor's diary.
ECTS credits balance	**CONTACT** **Form of classes - Number of hours/ECTS points** - participation in lectures – 30 hours/1.20 - participation in classes – 15 hours/0.60 - participation in consultations – 2 hours/ 0.08 **Total contact time 47 hours 1.88 points ECTS** **NON-CONTACT** **Form of classes - Number of hours/ECTS points** - preparation for classes – 8 hours/ 0.32 - development of a final project – 10 hours/0.4 - studying literature – 2 hours/0.08

	- preparation for the pass a subject – 8 hours/ 0.32 **Total non-contact 28 hours 1.12 points ECTS** **The total student workload is 75 hours. which corresponds to 3 points ECTS**
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 30 hours - participation in classes – 15 hours - participation in consultations – 2 hours **Total 47 hours which is 1.88 points ECTS**
Relation of course learning outcomes to the learning outcomes of the field of study	**Modular Effect Code – Directional Effect Code** K1 - ZI_W02 K2 - ZI_W07 S1 - ZI_U01, ZI_U04 S2 - ZI_U06 SC1 - ZI_K01, ZI_K02

The name of the field study	Management and Production Engineering
Course title	Metrology
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	3 (1.28/1.72)
Academic title/degree, name and surname of the person responsible for the course	PhD. Jacek Kapica, associate professor
Didactic unit offering a course	Department of Fundamentals of Technology
Objective of the course	Acquiring knowledge of methods for measuring physical quantities, construction and selection of measuring equipment, especially in industry, and estimation of measurement errors.
Learning outcomes	Knowledge:
	1. The student knows the structure and principles of operation of measuring equipment
	2. The student knows the sources of measurement errors
	Skills:
	1. The student is able to use measuring instruments
	2. The student is able to select the appropriate measurement method
	3. The student is able to estimate measurement errors
	Social competence:
	1. The student is aware of ethics in measurements
	2. The student can work in a team
Pre-requisites	Mathematics, physics
Course contents	Lectures include: Basic concepts of metrology, SI system of units, measurement uncertainties and errors, sources of errors and methods of limiting their impact on the measurement result, measurement methods, measurement tools, measurement systems, measurement transducers, telemetry, digital processing and acquisition of measurement data. Measurements of selected physical quantities, The classes include: performing measurements and determining qualitative and quantitative measurement errors of various physical quantities using analogue and digital measuring instruments.
References	Obligatory literature: Raghavendra, i Krishnamurthy. 2013. Engineering Metrology and Measurements. New Delhi. Recommended literature: Samir Mekid. 2021. Metrology and Instrumentation: Practical Applications for Engineering and Manufacturing. John Wiley & Sons, Ltd.
Teaching methods	Lecture using multimedia techniques, auditorium and laboratory classes, group work, and implementation of laboratory tasks.
Assessment methods	Verification method: Knowledge: assessment of colloquiums (in written form, test or oral answer); Skills: assessment of the performance of laboratory tasks and preparation of the report; Competence: assessment of activity during lectures and classes, assessment of group work and individual work

ECTS credits balance	Contact hours: Lecture 15 hours – 0.6 ECTS, Audit classes. 5 hours – 0.2 ECTS Lab classes 10 hours – 0.4 ECTS Consultations 2 hours – 0.08ECTS Total: 1.28 ECTS Non-contact hours: Preparation for classes 10 hours – 0.4 ECTS Preparation for the colloquium 10 hours – 0.4 ECTS Preparation of reports 10 hours – 0.4 ECTS Studying literature 13 hours – 0.52 ECTS Total: 1.72 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours; in classes – 15 hours; consultations – 2 hours. Total of 32 hours.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W01 K2 - ZI_W05 S1, S2, S3 - ZI_U03 S1, S2, S3 - ZI_U04 SC1 - ZI_K01 SC2 - ZI_K04

The name of the field study	Management and Production Engineering
Course title	Quality and Safety Management
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Prof. Sławomir Kocira
Didactic unit offering a course	Department of Machinery Exploitation and Management of Production Processes
Objective of the course	The aim of the module is to familiarize students with the standards of quality systems and the principles of sustainable development in relation to the requirements: safety, environment, technical infrastructure, economy and social conditions.
Learning outcomes	Knowledge:
	K1. He knows the standards of quality systems and methods and techniques of quality management.
	Skills:
	S1. Can develop assumptions for selected quality management systems.
	S2. He can use his knowledge to control economic processes in accordance with the process approach.
	Social competence:
	Sc1. Is aware of the social shaping of economic processes and their improvement through the systematic improvement of professional competences
Pre-requisites	No pre-requisites
Course contents	Lectures: History of the development of quality systems. Principles of quality management. Process approach. Implementation of quality management. Standards of quality management systems: quality management system - ISO 9000 series, product safety system, good practice systems, HCAP system, occupational safety management system - ISO 45001; environmental management system - ISO 14000. Classes: Methods and techniques of quality management in a company - general characteristics Pareto - Lorenza, Ishikawa diagram Block diagram, Arrow diagram, 5W Brainstorm PDCA 5S method Procedure Quality function development method - QFD "house of quality"
References	Goetsch, D. L., & Davis, S. B. (2016). Quality management for organizational excellence: Introduction to total quality. pearson. Tricker, R. (2019). Quality management systems: A practical guide to standards implementation. Routledge. Norms ISO 9001, 14000, 45001
Teaching methods	lectures, classes, group work, practical work

Assessment methods	K1 – final test S1 – final test, project S2 – final test, project Sc1 – final test
ECTS credits balance	– Lecture – 15 hours, – Classes - 30 hours. – Consultation - 2 hours – Classes preparation - 10 hours – Literature studies - 5 hours – Preparation for the colloquia - 13 hours Total student workload is 75 hours which equals 3 ECTS credits
Workload related to classes requiring the direct participation of an academic teacher	Attendance in lectures - 15 hours; in classes - 30 hours; consultations 2 hours. What amounts to 1.88 ECTS credits
Relation of course learning outcomes to the learning outcomes of the field of study	Code for the modular effect - code for the specific effect K1 – ZI_W04, ZI_W10, ZI_W12, ZI_W10, InzZI_W03, InzZI_W04 S1 – ZI_U04, ZI_U08, ZI_U10, InzZI_U02, InzZI_U04 S2 – ZI_U04, ZI_U08, ZI_U10, InzZI_U02, InzZI_U04 Sc1 – ZI_K01, ZI_K04

The name of the field study	Management and Production Engineering
Course title	Electrical engineering and energy law
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	II
Semester of study	4
Number of ECTS credits (contact/non-contact)	4 (2/2)
Academic title/degree, name and surname of the person responsible for the course	PhD. Jacek Kapica, associate professor
Didactic unit offering a course	Department of Fundamentals of Technology
Objective of the course	The aim of the module is to learn the fundamental laws of electrical engineering, the principles of operation and construction of electrical machines, and the basic legal acts in the field of electrical power engineering.
Learning outcomes	Knowledge:
	1. The student knows the basic laws of electrical engineering
	2. The student knows the structure and principles of operation of basic electrical devices
	Skills:
	1. The student is able to calculate simple electrical circuits
	2. The student is able to make measurements in electrical circuits.
	Social competence:
	1. The student is able to apply the principles of rational use of electricity
	2. The student is able to operate electrical devices safely.
Pre-requisites	Physics, Mathematics
Course contents	Lectures include: Physical basics of electrical engineering, direct current circuits, single- and three-phase alternating current circuits, measurements of basic electrical quantities, electromagnetism, electrical machines, protection against electric shock, basic legal acts in the power industry. Classes include: Calculating simple electrical circuits, connecting and reading from measuring instruments, measurements in direct current circuits, measurements in alternating current circuits, simulation of single- and three-phase alternating current circuits, testing of anti-shock protection measures.
References	Obligatory literature: Bumiller, Horst, Monika Burgmaier, Walter Eichler, Bernd Feustel, Thomas Käppel, Werner Klee, Jürgen Manderla, i in. 2016. Electrical Engineering Textbook. Haan-Gruiten. Recommended literature: SAMUEL J. LING, JEFF SANNY, WILLIAM MOEBS, University Physics, Volume 2, Openstax 2016
Teaching methods	Lecture Solving problems. Laboratory exercises. Simulation exercises on computers.
Assessment methods	K1 – exam, K2 – exam, S1 – test, S2 – participation in classes and report SC1, SC2 - assessment of the student's work during the exercises

ECTS credits balance	**CONTACT** **Form of classes Number of hours ECTS points** Lecture 15 hours 0.60 ECTS points Classes 30 hours 1.20 ECTS points Consultations 2 hours 0.08 ECTS points Exam 3 hours 0.12 ECTS points **Total contact time 50 hours 2 ECTS points** **NON-CONTACT** **Form of classes Number of hours ECTS points** Preparation for colloquium 15 hours 0.80 ECTS points Preparation 15 hours for the exam 0.80 ECTS points Preparation reports 10 hours 0.40 points ECTS Studying literature 10 hours 1.12 ECTS points **Total non-contact 50 hours 2 ECTS points** **The total student workload is 100 hours, which corresponds to 4.00 ECTS points.**
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 30 hours Participation in consultations – 2 hours Participation in the exam – 3 hours. **Total 50 hours which is 2 ECTS points**
Relation of course learning outcomes to the learning outcomes of the field of study	Z1_W03 –K1,K2 ZI_W14 –K1,K2 ZI_U03 -S1 ZI_U05 –S2 ZI_K01 – SC1, SC2 ZI_K02 – SC1, SC2

The name of the field study	Management and Production Engineering
Course title	Fundamentals of thermodynamics
Language	English
Type of the course	obligatory
Level of study	First
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	Professor Dariusz Dziki
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the subject is to acquire knowledge regarding the fundamentals of processes occurring in thermal engineering and the economic analysis of these processes. Based on this, knowledge will be deepened concerning the thermodynamic analysis of typical thermal processes related to the operation of heat engines, refrigeration cycles, steam turbines, heat pumps, and heat exchange analysis. This knowledge will enable, on the one hand, an understanding of the theoretical basics of thermal processes, as well as serve as a foundation for issues related to the economic aspects of agri-food production.
Learning outcomes	Knowledge:
	1. Student is familiar with basic methods, techniques, tools, and materials used in solving simple engineering tasks in the field of thermodynamic processes..
	2. The student has fundamental knowledge in the field of sciences pursued within the Management and Production Engineering program, which is essential for understanding basic thermal processes.
	Skills:
	1. The student is capable of conducting computational characteristics related to the balancing of thermal processes.
	Social competence:
	1. Think and act in an entrepreneurial manner and understand the need to constantly learn and inspire others
Pre-requisites	Mathematic 1, Mathematic 2
Course contents	The lectures cover: Zeroth law of thermodynamics. Ideal, semi-ideal, real gas. Clapeyron's equation and the universal gas equation. Concept of internal energy and enthalpy. Forms of energy: work and heat. Concept of absolute and technical work. First law of thermodynamics for closed and open systems. Second law of thermodynamics for reversible and irreversible processes. Third law of thermodynamics. Thermodynamic transformations of ideal gases. Comparative cycles of heat engines: Carnot, Otto, Diesel, and Sabathe's cycles. Water vapor as a thermodynamic agent. Isobaric process of steam formation. Steam tables and charts. Transformations of saturated and superheated steam. Thermodynamic cycles of refrigerators and heat pumps, Carnot cycle, dry cycle, and dry cycle with Linde cooling - unit refrigeration efficiency and coefficient of performance of cycles. Transformations of moist air. Classification of heat exchange methods: conduction, convection, radiation. Construction and classification of heat

	exchangers. Cumulative efficiency of thermal processes, optimal equipment load values, cost indicators in thermal processes. The classes include: Determining the parameters of an ideal gas and water vapor, calculating absolute and technical work, heat of transformation, internal energy, enthalpy, and entropy of ideal gases as well as wet and superheated steam. Estimating the efficiency and thermal quantities characteristic of heat engines. Calculating the coefficient of refrigeration efficiency, the amount of heat absorbed in the evaporator and rejected in the condenser, as well as the compression work in the cycles of refrigerators and heat pumps. Computing absolute humidity, enthalpy, and density of moist air. Evaluating heat losses through conduction, convection, radiation, and infiltration. Determining the thermal power of heat exchangers. Calculating cumulative efficiency, optimal loads, and costs of thermal processes.
References	James Luscombe. Thermodynamics. ISBN 9780367571993 240 Pages Published June 30, 2020 by CRC Press
Teaching methods	- Lecture - Discussion - Problem-solving - Utilizing instructional materials
Assessment methods	K1 – Written test K2 - Written paper. S1 - Presentation and performance assessment. S2 - Presentation and performance assessment. SC1 - Presentation assessment. Methods of documenting the achieved results: exams, instructor's journal, problem-solving assignments, presentations.
ECTS credits balance	**Contactual** **Form of lecture Number of hours ECTS** Lecture 15 h 0.60 Classes 30 h 1.2 Consultation 2 h 0.08 **Total 47 h 1.88 ECTS** **No-contactual** Preparation for classes 28 h 1.12 Preparation for tests 25 h. 1 **Total 53 h 2.12 ECTS** The total student workload 53 hours, which corresponds to 2.12 ECTS credits
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures - 15 hours. Participation in classes - 30 hours. Participation in consultations - 2 hour. In total, this amounts to 47 hours, which corresponds to 1.88 ECTS credits.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W01 K2 - ZI_W03 S1 - ZI_U05, InzZI_U04 S2 – ZI_U04 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Business management
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	PhD. Agnieszka Dudziak
Didactic unit offering a course	Department of Power Engineering and Transportation/Subdepartment of Logistic and Business Management
Objective of the course	The aim of the course is to provide students with knowledge in the field of business management, with an emphasis on human resources management, primarily in the context of goals, methods, techniques and benefits resulting from effective personnel management. Particular emphasis will also be placed on the issues of modern people management, by discussing the personnel policy typical of modern enterprises and the functions and types of motivating employees - participants of the organization.
Learning outcomes	Knowledge:
	1. The student has basic general knowledge in the field of human resources management.
	2. The student understands and is able to recognize processes and phenomena taking place in contemporary organizations and the world around them, relating to human resources (personnel) - human resource planning, organization, selection, motivation, evaluation and development.
	Skills:
	1. The student is able to diagnose and solve problems related to basic phenomena related to human resources management.
	2. The student is able to access sources of knowledge related to human resources management, use the information obtained and present and analyze its synthesis.
	Social competence:
	1. The student is able to navigate the labour market.
Pre-requisites	Completing the course assumes having basic knowledge of management, macroeconomics and marketing.
Course contents	Lectures include: issues in the field of human resources management: issues related to the history, essence and importance of human resources management, employment planning and flexible forms of employment, selection and selection of job candidates, issues related to employee motivation, issues of employee evaluation and human resources development (training, path career) and employee recruitment, modern concepts of human resources management (outsourcing, outplacement, personal benchmarking). The classes include: Analysis of exercises in the form of case studies, tests and other such forms on the topics discussed during lectures.
References	Obligatory literature: 1. Wilton N. 2022. An Introduction to Human Resource Management. SAGE Publications

	2. Barney Erasmus, Johan Strydom, Sharon Rudansky-Kloppers (eds.). 2019. Introduction to Business Management. Oxford University Press Recommended literature: 1. Amizan Omar, Anurag Singh, Deepmala Singh, SB Goyal. 2022. Business Intelligence and Human Resource Management Concept, Cases, and Practical Applications, Taylor & Francis
Teaching methods	Discussing issues based on diagrams and illustrations, presentation of selected phenomena using didactic models, exercises checking and consolidating knowledge acquired during lectures, solving practical problems in the field of human resources management, work in small groups, discussion among the entire exercise group.
Assessment methods	Ways of verifying the achieved learning outcomes: Knowledge: K1. A test checking knowledge in the field covered by the learning outcomes. K2. 1 colloquium checking knowledge from exercises, reports from conducted exercises. Skills: S1. Participation in individual and group exercises, preparation of home exercises, participation in group discussions. S2. Preparation of home exercises, preparation for exams and tests. Social competence: SC1. Participation in team exercises during classes, oral answers during classes, activity, doing home exercises and preparing for the exam. Forms of documenting the achieved results: reports, colloquium, final test, teacher's notes
ECTS credits balance	Contact hours - participation in lectures – 15 hours / 0.60 ECTS - participation in classes – 30 hours / 1.20 ECTS - participation in consultations – 2 hours / 0.08 ECTS Contact hours - 47 hours, which corresponds to 1.88 ECTS points. Non-contact hours - preparation for classes – 15 hours / 0.60 ECTS - preparation for colloquium – 10 hours / 0.40 ECTS - completing exercises at home – 10 hours / 0.40 ECTS - preparation for final test – 18 hours / 0.72 ECTS Non-contact hours - 53 hours, which corresponds to 2.12 ECTS points. The total student workload is 100 hours which corresponds to 4 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 15 hours / 0.60 ECTS - participation in classes – 30 hours / 1.20 ECTS - participation in consultations – 2 hours / 0.08 ECTS Total 47 hours which is 1.88 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W02 K2 - ZI_W02 S1 - ZI_U01 S2 - ZI_U04, ZI_U09 SC1 - ZI_K03, ZI_K05

The name of the field study	Management and Production Engineering
Course title	Food industry machinery
Language	English
Type of the course	Obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	5 (2.56/2.44)
Academic title/degree, name and surname of the person responsible for the course	PhD. Jacek Mazur, associate professor
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to familiarize students with the selection of materials, construction and principles of operation of machines and devices used in the food industry.
Learning outcomes	Knowledge:
	1. The student understands the basic concepts and issues related to machines and devices in the food industry.
	2. The student understands the basic phenomena occurring during technical processes related to the operation of machines and equipment in the food industry.
	Skills:
	1. The student is able to supervise and control aspects related to the design and use of food industry machines and devices.
	2. The student is able to develop a design of an example device operating in the food industry.
	Social competence:
	1. The student is aware of the need for continuous education in the use and operation of food industry machines and equipment
Pre-requisites	Physics, Materials Science, Manufacturing Processes
Course contents	The lectures include the following topics: Selection and design of food industry equipment. Construction and principles of operation of grinding, transporting, dosing, cleaning, separating, washing, mixing, pressure processing machines, etc. Classes include: Projects and accounting tasks, as well as practical classes on separation, ventilation, pumps, etc.
References	Basic literature: 1. Handbook of Farm, Dairy and Food Machinery Engineering. Elsevier. 2019, 2. Malcata F. Xavier: Food Process Engineering. Basics and Mechanical Operations. CRC Press. 2021 3. Zeki Berk: Food Process Engineering and Technology (Food Science and Technology). Academic Press, 2018
Teaching methods	Lecture, discussion of issues based on diagrams and illustrations, experimental and computational exercises, solving accounting tasks, carrying out projects.
Assessment methods	Knowledge: K. 1. - written work (colloquium, exam), K. 2. - written work (colloquium, exam), Skills: S. 1. - written work (colloquium, exam), S. 2. - written work (colloquium, exam) Social competence: SC. 1. - assessment of the student's project work

ECTS credits balance	CONTACT Form of classes Number of hours ECTS points Lecture 15 hours 0.60 points ECTS Classes and auditory classes 40 hours 1.60 points ECTS Field activities 5 hours 0.20 points ECTS Consultations 2 hours 0.08 points ECTS Exam 2 hours 0.08 points ECTS Total contact time 64 hours 2.56 points ECTS NON-CONTACT Preparation for colloquiums 20 hours 0.80 points ECTS Preparation for the exam 15 hours 0.60 points ECTS Studying literature 26 hours 1.04 points ECTS Total non-contact 61 hours 2.44 points ECTS The total student workload is 125 hours. which corresponds to 5 points. ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes and auditory classes – 40 hours Participation in field activities – 5 hours Participation in consultations – 2 hours Participation in the exam – 2 hours. Total 64 hours which is 2.56 points ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Directional Effect Code K. 1 - Z1_W03, InzZI_W03 K. 2 - Z1_W05, InzZI_W03 S. 1 – Z1_U04, InzZI_U01 S. 2 – Z1_U07, InzZI_U03 SC. 1 - Z1_K03

The name of the field study	Management and Production Engineering
Course title	Management of transportation and supply
Language	English
Type of the course	obligatory/~~elective~~
Level of study	First/~~Second-cycle~~ studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	Andrzej Marczuk, Professor Małgorzata Góral-Kowalczyk, PhD
Didactic unit offering a course	Department of Agricultural Forestry and Transport Machines
Objective of the course	The aim of the module is to familiarize students with basic information regarding supply chain management, transport and proper warehouse management.
Learning outcomes	Knowledge:
	1. The student knows the basic concepts related to transport and storage management.
	2. The student has knowledge of supply chain and inventory management.
	Skills:
	1. The student is able to design a warehouse space, plan the arrangement of inventory and perform calculations regarding the size of warehouse modules.
	2. The student is able to properly select means of internal transport and additional warehouse equipment and perform calculations related to the optimization of the operation of these devices.
	3. The student is able to analyze the efficiency and costs of storage and solve location tasks.
	Social competence:
	1. The student shows readiness to expand knowledge and improve his qualifications in the field of transport, warehouse management and supply management
Pre-requisites	Mathematics, physics
Course contents	Lectures include: Planning of warehouse functions, storage processes, types of inventories, planning of material needs, arrangement of inventories in the warehouse, technical and additional warehouse equipment, information technologies and occupational health and safety regulations in warehouse management. The Classses include: Methods of determining delivery volumes, management of inventory groups, demand forecasting, inventory control systems, determining operating parameters of transport devices in the warehouse, optimization of parameters, calculations of warehouse modules and locations.
References	<u>Basic:</u> 1. Christopher Martin: Logistics & Supply Chain Management, Pearson Education, 2021. 2. Zoran Gacovski: Transportation Technologies, Arcler Press. 2020. 3. Krzysztof Rutkowski: Best Practices in Logistics and Supply Chain Management, Szkoła Główna Handlowa w Warszawie, 2014. <u>Additional:</u>

	1. Institute for Career Research: A Career in Warehouse Management : Shipping and Inventory Logistics, Institute for Career Research. 2005. 2. Stadtler Hartmut, Kilger Christoph, Meyr Herbert: Supply Chain Management and Advanced Planning, Springer-Verlag Gmbh Springer, 2015.
Teaching methods	Lecture using multimedia presentations, solving mathematical tasks, laboratory experiments.
Assessment methods	Ways to verify the achieved learning outcomes: K1 – grade from the written final examination K2 – grade from the written final exam, activity grade Sk1 – assessment of worksheets and tests Sk2 – assessment of reports from laboratory classes Sk3 – accounting calculations So1 – activity and oral answers during classes Forms of documenting achieved results: archiving written final assessments, worksheets and reports, attendance lists with marked activities.
ECTS credits balance	**CONTACT** **Form of classes Number of hours ECTS points** Lecture 15 hours 0.60 points ECTS Classes 30 hours 1.20 points ECTS Consultations 2 hours 0.08 points ECTS Total contact time 47 hours 1.88 points ECTS **NON-CONTACT** **Form of classes Number of hours ECTS points** Study literature 20 hours 0.80 points ECTS Preparation for tests 20 hours 0.80 points ECTS Preparation reports 13 hours 0.52 points ECTS Total non-contact 53 hours 2.12 points ECTS The total student workload is 100 hours which corresponds to 4 points ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 30 hours Participation in consultations – 2 hours Total 47 hours which is 1.88 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W04; ZI_W05 K2 - ZI_W06; ZI_W13 Sk1 – ZI_U11 Sk2 – ZI_U05 Sk3 - ZI_U01; ZI_U08 So1 - ZI_K03

The name of the field study	Management and Production Engineering
Course title	Food engineering operations in fruit and vegetable industrial plants
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	5 (2.48/2.52)
Academic title/degree, name and surname of the person responsible for the course	Tomasz Guz, assistant professor, (PhD)
Didactic unit offering a course	Department of Food Engineering and Machinery
Objective of the course	The aim of the course is to introduce students with unit processes that occur in the fruit and vegetable industry, the specificity of machine construction for this industry and issues related to the use of these processes in production lines.
Learning outcomes	Knowledge:
	K1. Knowledge of the theoretical basis of processes used in the fruit and vegetable industry.
	K2. Knowledge of the structure and principles of operation of machines and devices used in technological lines
	Skills:
	S1 Ability to perform calculations in the field of planning the production process
	S2 Ability to combine machines and devices in the production process
	Social competence:
	SC1. Awareness of the impact of the production process on the environment
Pre-requisites	The course is based on knowledge of such subjects as physics, thermodynamics and mechanics
Course contents	The course helps students acquire knowledge in the field of fruit and vegetable processing. Its program includes detailed information about the theory of individual processes, such as grinding, pressing, filtration, membrane processes, thermal processes, including food preservation using physical methods. The course program also includes liquid thickening, the final stages of production of some concentrates and preliminary operations, with particular emphasis on those used in fruit and vegetable processing. The subject program comprehensively presents most of the issues related to the processing of this group of raw materials. Despite the fact that this is not a subject presenting the production technology of selected products in this industry, the presentation of processes includes numerous references to the use of machines in the technological process, which allows students to become familiar with its course and is an additional benefit resulting from education in this subject.
References	Brennan J. G., Butters J. R., Cowell N. D., Liley A., E., V.: Food Engineering Operations. Elsevier Applied Science. London, New York. 1990.
Teaching methods	lecture, calculation exercises, performing drawings/tasks/calculations, individual speeches by students, speech (presentation of a paper, project),
Assessment methods	K1 - written work,

	K2 - test, S1 - colloquium, S2 – written work, SC1 - presentation of a project
ECTS credits balance	- participation in lectures – 30 hours, - participation in auditorium and laboratory classes – 24 hours, - participation in field classes – 6 hours - preparation for laboratory classes – 31 hours, - preparation for auditorium classes – 20 hours, - preparation for semester tests 2x6 hours. = 12 hours, - participation in consultations for credit - 2 hours The total student workload is 125 hours, which corresponds to 5 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	- participation in lectures – 30 hours, - participation in auditorium and laboratory classes – 30 hours, - participation in consultations related to preparation for passing tests - 2 hours, Total - 62 hours, which corresponds to 2.48 ECTS points
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W04 K2 - ZI_W05 S1 – ZI_U08 S2 - ZI_U07 SC1 - ZI_K04

The name of the field study	Management and Production Engineering
Course title	Operation of food machinery
Language	English
Type of the course	Elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	5 (2.48/2.52)
Academic title/degree, name and surname of the person responsible for the course	Grzegorz Łysiak, PhD., associate professor
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to provide students with interdisciplinary knowledge about the process and principles of operation as well as issues related to the use and operation of machines and food industry equipment, enabling planning, organization and supervision of production systems and ensuring the technical readiness of the machinery.
Learning outcomes	Knowledge:
	1. The student has basic and structured knowledge in terms of: operating conditions of equipment, facilities and technical systems; reliability; damage and wear of machines; safety in the operation of machines and devices; rules for conducting operational tests and ensuring technical readiness and availability of machinery.
	2. The student knows the technical and technological principles of use and maintenance of food machines and equipment; the structure of the production system and technologies typical of food processing.
	Skills:
	1. The student is able to manage the process of operating technical systems; plan, organize, supervise and optimize operational processes in food production.
	2. The student is able to determine operational indicators, production and processing capacity in food processing and analyze the availability and use of food machines and equipment.
	Social competence:
	1. The student is aware of the social importance of activities that contribute to quality improvement and health safety of food production and contribute to environmental protection - through the rational use of technical equipment.
Pre-requisites	Physics, Materials Science, Manufacturing Processes
Course contents	Lectures include: Concepts and definitions in the field of machine operation and issues related to the use and operation of machines and equipment in food processing. Machine operation process and system. Conditions and properties of machinery operation. Production system. Production factors. Selection of machines and devices and organization of technological lines. Principles of determining throughput, production capacity, processing capacity and evaluation of the use of machines. Rules for conducting operational tests of machines. Damage and wear of machine elements. Durability and reliability of machines. Operational policies and strategies. Safety issues in the operation of machines. Classes include: Assessment of the machine operation process, calculation of operational indicators. Analysis of production and processing capacity. Learning about technological processes in

	food processing. Optimization of the operation process of technical systems. Analysis of the availability and efficiency of use of machines and ensuring the technical readiness of the machinery park.
References	Basic literature: 1. P.J. Fellows: Food Processing Technology. Elsevier Science Publishing Co Inc, 2022 2. Malcata F. Xavier: Food Process Engineering. Basics and Mechanical Operations. CRC Press. 2021 3. Mobley Keith: Maintenance Engineering Handbook, Eighth Edition. McGraw-Hill Education - Europe, 2014
Teaching methods	Lecture, discussion of issues based on diagrams and illustrations, experimental and computational exercises, solving accounting tasks, carrying out projects.
Assessment methods	Knowledge: K. 1. - written work (colloquium, course credit), K. 2. - written work (colloquium, course credit), Skills: S. 1. - written work (colloquium, course credit), S. 2. - written work (colloquium, course credit), Social competence: SC. 1. - assessment of the student's project work
ECTS credits balance	CONTACT Form of classes Number of hours ECTS points Lecture 30 hours 1,2 points ECTS Classes 30 hours 1,2 points ECTS Consultations 2 hours 0.08 points ECTS Total contact time 62 hours 2.48 points ECTS NON-CONTACT Preparation for colloquiums 20 hours 0.80 points ECTS Preparation for the course credit 12 hours 0.60 points ECTS Studying literature 31 hours 1.04 points ECTS Total non-contact 63 hours 2.52 points ECTS The total student workload is 125 hours. which corresponds to 5 points. ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 30 hours Participation in classes – 30 hours Participation in consultations – 2 hours Total 62 hours which is 2.48 points ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Directional Effect Code K.1 – ZI_W04 K.2 – ZI_W05 S.1 – ZI_U11 S.2 – ZI_U04 S.C.1 – ZI_K04 K.1- InzZI_W01 K.2 – InzZI_W04 S.1 – InzZI_U01 S.2 – InzZI_U05

The name of the field study	Management and Production Engineering
Course title	Instrumental analysis
Language	English
Type of the course	elective
Level of study	First cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Agnieszka Sagan, PhD
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technologies
Objective of the course	Objective of the course is to acquire knowledge about methods of instrumental analysis
Learning outcomes	Knowledge:
	1. student knows and understands the theoretical basis of the discussed instrumental methods
	2. student knows the theoretical and practical aspects of performing qualitative and quantitative analysis using instrumental methods
	Skills:
	1. student has the skills to perform measurements using measuring equipment and interprets the results obtained during the analysis
	Social competence:
	1. cooperation in a group
Pre-requisites	Chemistry
Course contents	Lectures: Stages of the analytical process. Preparation of the results and their statistical analysis. Method validation. Spectroscopic methods: UV-VIS spectrophotometry, infrared spectrophotometry, atomic absorption spectrometry. Electroanalytical methods: potentiometry, polarography, conductometry. Chromatographic methods: high-performance liquid chromatography, gas chromatography. Mass spectrometry. Classes: Preparation of samples for analysis, analysis samples by selected instrumental methods, statistical analysis of measurement results
References	- Harris D.C. Quantitative Chemical Analysis. W.H. Freeman and Co. N.Y. 8th Ed. 2010 - Schlemmer G., Schlemmer J. Instrumental Analysis. Chemical IT. De Gruyter, 2022 - Robinson J.W., Skelly Frame E.M., Frame II G.M. Instrumental Analytical Chemistry An Introduction. Boca Raton CRC Press, 2021
Teaching methods	lecture, classes - work in small groups
Assessment methods	K1, K2 - final test, Sk1 - assessment of the report, So1 - assessment of the student's work as a member of the team
ECTS credits balance	Hours/ ECTS contact Lecture 15/0.60 Classes 30/1.20 Consultations 2/0.08 Exam 2/0.08 **Total contact** **49/1.96** non-contact

	Preparation for classes: 20/0.80 Completion of classes reports 20/0.80 Preparation for the exam 11//0.44 **Total non-contact 51/2.04** **Total 100/4**
Workload related to classes requiring the direct participation of an academic teacher	Lecture 15/0.60 Classes 30/1.20 Consultations 2/0.08 Exam 2/0.08 **Total contact 49/1.96**
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 – ZI_W01 Sk1 – ZI_U05 So1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Food analysis
Language	English
Type of the course	elective
Level of study	First cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Agnieszka Sagan, PhD
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technologies
Objective of the course	Objective of the course is to acquire knowledge about methods of food analysis
Learning outcomes	Knowledge:
	1. student knows and understands the theoretical basis of the discussed methods
	2. student knows the theoretical and practical aspects of performing qualitative and quantitative food analysis
	Skills:
	1. student performs simple food analyses and interprets the results obtained during the analysis
	Social competence:
	2. cooperation in a group
Pre-requisites	Chemistry
Course contents	Lectures: Principles of collecting and preparing samples for testing. Results and their statistical evaluation. Methods for determining water content in food. Direct and indirect methods for determining protein content. Lipid analysis: lipid extraction from tissues, fatty acid composition. Determination of mineral content. Saccharide analysis. Methods for testing antioxidant properties. Chemical contamination of food. Classes: Preparation of food samples for analysis. Qualitative and quantitative analysis using selected techniques. Statistical analysis of measurement results.
References	- Nielsen S. (ed.). Food Analysis. Springer International Publishing, Springer-Verlag Gmbh, 2017 - Schlemmer G., Schlemmer J. Instrumental Analysis. Chemical IT. De Gruyter, 2022
Teaching methods	lecture, classes - work in small groups
Assessment methods	K1, K2 - final test, Sk1 - assessment of the report, So1 - assessment of student's work as a team member
ECTS credits balance	Hours/ ECTS contact Lecture 15/0.60 Classes 30/1.20 Consultations 2/0.08 Exam 2/0.08 **Total contact 49/1.96** non-contact Preparation for classes 20/0.80 Completion of classes reports 20/0.80 Preparation for the exam 11//0.44 **Total non-contact 51/2.04** **Total 100/4**

Workload related to classes requiring the direct participation of an academic teacher	Lecture Classes Consultations Exam **Total contact**	15/0.60 30/1.20 2/0.08 2/0.08 **49/1.96**
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 – ZI_W01 Sk1 – ZI_U05 So1 – ZI_K01	

The name of the field study	Management and Production Engineering
Course title	Technological aspects of cereal processing
Language	English
Type of the course	obligatory
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	5
Number of ECTS credits (contact/non-contact)	4 (1.84/2.16)
Academic title/degree, name and surname of the person responsible for the course	PhD. Renata Różyło, associate professor
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to familiarize students with aspects of cereal grain and milling processing. Qualitative characteristics of milling cereal raw materials. Discussion of the process of preparing grain for grinding and grinding and the type of machines involved in these processes. Characteristics of the production process of wheat, rye and mixed bread, taking into account the types of machines and devices as well as technological parameters.
Learning outcomes	Knowledge:
	1. Is able to describe the properties of cereal raw materials and their connections with the flour production process. Knows basic standards - quality standards for cereals. Has structured general knowledge of the flour production process.
	2. Knows the types, graphic symbols and principles of operation of devices used for cleaning and moistening grain and machines for milling wheat and rye
	3. Has structured general knowledge of methods and stages of the bread production process.
	Skills:
	1. Is able to select laboratory equipment for grain analysis and develop quality specifications for selected grain raw materials
	2. Selects equipment and develops a grain elevator operation scheme and a scheme for preparing grain for milling
	3. It complements the fermentation patterns of various types of bread
	Social competence:
	1. Has the ability to work in a group, organize and manage the work of teams (project, task, etc.) and organization in the work environment
Pre-requisites	Mathematics 1,2, Engineering design, Production processes
Course contents	Lectures include: The importance of the grain industry in the food economy. Requirements and importance of quality parameters of basic milling raw materials (wheat and rye) in processing. Types of warehouses and the influence of factors on the process of storing milling raw materials. Characteristics and stages of grain preparation for milling. The influence of material properties and machine design parameters on the grinding process. The importance of the baking industry, the history of bakery production and the characteristics of the nutritional value of bread. The exercises include: Types and characteristics of cereal raw materials. Development of quality specifications for milling raw materials. Presentation of methods for assessing the chemical, physical and technological properties of grain raw materials. Design of laboratory equipment for grain analysis.

	Operation of grain elevators (Reception, drying, airing and storage of grain). Preparing grain for milling. Selection of machines in schemes for separating impurities and cleaning the grain surface (black and white cleaning). Grinding of cereals (wheat, rye). Characteristics of grinders and parameters of the grinding process. Rules for preparing milling diagrams. Quality parameters of flours used for baking. Basics of mixing flour and preparing appropriate baking mixtures. Quality of wheat and rye flours and types of technological additives used in baking. Organization and stages of bakery production. Fermentation of rye, wheat and mixed doughs - fermentation patterns of various types of bread. Characteristics of the bread baking process. Quality management systems in the mill and bakery and other issues of production process control.
References	1. Owens, G. (Ed.). (2001). *Cereals processing technology* (Vol. 53). CRC Press. 2. Hoseney, R. C. (1994). *Principles of cereal science and technology* (No. Ed. 2). American Association of Cereal Chemists (AACC). 3. Guiné, R. D. P. F., & dos Reis Correia, P. M. (Eds.). (2013). *Engineering aspects of cereal and cereal-based products*. CRC Press.
Teaching methods	- Illustrating a verbal message using (drawings, diagrams, charts, tables, films and photographs - multimedia projection) - Demonstrations and explanations using instructional videos - Short design tasks - Calculation tasks
Assessment methods	Knowledge 1,2, 3- written test (Passing test), Skills 1 - assessment of the design of laboratory equipment for assessing the quality of cereals, Skills 2 - checking the correctness of the selection of machines during classes and assessing skills on the final exam Skills 3 - checking the correctness of calculation tasks during classes and assessing skills for the final exam Social competence 1 - assessment of students' work and oral statements. Forms of documenting the achieved results: written test, project, instructor's diary, exam for people with a grade lower than 4 (grades equal to or higher than 4 obtained during the tests entitle to exemption from the exam) Forms of documenting the achieved results: written test, instructor's diary, exam for people with a grade lower than 4 in the test
ECTS credits balance	CONTACT Form of classes — Number of hours — ECTS points Lecture — 15 hours — 0.60 points ECTS Exercises — 30 hours — 1.20 points ECTS Consultations — 1 hour — 0.04 points ECTS Total contact time — 46 hours — 1.84 points ECTS NON-CONTACT Preparation projects — 26 hours — 1.04 points ECTS Preparation for passing the exercises — 18 hours — 0.72 points ECTS Studying literature — 10 hours — 0.40 points ECTS Total non-contact — 54 hours — 2.16 points ECTS The total student workload is 100 hours. which corresponds to 4 points. ECTS

Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in exercises – 30 hours Participation in consultations – 1 hour. Total 46 hours which is 1.84 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge 1 - InzZI_W03 Knowledge 2 - ZI_W04 Knowledge 3 -ZI_W10 Skills 1 - ZI_U02 Skills 2 – ZI_U04 Skills 3 – InzZI_U04 Social competence 1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Industrial Process Control by Electronic Devices
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	3 (1.96/1.04)
Academic title/degree, name and surname of the person responsible for the course	Jacek Kapica, associate professor
Didactic unit offering a course	Department of Fundamentals of Technology
Objective of the course	The aim of the module is to familiarise the student with the properties and principles of operation of basic electronic devices used in industrial process control.
Learning outcomes	Knowledge:
	1. The student knows the principle of operation of basic electronic components.
	2. The student knows the principle of operation of electronic sensors.
	Skills:
	1. The student is able to design a simple experiment to test electronic devices.
	2. The student is able to determine the processing function of electronic devices.
	Social competence:
	1. The student can work in a team
	2. The student can cooperate with the engineers of other specialities in order to properly manage the production process.
Pre-requisites	Electrical Engineering, Physics
Course contents	**The lecture covers the following topics:** Semiconductor materials, principle of operation and properties of electronic devices: diodes, transistors, principle of operation and properties of electronic sensors. **Classes include:** Calculations of basic electronic circuits, experiments revealing properties of electronic components, experiments revealing properties of sensors used in the process control.
References	Obligatory literature: 1. O. N. Pandey, Electronics Engineering, Springer Cham 2022 Recommended literature: 1. McGowan, K. Semiconductors: From Book to Breadboard. (Cengage Learning, 2011).
Teaching methods	1. Lecture – 15 hours 2. 20 hours of laboratory classes in the form of real experiments 3. 10 hours of auditorium classes – calculation of electronic circuits.
Assessment methods	K1 – written exam K2 – written exam S1 – practical test S2 – practical test SC1 – assessment of student's work

	Forms of documenting achieved results: written exam, reports from laboratory exercises, instructor's diary, presentation or speech on a given topic
ECTS credits balance	Contact hours: Lecture 15 hours – 0.6 ECTS, Audit classes 10 hours – 0.4 ECTS Lab classes 20 hours – 0.8 ECTS Consultations 2 hours – 0.08 ECTS Participation in an exam 2 hours – 0.08 ECTS Total: 1.96 ECTS Non-contact hours: Preparation for classes 10 hours – 0.4 ECTS Preparation for the colloquium 5 hours – 0.2 ECTS Preparation of reports 5 hours – 0.2 ECTS Studying literature 6 hours – 0.24 ECTS Total: 1.04 ECTS points
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours; in classes – 30 hours; consultations – 2 hours, in an exam - 2 hours
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 - ZI_W01 K1, K2 - ZI_W05 S1, S2 - ZI_U02 S1, S2 - ZI_U04 SC1 - ZI_K01 SC2 - ZI_K02

The name of the field study	Management and Production Engineering
Course title	Processing of food from animal origin
Language	English
Type of the course	obligatory
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Professor Paweł Sobczak
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to familiarize students with the generally understood issues of processing raw materials of animal origin, i.e. milk processing, meat processing, processing of raw materials, fats and by-products of slaughter animals. Familiarizing students with the technological requirements and rigors of safe processing of food of animal origin, with particular emphasis on machinery.
Learning outcomes	Knowledge:
	K1 - the life cycle of devices, objects, technical systems and industrial products and the influence of technology on the quality of raw materials and products, including multifaceted knowledge of methods that are used to determine occupational risks for the users of technical facilities and risks for the environment
	K2 - issues related to technical knowledge in the field of Management and Production Engineering that are necessary to understand basic phenomena and technical processes
	Skills:
	S1. - understand standard engineering activities, use appropriate methods, techniques, technologies, tools and materials to solve current problems related to production processes, services, condition of the environment, management of human, financial and natural resources
	S2. - use basic available information technologies to obtain and process information in the field of production and is able to use the acquired knowledge to resolve issues and communicate regarding problems that arise in the professional work including those related to technological and logistic processes
	Social competence:
	SC1. - work in a team, is able to organise and supervise the work of groups of people (projects, tasks, etc.) in a working environment
Pre-requisites	general machine science
Course contents	Lectures include: Specific operations and processes used in meat and poultry processing: obtaining meat from slaughter animals and poultry, unit operations in the processing of meat from slaughter animals and poultry. Specific operations, processes and machines used in milk processing: production of milk and food cream, production of milk fat concentrates, ripening and unripened cheeses, fermented and unfermented milk drinks, milk concentrates. The classes include: the issue of operation of machines from the discussed industry, selection of

	machines and devices for particular processes, selection of machines in production lines
References	Obligatory: 1. Popko H. - Machines in food industry. Meat processing. 2. Popko H. - Machines in food industry. Milk processing. Recommended: 1. Gunter Heinz, Peter Hautzinger Meat processing technology for small- to medium- scale producers. Bangkog 2007.
Teaching methods	multimedia presentations, discussion
Assessment methods	K1, K2 – written work S1, S2 – assessment of student's activity during exercises SC1 – assessment of the student's role as a team leader and member during class activities
ECTS credits balance	**Contacts** Lecture 15 h 0.60 ECTS points Classes 30 h 1.20 ECTS points Consultations 2 h 0.08 ECTS points **Summary 47 h 1.88 ECTS points** **No-contacts** Preparation for the test 13 h 0.52 ECTS points Literature research 15 h 0.60 ECTS points **Summary no-contact 28 h 1.12 ECTS points** **Total 75 h - 3 ECTS points**
Workload related to classes requiring the direct participation of an academic teacher	Participation in lecture – 15 h Participation in classes – 30 h Participation in consultations – 2 h **Total 47 h - 1.88 ECTS points**
Relation of course learning outcomes to the learning outcomes of the field of study	K1. - ZI_W06 K2 - ZI_W03 S1. - ZI_U04 S2. - ZI_U05 SC1. ZI_K01

The name of the field study	Management and Production Engineering
Course title	Packaging systems
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Professor Agnieszka Wójtowicz
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to provide students with issues in the various products packaging systems, the construction of packaging machines and equipment of various food products (, liquid, fresh food, canned, frozen, dry, dairy, snacks and candys, meat), and the possibility of using modern packaging materials and systems as functional and active packaging to extend the shelf life of food products, ecodesign principles.
Learning outcomes	Knowledge:
	K1. Student knows the types of packaging machines.
	K2. Student knows and understands the principles of basic packaging techniques
	Skills:
	S1. Student is able to perform, under the supervision of a scientific supervisor, tests of various packaging materials with the use of appropriate software
	S2. Student is able to select the appropriate packaging technique for various groups of agri-food products
	Social competence:
	SC1. Student has research skills
Pre-requisites	Quality and safety management, Food industry machines, Operation of food machines, Commodity science, General food technology
Course contents	The lectures include: packaging equipment, dosing systems, filling machines for liquid products, closing systems, labelling systems, fresh food packaging, canned food packaging, frozen food packaging, dry food packaging, dairy products packaging, snacks and candys packaging, meat products packaging, active packaging, intelligent packaging, packaging design, ecodesign principles of packages. The classes include: multi-layer materials and methods of refining packaging materials, testing properties various packaging materials, including strength tests: elongation, tensile and puncture, density, color, hybrid materials, active additives in packaging materials, functional particles and nanoparticles, antiaging and antimicrobial systems
References	Basic literature: 1. Colles R., McDowell D., Kirwan M.: Food Packaging Technology, Blackwell Publishing, CRC Press, Boca Raton, USA, 2003 2. Rooney M.L.: Active Food Packaging, Blackie Academic & Proffesional, Chapman & Hall, Glasgow, 1995 3. Ahvenainen R.: Novel Food Packaging Techniques, Woodhead Publishing Ltd., Cambridge, UK, 2003.

	4. Aaron L. Brody, Eugene R. Strupinsky, Lauri R. Kline Active packaging for food applications, Lancaster ; Basel : Technomic Publishing, 2001 5. Da-Wen Sun, Handbook of frozen food processing and packaging, Boca Raton [etc.] : CRC Press Taylor & Francis Group, cop. 2012 6. Frank A. Paine Modern processing, packaging and distribution systems for food, Glasgow [etc.] : Blackie : Van Nostrand Reinhold Company, 1987 Auxiliary literature: 1. Prospects and catalogues of packaging machinery producers. 2. Law regulations and rules 3. Scientific papers.
Teaching methods	The theory will be given as lectures and presentations. Syllabus and slides will be available as materials for study. Classes/labs as presentations and laboratory practical works.
Assessment methods	K1 – written exam K2 – written exam S1 – assessment of test report S2 – written exam SC1 – assessment of test report Forms of documenting the achieved results: a written exam, the teacher's diary, submission of a test report
ECTS credits balance	CONTACT Form Hours Points ECTS Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Final exam 2 h. 0.08 ECTS Total 49 h. that is 1.96 ECTS NON-CONTACT Form Hours Points ECTS Preparation to class exam 10 h. 0.40 ECTS Preparation to final exam 10 h. 0.40 ECTS Preparation of report 8 h. 0.32 ECTS Reading of literature 23 h. 0.92 ECTS Total non-contact 51 h. that is 2.04 ECTS Total student workload 100 h. that is 4.0 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Lecture – 15 h. Class – 30 h. Consulting – 2 h. Final exam – 2 h. Total 49 h. that is 1.96 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W13 K2 – ZI_W04 S1 – ZI_U03/ InzZI_W04 S2 – ZI_U04 SC1 – ZI-K03

The name of the field study	Management and Production Engineering
Course title	Packaging engineering
Language	English
Type of the course	elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Professor Agnieszka Wójtowicz
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to introduce students to the types and features of packaging for agri-food products, packaging devices and systems, modern solutions used in the packaging industry, to indicate the possibility of using various technical solutions when packaging various groups of food products and to assess the physical and strength characteristics of packaging materials using modern research tools.
Learning outcomes	Knowledge:
	K1. Student knows and understands the features and types of packaging materials.
	K2. Student knows and understands the principles of packaging machines and basic packaging techniques
	Skills:
	S1. Student is able to perform, under the supervision of a scientific supervisor, tests of various packaging materials with the use of appropriate software
	S2. Student is able to select the appropriate packaging technique for various groups of agri-food products
	Social competence:
	SC1. Student has research skills
Pre-requisites	Quality and safety management, Food industry machines, Operation of food machines, Commodity science, General food technology
Course contents	The lectures include: packaging requirements, dosing systems, packaging systems for formed, solid, loose and liquid products, multifunctional packaging systems, modern packaging systems: aseptic packaging, MAP, vacuum packaging, rules for compiling packaging lines, marking, coding and identification of packaging materials, issues of eco-balance and recycling of packaging materials, and examples of biodegradable materials. The classes include: the division and functions of packaging, the characteristics and properties of packaging materials: glass, paper, metal, wood, plastics, methods of production of various construction forms of packaging, methods of producing plastic packaging, multi-layer materials and methods of refining packaging materials, testing properties various materials, including strength tests: elongation, tensile and puncture
References	Basic literature: 1. Colles R., McDowell D., Kirwan M.: Food Packaging Technology, Blackwell Publishing, CRC Press, Boca Raton, USA, 2003 2. Rooney M.L.: Active Food Packaging, Blackie Academic & Proffesional, Chapman & Hall, Glasgow, 1995

	3. Ahvenainen R.: Novel Food Packaging Techniques, Woodhead Publishing Ltd., Cambridge, UK, 2003. 4. Aaron L. Brody, Eugene R. Strupinsky, Lauri R. Kline Active packaging for food applications, Lancaster ; Basel : Technomic Publishing, 2001 5. Da-Wen Sun, Handbook of frozen food processing and packaging, Boca Raton [etc.] : CRC Press Taylor & Francis Group, cop. 2012 6. Frank A. Paine Modern processing, packaging and distribution systems for food, Glasgow [etc.] : Blackie : Van Nostrand Reinhold Company, 1987 Auxiliary literature: 1. Prospects and catalogues of packaging machinery producers. 2. Law regulations and rules 3. Scientific papers.
Teaching methods	The theory will be given as lectures and presentations. Syllabus and slides will be available as materials for study. Classes/labs as presentations and laboratory practical works.
Assessment methods	K1 – written exam K2 – written exam S1 – assessment of test report S2 – written exam SC1 – assessment of test report Forms of documenting the achieved results: a written exam, the teacher's diary, submission of a test report
ECTS credits balance	CONTACT Form Hours Points ECTS Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Final exam 2 h. 0.08 ECTS Total 49 h. that is 1.96 ECTS NON-CONTACT Form Hours Points ECTS Preparation to class exam 10 h. 0.40 ECTS Preparation to final exam 10 h. 0.40 ECTS Preparation of report 8 h. 0.32 ECTS Reading of literature 23 h. 0.92 ECTS Total non-contact 51 h. that is 2.04 ECTS Total student workload 100 h. that is 4.0 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Lecture – 15 h. Class – 30 h. Consulting – 2 h. Final exam – 2 h. Total 49 h. that is 1.96 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W13 K2 – ZI_W04 S1 – ZI_U03/ InzZI_W04 S2 – ZI_U04 SC1 – ZI-K03

The name of the field study	Management and Production Engineering
Course title	Engineering aspects of food processing
Language	English
Type of the course	obligatory
Level of study	First
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	DSc. Marcin Mitrus
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to introduce students to selected issues in the field of basic phenomena and physical processes occurring in the chemical and food industry.
Learning outcomes	Knowledge:
	1. The student knows and understands the basic unit processes occurring in the chemical and food industry.
	2. The student knows and understands the principle of operation of basic devices used in food processing
	Skills:
	1. The student is able to perform a simple research task related to unit processes.
	2. The student is able to solve a simple engineering task regarding unit operations and processes.
	Social competence:
	1. The student is ready to act ethically within assigned organizational and social roles and to take responsibility for the tasks assigned to him
Pre-requisites	Physics, Mathematics
Course contents	Physical Properties of Food Materials; Fluid Flow; Heat and Mass Transfer, Basic Principles; Reaction Kinetics; Elements of Process Control; Size Reduction; Mixing; Filtration; Centrifugation; Membrane Processes; Extraction; Adsorption and Ion Exchange; Distillation; Crystallization and Dissolution; Extrusion; Thermal Processing; Refrigeration, Chilling and Freezing; Evaporation; Dehydration; Ionizing Irradiation and other Non-thermal Preservation Processes and Food Packaging
References	Recommended literature: Zeki Berk: Food Process Engineering and Technology, 2009, Academic Press Singh R.P., Heldman D.R.: Introduction to Food Engineering, 2009, Academic Press Toledo R.T.: Fundamentals of Food Process Engineering, 2007, Springer Science+Business Media
Teaching methods	Lectures and some classes - multimedia presentations supported by examples from industry, especially processing equipment. Selected training activities in the form of stationary exercises on teaching stands
Assessment methods	K1 - Exam testing knowledge of the subject, K2 - Exam testing knowledge of the subject, S1 - Participation in exercises, reports from on-site exercises, S2 – Test, SC1 - Preparing to perform on-the-job exercises and preparing for the colloquium and exam.

	Forms of documenting the achieved results: report on the research task, test, notes from the lecturer, exam.
ECTS credits balance	Contact hours Form of classes — number of hours — ECTS points Lectures — 15 h Classes — 30 h Consultations — 2 h Exam — 2 h Total contact hours — 49 h — 1.96 ECTS points Non-contact hours Form of classes — number of hours — ECTS points Preparation for exercise — 14 h Preparation for the exam — 15 h Preparation for Test — 12 h Preparation reports — 10 h Total non-contact hours — 51 h — 2.04 ECTS points The total student workload is 100 hours, which corresponds to 4 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	Lectures — 15 h Classes — 30 h Consultations — 2 h Exam — 2 h Total 49 h which corresponds to 1.96 ECTS points.
Relation of course learning outcomes to the learning outcomes of the field of study	K1- ZI_W03 K2 - ZI_W5 S1 - ZI_U03 S2 - ZI_U04 SC1 - ZI_K04

The name of the field study	Management and Production Engineering
Course title	Residual bioproduct management
Language	English
Type of the course	elective
Level of study	First cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Agnieszka Sagan PhD
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technologies
Objective of the course	Objective of the course is to acquire knowledge about residual bioproduct produced in the food industry and methods of their management
Learning outcomes	Knowledge:
	1. student knows residual bioproduct produced in various branches of the agri-food industry
	2. student knows possibilities of using residual bioproducts in the food industry
	Skills:
	1. using properly selected source materials to obtain information on the management of byproducts
	Social competence:
	3. cooperation in a group
Pre-requisites	-
Course contents	Lectures: History of waste management. Basic concepts, residual bioproducts, waste. Basic issues related to environmental protection and management. Waste classification. Residual bioproducts produced in selected branches of the food industry and possibilities of their management. Uses of enzymes in food industry waste utilization. Methods of reducing waste in the food industry. Classes: analysis of legal documents regarding waste management and examples of the use of residual bioproducts in the food industry.
References	Obligatory literature: - Dhull S.B., Ajay Singh A., Kumar P. 1. Food Processing Waste and Utilization Tackling Pollution and Enhancing Product Recovery. CRC Press, 2022. Recommended literature: - applicable legal acts regarding waste and by-products
Teaching methods	lectures, classes - work in small groups
Assessment methods	K1, K2 - final test S1 - assessment of the report SC1 - assessment of the student's work as a member of the team
ECTS credits balance	Hours/ ECTS contact Lectures 15/0.60 Classes 30/1.20 Consultations 2/0.08 **Total contact 47/1.88** non-contact Preparation for classes 10/0.40 Completion of classes reports 10/0.40 Preparation for the final test 8/0.32

	Total non-contact	**28/1.12**
	Total	**75/3**
Workload related to classes requiring the direct participation of an academic teacher	Lectures	15/0.60
	Classes	30/1.20
	Consultations	2/0.08
	Total contact	**47/1.88**
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 – ZI_W10 S1 – ZI_U01 SC1 – ZI_K01	

The name of the field study	Management and Production Engineering
Course title	Contamination of plant and animal raw material
Language	English
Type of the course	elective
Level of study	First cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Agnieszka Sagan PhD
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technologies
Objective of the course	Objective of the course is to acquire knowledge about contamination of raw materials and food arising during production, transport and storage
Learning outcomes	Knowledge:
	1. student knows the factors causing chemical, physical and biological contamination of raw materials and food
	2. student knows the risks related to consuming contaminated food
	Skills:
	1. interpretation of the results obtained during the classes
	Social competence:
	4. cooperation in a group
Pre-requisites	Chemistry, Physics
Course contents	Lectures: Basic concepts and definitions. General information about poisons and intoxications. Chemical, physical and biological contamination. Contaminants related to food production (compounds used in plant cultivation, animal breeding and technical pollutants from packaging and equipment). Metals and harmful elements, organic compounds (PAHs, dioxins, PCBs, acrylamide). Anti-nutritional ingredients in plant raw materials (amygdalin, solanine, phytates) Routes of contaminants' entry into raw materials and food. Effects of contaminants on the human body. Classes: analysis of the content of contaminants in selected food products, analysis of standards regarding the content of harmful substances in raw materials and food.
References	Obligatory literature: - Schrenk D. and Cartus A. (eds.). Chemical Contaminants and Residues in Food. Elsevier Ltd. 2017 Recommended literature: - Reilly C. (ed.). Metal Contamination of Food: Its Significance for Food Quality and Human Health. Blackwell Science Ltd. 2002 - Commission Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs
Teaching methods	lectures, classes - work in small groups
Assessment methods	K1, K2 - final test S1 - assessment of classes reports SC1 - assessment of student's work as a team member

ECTS credits balance		Hours/ ECTS
		contact
	Lectures	15/0.60
	Classes	30/1.20
	Consultations	2/0.0.08
	Total contact	**47/1.88**
		non-contact
	Preparation for classes	10/0.40
	Completion of classes reports	10/0.40
	Preparation for the final test	8/0.32
	Total non-contact	**28/1.12**
	Total	**75/3**
Workload related to classes requiring the direct participation of an academic teacher	Lectures	15/0.60
	Classes	30/1.20
	Consultations	2/0.0.08
	Total contact	**47/1.88**
Relation of course learning outcomes to the learning outcomes of the field of study	K1, K2 – ZI_W10 S1 – ZI_U01, ZI_U05 SC1 – ZI_K01	

The name of the field study	Management and Production Engineering
Course title	Management of drying processes
Language	English
Type of the course	obligatory
Level of study	First
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Professor dr. Dariusz Dziki
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The objective of this course is to acquaint students with the characteristics of the drying process, food drying methods, alterations that occur in food during this process, the influence of drying on food quality, structural solutions of drying machinery and devices, as well as their computational specifications.
Learning outcomes	Knowledge:
	1. Possesses fundamental knowledge in the field of the basic theory and techniques of food drying, essential for understanding the phenomena occurring during this process.
	2. Familiar with basic methods, techniques, tools, and materials used to solve simple engineering tasks in the domain of food drying engineering.
	Skills:
	1. Applies acquired knowledge to resolve and communicate regarding issues related to food drying.
	Social competence:
	1. Think and act in an entrepreneurial manner and understand the need to constantly learn and inspire others
Pre-requisites	Production management and services
Course contents	The lectures cover: Thermodynamics of air and moist material. Heat and mass transfer in the drying process. Kinetics of the drying process. Pre-treatment of food before drying. Drying methods (convective, contact, sublimation, microwave drying). Changes in food properties during drying. Selection of optimal drying parameters. Classification and performance indicators of dryers. Selected food drying technologies. Storage of dried products. The classes include: Determination of water content in food, measurement of water activity, conducting assays, basic balance tasks. Utilization of the psychrometric chart in the analysis of the drying process - computational examples. Drying equilibrium (sorption and desorption isotherms). Analytical and graphical methods for determining the kinetics of the drying process. Structure and operation of dryers: convective dryers, contact dryers, freeze dryers, fluidized bed and spray dryers, radiative dryers, dielectric and microwave dryers. Material and thermal balance of the dryer - computational examples.
References	Drying Technologies for Foods Fundamentals and Applications, 1st Edition Edited By Prabhat K. Nema, Barjinder Pal Kaur, Arun S. Mujumdar 2019, ISBN 9781138733084.
Teaching methods	- Lecture - Discussion - Problem-solving

	- Utilizing instructional materials
Assessment methods	K1 - Written test. K2 - Written paper. S1 - Presentation and performance assessment. S2 - Presentation and performance assessment. SC1 - Presentation assessment. Methods of documenting the achieved results: exams, instructor's journal, problem-solving assignments, presentations.
ECTS credits balance	**Contactual** **Form of lecture Number of hours ECTS** Lecture 15 h 0.60 Classes 30 h 1.20 Consultation 2 h 0.08 **Total 47 h 1.88 ECTS** **No-contactual** Preparation for exercises 18 h 0.72 Preparation for tests 10 h. 0.40 **Total 28 h 1.12 ECTS** The total student workload is 75 hours, which corresponds to 3 ECTS credits
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures - 15 hours. Participation in classes - 30 hours. Participation in consultations - 2 hour. In total, this amounts to 47 hours, which corresponds to 1.88 ECTS credits.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W01 K2 - ZI_W03 S1 - ZI_U05, InzZI_U04 S2 – ZI_U04 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Innovative Cereal Products
Language	English
Type of the course	elective
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	4 (1.92/2.08)
Academic title/degree, name and surname of the person responsible for the course	PhD Renata Różyło, associate professor
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to familiarize students with issues related to the production of cereal products (groats, flakes, prepared products, pasta and other special products). Development of a project of a selected innovative cereal product.
Learning outcomes	Knowledge:
	4. Is able to describe the properties, including nutritional aspects, of raw materials used in the production of selected cereal products.
	5. Has structured general knowledge of engineering issues related to the production of selected cereal products.
	Skills:
	4. Is able to determine quality requirements for selected raw materials and cereal products
	5. Selects places, tools, equipment and parameters necessary to carry out the production of the selected product range
	6. Creates and presents a design of the production process of a selected cereal product containing quality specifications of raw materials and products and a detailed process flowchart
	Social competence:
	1. Is aware of the importance of social, professional and ethical responsibility for the production of high-quality food
Pre-requisites	Technological aspects of cereal processing, Food industry machinery, Quality and Safety Management, Production processes
Course contents	Lectures: The importance of the production of cereal products in the food economy. Nutritional aspects of rye, oats, barley, spelled. Types and characteristics of gluten-free raw materials. Characteristics of the production of special flours (strainer, confectionery, low-energy, high-gluten, gluten-free). Production of groats and flakes, prepared cereal products, wafers, pasta and gluten-free bread and other special cereal products. Non-food use of raw materials and cereal products. Classes: Creating a technological and technical project of an innovative cereal product, including: defining quality requirements for raw materials and products; development of a detailed process flowchart highlighting important production parameters. Selection of machines and devices used in the production process.
References	4. Owens, G. (Ed.). (2001). *Cereals processing technology* (Vol. 53). CRC Press. 5. Hoseney, R. C. (1994). *Principles of cereal science and technology* (No. Ed. 2). American Association of Cereal Chemists (AACC).

	6. Guiné, R. D. P. F., & dos Reis Correia, P. M. (Eds.). (2013). *Engineering aspects of cereal and cereal-based products*. CRC Press.
Teaching methods	- Illustrating a verbal message using (drawings, diagrams, charts, tables, films and photographs - multimedia projection) - Demonstrations and explanations using instructional videos - Short design tasks
Assessment methods	Knowledge 1, 2 – assessment of the student's work and assessment during the oral presentation of the project Skills 1, 2, 3 – assessment of the correctness of the project. Social competence – assessment during oral presentation Forms of documenting the achievements - grades in the class journal and project evaluation
ECTS credits balance	CONTACT Form of classes — Number of hours — ECTS points Lecture — 15 hours — 0.60 points ECTS Classes — 30 hours — 1.20 points ECTS Consultations — 1 hour — 0.04 points ECTS Exam — 2 hours — 0.08 points ECTS Total contact time — 48 hours — 1.92 points ECTS NON-CONTACT Preparation project — 20 hours — 0.80 points ECTS Preparation for passing the exercise — 12 hours — 0.48 points ECTS Preparation for passing the exam — 10 hours — 0.40 points ECTS Studying literature — 10 hours — 0.40 points ECTS Total non-contact — 52 hours — 2.08 points ECTS The total student workload is 100 hours. which corresponds to 4 points. ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 30 hours Participation in consultations – 1 hour. Participation in the exam – 2 hours Total 48 hours which is 1.92 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge 1 - ZI_W10 Knowledge 2 - ZI_W04 Skills 1 – InzZI_U03 Skills 2,3 – InzZI_U05 Social competence 1 – ZI_K04

The name of the field study	Management and Production Engineering
Course title	Cereal Processing Engineering
Language	English
Type of the course	elective
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	4 (1.92/2.08)
Academic title/degree, name and surname of the person responsible for the course	PhD Renata Różyło, associate professor
Didactic unit offering a course	Department of Food Engineering and Machines
Objective of the course	The aim of the course is to familiarize students with issues related to the engineering aspects of the production of cereal products (groats, flakes, prepared products, pasta and other special products). Develops procedures for controlling the production process; selection of methods, frequency, tools and equipment necessary to monitor the production of a selected cereal product.
Learning outcomes	Knowledge:
	6. Is able to describe the properties of raw materials used in the production of selected cereal products.
	7. Has structured general knowledge of engineering issues related to the production of selected cereal products.
	Skills:
	7. Is able to determine quality requirements for selected raw materials and cereal products
	8. Selects places, tools, equipment and parameters necessary to carry out the production of the selected product range
	9. Develops a procedure for controlling the production process of a selected cereal product
	Social competence:
	2. Is aware of the importance of social, professional and ethical responsibility for the production of high-quality food
Pre-requisites	Technological aspects of cereal processing, Food industry machinery, Quality and Safety Management, Production processes
Course contents	Lectures: The importance of the production of cereal products in the food economy. Nutritional aspects of rye, oats, barley, spelled. Types and characteristics of gluten-free raw materials. Characteristics of the production of special flours (strainer, confectionery, low-energy, high-gluten, gluten-free). Production of groats and flakes, prepared cereal products, wafers, pasta and gluten-free bread and other special cereal products. Non-food use of raw materials and cereal products. Classes: Creating a monitoring procedure for a selected cereal product, including: defining quality requirements for raw materials and products; developing a flowchart of the production process indicating places of production monitoring; creation of a cleaning and disinfection program as well as monitoring and control cards for the production process; selection of methods, frequency, tools and equipment necessary to monitor production.
References	7. Owens, G. (Ed.). (2001). *Cereals processing technology* (Vol. 53). CRC Press.

	8. Hoseney, R. C. (1994). *Principles of cereal science and technology* (No. Ed. 2). American Association of Cereal Chemists (AACC). 9. Guiné, R. D. P. F., & dos Reis Correia, P. M. (Eds.). (2013). *Engineering aspects of cereal and cereal-based products*. CRC Press.
Teaching methods	- Illustrating a verbal message using (drawings, diagrams, charts, tables, films and photographs - multimedia projection) - Demonstrations and explanations using instructional videos - Short design tasks
Assessment methods	Knowledge 1, 2 – assessment of the student's work and assessment during the oral presentation of the project Skills 1, 2, 3 – assessment of the correctness of the project. Social competence – assessment during oral presentation Forms of documenting the achievements - grades in the class journal and project evaluation
ECTS credits balance	CONTACT Form of classes — Number of hours — ECTS points Lecture — 15 hours — 0.60 points ECTS Classes — 30 hours — 1.20 points ECTS Consultations — 1 hour — 0.04 points ECTS Exam — 2 hours — 0.08 points ECTS Total contact time — 48 hours — 1.92 points ECTS NON-CONTACT Preparation project — 20 hours — 0.80 points ECTS Preparation for passing the exercise — 12 hours — 0.48 points ECTS Preparation for passing the exam — 10 hours — 0.40 points ECTS Studying literature — 10 hours — 0.40 points ECTS Total non-contact — 52 hours — 2.08 points ECTS The total student workload is 100 hours. which corresponds to 4 points. ECTS
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 30 hours Participation in consultations – 1 hour. Participation in the exam – 2 hours Total 48 hours which is 1.92 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Knowledge 1 - ZI_W10 Knowledge 2 - ZI_W04 Skills 1 – InzZI_U03 Skills 2,3 – InzZI_U05 Social competence 1 – ZI_K04

The name of the field study	Management and Production Engineering
Course title	Diploma Seminar 1
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	1 (0.68/0.32)
Academic title/degree, name and surname of the person responsible for the course	Vice-Dean of the Faculty of Production Engineering
Didactic unit offering a course	Faculty of Production Engineering
Objective of the course	The aim of the course is to familiarize the student with the technique of preparing and presenting an engineering project and the techniques of collecting and developing information necessary to prepare an outline, as well as using various sources of information (including library databases). During the seminar, the latest achievements in the field of engineering projects are presented in the aspect of issues adapted to the specialization of studies.
Learning outcomes	Knowledge:
	1. The student knows standard methods and IT tools for collecting, analyzing and presenting data in the field of management and production engineering.
	2. The student knows development trends and research methods of individual areas of the company's activity, especially in the field of: market research, financial analysis, product quality level, etc.
	Skills:
	1. The student is able to carry out analyzes and projects related to management and production engineering under the supervision of a research supervisor.
	2. The student is able to prepare an outline in the field of management and production engineering and prepare and deliver a presentation including a discussion of the results of its implementation.
	Social competence:
	1. The student is ready to work in a group, organize and manage the work of teams.
	2. The student determines priorities for implementing various tasks and understands the need to acquire knowledge independently.
Pre-requisites	Previously completed study program.
Course contents	Types and examples of engineering projects, rules for presenting engineering project theses. Preparing a project plan. Describing the problem, defining key terms and creating an outline. Searching for source materials (databases, citation rules). The most common basic errors when implementing engineering projects. Presentation of an outline of an engineering project by seminar participants and joint discussion under the supervision of the instructor on the vision of implementing an engineering diploma thesis. Consultations with the academic teacher responsible for the seminar (in justified cases also with another academic teacher with at least a doctoral degree), present/report the partial scope of the engineering project
References	1. The literature includes items related to the topic of the diploma thesis.

	2. The literature is agreed upon during consultations with the diploma thesis supervisor.
Teaching methods	lecture, case study, elements of engineering projects, discussion, presentation of outlines
Assessment methods	Ways of verifying the achieved learning outcomes: Knowledge: K1, K2 – knowledge presented during the seminar. Skills: S1, S2 – outline assessment. Social competence: SC1, SC2 – assessment of students' work and oral statements. Forms of documenting the achieved results: Engineering project outlines, teacher's journal
ECTS credits balance	- participation in classes – 15 hours / 0.60 ECTS - participation in consultations – 2 hours / 0.08 ECTS - preparing an outline – 3 hours / 0.12 ECTS - studying literature – 5 hours / 0.20 ECTS The total student workload is 25 hours which corresponds to 1 ECTS point.
Workload related to classes requiring the direct participation of an academic teacher	- participation in classes – 15 hours / 0.60 ECTS - participation in consultations – 2 hours / 0.08 ECTS Total 17 hours which is 0.68 ECTS points.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W11 K2 – ZI_W12 S1 – ZI_U03 S2 – ZI_U07 SC1 – ZI_K01 SC2 – ZI_K03

The name of the field study	Management and Production Engineering
Course title	Student practises
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	III
Semester of study	6
Number of ECTS credits (contact/non-contact)	5 (0.08/4.92)
Academic title/degree, name and surname of the person responsible for the course	Vice-Dean of the Faculty of Production Engineering
Didactic unit offering a course	Office of Practical Education and Competence Development
Objective of the course	The aim of the practises is to combine knowledge, skills and social competences acquired during studies with their practical application, developing teamwork skills when performing professional tasks related to the management of tasks typical of engineering activities.
Learning outcomes	Knowledge:
	1. The student knows the activity profiles and organizational structure of the unit where the internship takes place.
	2. The student knows the methods and tools as well as the principles of operation in project teams and others (procedures for submitting work and documentation circulation, practical application of legal regulations).
	Skills:
	1. The student is able to carry out basic activities related to the statutory objectives of the unit.
	2. The student is able to perform various engineering works in various units in accordance with the framework program of professional practice for students of management and production engineering.
	Social competence:
	1. The student is ready to assess the positive and negative effects of performing various work related to the profession.
	2. The student understands and is aware of non-technical aspects and effects of engineering activities on the environment.
Pre-requisites	Most courses taken during studies.
Course contents	Getting acquainted with the business profile and organizational structure of the unit as well as applicable legal regulations, principles of working in teams, getting acquainted with the principles of preparing reports on the unit's activities, learning about the technology and organization of execution works, and learning about the practical use of software and devices supporting and implementing production and design processes depending on the type of unit. Getting to know the practical application of legal regulations, learning about local development opportunities and programs being developed to increase the efficiency and competitiveness of units.
References	Literature adapted to the scope of work carried out during the internship
Teaching methods	problem solving, active participation in work, team work, consultations
Assessment methods	Ways of verifying the achieved learning outcomes: Knowledge: K1, K2 – exam. Skills: S1, S2 – practice report card.

	Social competence: SC1, SC2 – assessment of students' work and oral statements. <u>Forms of documenting the achieved results:</u> Practice report card, exam grade
ECTS credits balance	- participation in the exam – 2 hours / 0.08 ECTS - implementation of internships and preparation of internship documentation – 123 hours / 4.92 ECTS The total student workload is 125 hours which corresponds to 5 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in the exam – 2 hours / 0.08 ECTS Total 2 hours which is 0.08 ECTS points.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W05 K2 – ZI_W08, InzZI_W05 S1 – ZI_U06 S2 – ZI_U08, InzZI_U02 SC1 – ZI_K03 SC2 – ZI_K04

The name of the field study	Management and Production Engineering
Course title	Design of agri-food investment
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Professor Agnieszka Wójtowicz
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to introduce students to the basic assumptions of technological design in the design of agri-food industry plants. Presentation of the organization and principles of logistics in the enterprise, the principles of selecting raw materials and additives, machines and technological devices, warehouses and storage methods, energy and environmental aspects, technological requirements. This knowledge will enable students to efficiently use technical and technological documentation in accordance with their field of study.
Learning outcomes	Knowledge:
	K1. Student knows and understands the impact of technology on the planning of production processes and the quality of raw materials and products.
	K2. Student knows and understands issues related to the design of agri-food processing plants.
	Skills:
	S1. Student is able to prepare, under the supervision of a scientific supervisor, documentation regarding the implementation of a simple engineering task in the field of manufacturing processes in the agri-food industry.
	S2. Student is able to design, selecting appropriate methods, techniques, technologies, tools and materials, simple technological processes in the processing of agricultural raw materials.
	Social competence:
	SC1. Student is ready to work in a group, organize and manage the work of teams (project, task, etc.) and organization in the work environment
Pre-requisites	Technical drawing, Production processes, Logistics in the enterprise, Food industry machines
Course contents	The lectures include: basic concepts necessary to implement a technological project, familiarize students with the basic assumptions of a technological project, methods of preparing drawings and charts in the design of plants in the food industry, principles of general location, design of the production and technological processes, warehouse design, construction and transport issues, environmental protection and energy aspects, health and safety issues, rules for land development of industrial plants. The classes include: introduction to typical construction projects, preparing an independent technological design project of a selected food or agri-food industry plant. The project includes: determining the raw material base and sales market,

	developing a production program and technology, calculating the size of production, storage and social rooms, energy requirements calculations, preparing a simplified construction design and a land development plan using available methods.
References	Basic literature: 1. Food processing technology : principles and practice / P. Fellows. Boca Raton : Cambridge : CRC Press ; Woodhead Publishing, 2000 2. Cereals processing technology / ed. by Gavin Owens. Boca Raton : Cambridge : CRC Press ; Woodhead Publishing Limited, 2001 3. Meat science, milk science and technology / ed. by H. R. Cross and A. J. Overby, Amsterdam : Elsevier Science Publishers, 1988 4. Food technology processing and laboratory control / advisory ed. F. Aylwaed, Jodhpur : Agrobios, 2001 5. Handbook of food preservation / ed. by M. Shafiur RahmanNew York ; Basel : Marcel Dekker, 1999 6. Handbook of fruit science and technology : production, composition, storage, and processing / ed. by D. K. Salunkhe, S. S. Kadam. New York : Marcel Dekker, 1995 7. Food processing operations and scale-up / Kenneth J. Valentas, Leon Levine, J. Peter Clark. New York : Marcel Dekker, 1991 8. Handbook of food engineering / ed. by Dennis R. Heldman, Daryl B. Lund. New York : Marcel Dekker, 1992 Auxiliary literature: 1. Methods in food science and technology. Part 1 / monograph edited by Maria Walczycka, Urszula Błaszczyk. Publishing House of the University of Agriculture in Krakow, 2022 2. Principles of fermentation technology / Peter F. Stanbury and Allan Whitaher. Oxford : Pergamon Press, 1986 3. Managing frozen foods / ed. by Christopher J. Kennedy. Boca Raton : Cambridge : CRC Press ; Woodhead Publishing Limited, 2000 4. Principles of cereal science and technology / R. Carl Hoseney. St. Paul : American Association of Cereal Chemists, 1986 5. Technology of biscuits, crackers and cookies / Duncan Manley. Cambridge : Woodhead Publishing Limited, 1996 6. Developments in soft drinks technology. / ed. by H. W. Houghton. London ; New Jork : Elsevier Applied Science Publishers, 1984 7. Handbook of meat product technology / M. D. Ranken. Oxford : Blackwell Science, 2000 8. Advanced dairy science and technology / ed. by Trevor J. Britz, Richard K. Robinson. Oxford: Blackwell Publishing, 2008 9. Petfood technology / editors Jennifer L. Kvamme, Timothy D. Phillips, Mt. Morris, Illinois : Watt Publishing, cop. 2003 10. Food machinery : for the production of cereal foods, snack foods and confectionery / Ling-Min Cheng. New York : Ellis Horwood, 1992

Teaching methods	Lectures and auditorium class in the form of multimedia presentations, laboratory class - calculations and performance of design tasks.
Assessment methods	K1 – assessment of project implementation K2 – assessment of project implementation S1 – assessment of project implementation S2 – assessment of project implementation SC1 - assessment of the student's work as a leader or team member
ECTS credits balance	CONTACT Form Hours Points ECTS Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Total 47 h. that is 1.88 ECTS NON-CONTACT Form Hours Points ECTS Preparation for class 8 h. 0.32 ECTS Completion of projects 15 h. 0.60 ECTS Reading of literature 5 h. 0.20 ECTS Total non-contact 28 h. that is 1.12 ECTS Total student workload 75 h. that is 3.0 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Total 47 h. that is 1.88 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W04 K2 – ZI_W05 S1 - ZI_U03 S2 - ZI_U11, InzZI_W04 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Packaging systems
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	4 (1.88/2.12)
Academic title/degree, name and surname of the person responsible for the course	Professor Agnieszka Wójtowicz
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to provide students with issues in the field of logistics and packaging systems management, the construction of packaging departments (lines and technological lines) of food products (solid, liquid, fruits and vegetables, meat, frozen foods) and the possibility of using various packaging materials and packaging systems enabling the use of functional and active packaging to extend the shelf life of food products.
Learning outcomes	Knowledge:
	K1. Student knows and understands the features and types of packaging materials.
	K2. Student knows and understands the principles of packaging machines and basic packaging techniques
	Skills:
	S1. Student is able to perform, under the supervision of a scientific supervisor, tests of various packaging materials with the use of appropriate software
	S2. Student is able to select the appropriate packaging technique for various groups of agri-food products
	Social competence:
	SC1. Student has research skills
Pre-requisites	Quality and safety management, Food industry machines, Operation of food machines, Commodity science, General food technology
Course contents	The lectures include: methods of product preservation and packaging requirements, packaging systems for formed, solid, loose and liquid products, multifunctional packaging systems, modern packaging systems: aseptic packaging, MAP, vacuum packaging, rules for compiling packaging lines, marking, coding and identification of packaging materials, issues of eco-balance and recycling of packaging materials, and examples of biodegradable materials. The classes include: the division and functions of packaging, the characteristics and properties of packaging materials: glass, paper, metal, wood, plastics, methods of production of various construction forms of packaging, methods of producing plastic packaging, multi-layer materials and methods of refining packaging materials, testing properties various materials, including strength tests: elongation, tensile and puncture
References	Basic literature: 1. Colles R., McDowell D., Kirwan M.: Food Packaging Technology, Blackwell Publishing, CRC Press, Boca Raton, USA, 2003

	2. Rooney M.L.: Active Food Packaging, Blackie Academic & Proffesional, Chapman & Hall, Glasgow, 1995 3. Ahvenainen R.: Novel Food Packaging Techniques, Woodhead Publishing Ltd., Cambridge, UK, 2003. Auxiliary literature: 1. Prospects and catalogues of packaging machinery producers. 2. Law regulations and rules 3. Scientific papers.
Teaching methods	The theory will be given as lectures and presentations. Syllabus and slides will be available as materials for study. Classes/labs as presentations and laboratory practical works. Additional outdoor training.
Assessment methods	K1 – written test K2 – written test S1 – assessment of test report S2 – written test SC1 – evaluation of the student's work Forms of documenting the achieved results: a written test, the teacher's diary, submission of a test report
ECTS credits balance	CONTACT Form Hours Points ECTS Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Total 47 h. that is 1.88 ECTS NON-CONTACT Form Hours Points ECTS Preparation to test 21 h. 0.84 ECTS Preparation of report 7 h. 0.28 ECTS Reading of literature 25 h. 1.00 ECTS Total non-contact 53 h. that is 2.12 ECTS Total student workload 100 h. that is 4.0 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Lecture – 15 h. Class – 30 h. Consulting – 2 h. Total 47 h. that is 1.88 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W13 K2 – ZI_W14/InzZI_W04 S1 – ZI_U03 S2 – ZI_U04 SC1 – ZI-K03

The name of the field study	Management and Production Engineering
Course title	Thermal engineering
Language	English
Type of the course	elective
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	Ph.D Dariusz Góral
Didactic unit offering a course	Department of Biological Basis of Food and Feed Technology
Objective of the course	Providing knowledge about the basics and laws of energy transfer and transformation by heat exchange with reference to machines, apparatus and devices as well as technical and processing processes used in food production. To facilitate the students' work on the technical and technological protection of production processes.
Learning outcomes	Knowledge:
	1. K1. Knows and understands the laws of energy transfer and transformation by heat transfer
	2. K2. Knows which the heat processes used in food production
	K3. Knows the principle of operation of machinery and equipment used in thermal processes of food production.
	Skills:
	S1. They can identify and mathematically describe the basic processes of heat and mass transfer in technological processes.
	S2. It has the basis for the management of thermal processes in food production.
	S3. They know how to select the right device for the implementation of technology in thermal food production processes.
	Social competence:
	SC1. Has the competence to organize and manage the work of project teams in the field of thermal engineering in the work environment and beyond.
Pre-requisites	Mathematics 1, Physics
Course contents	The course covers the following issues: Heat and the characteristics of heat transfer mechanisms; Foundations of the theory of similarity of physical phenomena; Physico-mathematical description of heat conduction in solids; Special cases of heat transfer using the Fourier-Kirchoff equation; Established heat conduction and methods of its description; Basics of radiant heat transfer; Heat penetration in various hydromechanical-thermal systems and its description; Heat transfer characteristics for surface developments (ribs); Complex stationary heat transfer by permeation in a variety of process systems; Fundamentals of heat exchanger design; General characteristics of specific heat transfer cases; Heat transfer characteristics in processes involving basic phase transitions; Modeling of temperature fields and the basis of numerical solving of heat transfer problems.
References	Required reading: 1.Wiśniewski S. , Wiśniewski T.S.: Heat transfer. PWN 2017 2.Zarzycki R: Process engineering. Heat transfer. PWN, Warsaw 2020

	Recommended Reading: 3.Kaleta A., Górnicki Z: Fundamentals of thermal engineering in agricultural engineering. Ed. Warsaw University of Life Sciences 2022 4. Świerczek P.: Thermal technology tasks. Ed. University of Silesia, Katowice 1979 5.Bonca Z., Dziubek R.: Computational issues in refrigeration and air conditioning. Ed. University of Higher School of Music Gdynia, Gdynia 1998
Teaching methods	solving calculus problems, laboratory exercises in the form of experiments, lecture, partial colloquia, homework
Assessment methods	K1 - passing the exam, K2 - passing the exam, K3 - passing the exam, S1 - partial colloquium, S2 – partial colloquium, S3 – partial colloquium, SC1 - evaluation of the student's work as a leader and a member of the team performing the exercise
ECTS credits balance	CONTACTS Form of course Number of hours ECTS credits Lecture 15 hours 0.60 pts. ECTS Classes 30 hours 1.20 pts. ECTS Consultations 2 hours 0.08 pts. ECTS Attendance at the exam 2 hours 0.08 pts. ECTS Total contact 49 hrs 1.96 pts. ECTS NON-CONTACT Form of course Number of hours ECTS credits Preparation for classes 20 hours 0.80 pts. ECTS Completing homework 5 hours 0.20 pts. ECTS Studying the literature 20 hours 0.80 pts. ECTS Studying for the exam 6 hours 0.24 pts. ECTS Total non-contact 51 hrs 2.04 pts. ECTS The total workload of the student is 100 hours, which corresponds to 4 ECTS credits.
Workload related to classes requiring the direct participation of an academic teacher	participation in lectures – 15 hours; in classes– 30 hours; consultations 2; exam 2 hours.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W05 K2 – ZI_W10 K3 – ZI_W13 S1 – InzZI_U04 S2 – ZI_U04 S3 – InzZI_U05 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	Refrigeration in food industry
Language	English
Type of the course	Elective
Level of study	First -cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	4 (1.96/2.04)
Academic title/degree, name and surname of the person responsible for the course	PhD Dariusz Góral
Didactic unit offering a course	Department of Biological Bases of Food and Feed Technology
Objective of the course	Providing knowledge about the basics of construction, functioning and operation of refrigeration devices and installations, with particular emphasis on food production, preservation and storage. At the same time, the student acquires knowledge and skills in analyzing combined systems such as heat pumps and air conditioning devices.
Learning outcomes	Knowledge:
	K1. Knows the physical transformations on which the operation of refrigeration and related devices is based.
	K2. Knows the principle of operation and construction of basic refrigeration installations.
	Skills:
	S1. Is able to perform performance and balance calculations of refrigeration equipment and rooms
	S2. Is able to assess the kinetics of cooling and freezing and relate it to the operation of devices and the quality of products.
	Social competence:
	SC1. Understands the guidelines for producers and users of refrigeration equipment, which are aimed at protecting nature
Pre-requisites	Mathematics, Physics, Basics of Thermal Technology
Course contents	Lectures include: Basic phenomena and physical laws. Working media in refrigeration. Refrigerants: requirements, properties, coding and classification. Compressor refrigeration devices, structure and principle of operation. Components, additional devices and fittings. Refrigeration compressors. Heat exchangers in refrigeration installations. Condensers, evaporators and coolers - structure, principle of operation. Implementation of throttling in refrigeration systems. Power supply for refrigeration evaporators. Control, control and regulation equipment. Sorption refrigeration devices, classification, principle of operation, advantages and disadvantages. Basics of using refrigeration systems in the economy. Technological basis of cooling and freezing food. Classes include: Selected issues of refrigeration equipment operation. Computational characteristics of single- and multi-stage left-hand cooling circuits. Performance calculations of compressors, heat exchangers and refrigeration valves. Basics of technological and operational measurements. Identifying components and decoding their use.
References	Obligatory literature:

	· Desrosier N.W., Tressler D.K. FUNDAMENTALS OF FOOD FREEZING. Food Preservation Techniques 2012 · Jeremiah. FREEZING EFFECTS ON FOOD QUALITY, 2019 · Kehl A., Konietzko A., Hartmann J., Jäger M., Winkler S. FREEZING THEORETICAL APPROACHES AND EMPIRICAL DOMAINS, 2018 · Phillips E. THE BEGINNERS APPROACH TO FOOD PRESERVATION, THE STEP-BY-STEP INSTRUCTIONS ON HOW TO FREEZE, DRY, CAN, AND PRESERVE FOOD, Rnd 2020 · Toledo R.T. FUNDAMENTALS OF FOOD PROCESS ENGINEERING. Springer Science, 2007 Recommended literature: · Berk Z. FOOD PROCESS ENGINEERING AND TECHNOLOGY. Elsevier Inc. New York, 2009 · Ibarz A., Barbosa-Canovas G.V. UNIT OPERATIONS IN FOOD ENGINEERING, CRC Press, NY, Publ., 2003 · Richter J. THE ULTIMATE CHEST FREEZER COLD PLUNGE DIY Guide · Wilbert F. THE REFRIGERATION AND FREEZING OF FOOD. Chap. 17 in Industrial Refrigeration Handbook. 1st ed. New York: McGraw-Hill. 1998. · Yanniotis, S. COOLING AND FREEZING. IN: SOLVING PROBLEMS IN FOOD ENGINEERING. Food Engineering Series. Springer, New York, NY. 2008
Teaching methods	1) solving accounting tasks 2) laboratory exercises in the form of experiments 3) lecture, 4) partial tests 5) homework 6) discussion
Assessment methods	K1- exam, K2- exam, S1- partial colloquium, S2 - partial colloquium, S1 and S2 – assessment of the design task SC1- assessment of the work of the student performing the exercise. Forms of documenting achieved results: tests, instructor's diary, exam.
ECTS credits balance	CONTACT Form of classes Number of hours ECTS points Lecture 15 hours, 0.60 points ECTS Classes 30 hours, 1.20 points ECTS Consultations 2 hours, 0.08 points ECTS Exam 2 hours, 0.08 points ECTS Total contact time 49 hours, 1.96 points ECTS NON-CONTACT Preparation of presentation, 10 hours 0.40 points ECTS Preparation for the colloquium, 10 hours 0.40 points ECTS Preparation for the exam, 10 hours 0.40 points ECTS Preparation of the report, 10 hours 0.40 points ECTS Studying literature, 11 hours 0.44 points ECTS Total non-contact, 51 hours 2.04 points ECTS The total student workload is 100 hours. which corresponds to 4 points. ECTS

Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 30 hours Participation in consultations – 2 hours Participation in the exam – 2 hours Total 49 hours which is 1.96 points ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1- ZI_W01 K2- ZI_W04 S1- ZI_U01 S1- ZI_U04 SC1- ZI_K03

The name of the field study	Management and Production Engineering
Course title	Functional food engineering
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Professor Agnieszka Wójtowicz
Didactic unit offering a course	Department of Thermal Technology and Food Process Engineering
Objective of the course	The aim of the course is to present students the most important information about the types of functional food, methods of their production using modern techniques and production technologies, functional and bioactive additives used as active substances, logistic management in the production of functional food, health aspects of the use of active substances.
Learning outcomes	Knowledge:
	K1. Student knows and understands development trends and the knowledge in the field of implementation of integrated production processes in functional food production.
	K2. Student knows and understands the principle operations, basic equipment and technological lines used in processes of production of functional food, their quality and suitability.
	Skills:
	S1. Student is able to identify and apply appropriate methods and techniques to process the functional food.
	Social competence:
	SC1. Student is ready to define priorities for the implementation of tasks and understands the need to acquire knowledge about healthy and functional food.
Pre-requisites	
Course contents	The lectures and classes include: Functional food - definitions. Characteristics of functional food with a division into processing industries. Functional ingredients in dairy products, drinks, cereal products, snacks. Functional additives - the pro-health effect and disease prevention: cancer, diabetes, allergies, intolerance to nutrients. Probiotics and prebiotics - definitions and possible applications in functional food. Bioactive microorganisms and their role in functional food. Dietary supplements - application, production methods. Encapsulation and encapsulation used in the production of dietary supplements. Nutraceuticals. Functional food market. Selected techniques of producing functional food. Food of organic origin.
References	Basic literature: 1. Gibson G., Williams C.: Functional foods. Concept to product, CRC Press, Woodhead Publishing Ltd., Cambridge, UK, 2000. 2. Campbell G., Webb C., McKee S.: Cereals. Novel Uses and Processes Plenum Press, New York, USA, 1997. 3. Linden G., Lorient D.: New ingredients in food processing. Biochemistry and agriculture, CRC Press, Woodhead Publishing Ltd., Abington Hall, UK, 1999.

	Auxiliary literature: 1. Food Technology journal 2. Law regulations and rules 3. Scientific papers.
Teaching methods	The theory will be given as lectures and presentations. Syllabus and slides will be available as materials for study. Classes/labs as presentations and discussions.
Assessment methods	K1 – written test K2 – written test S1 – written test SC1 – written test
ECTS credits balance	CONTACT Form Hours Points ECTS Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Total 47 h. that is 1.88 ECTS NON-CONTACT Form Hours Points ECTS Presentation preparation 5 h. 0.20 ECTS Preparation for discussion 8 h. 0.32 ECTS Reading of literature 15 h. 0.60 ECTS Total non-contact 28 h. that is 1.12 ECTS Total student workload 75 h. that is 3.0 ECTS
Workload related to classes requiring the direct participation of an academic teacher	Lecture 15 h. 0.60 ECTS Class 30 h. 1.20 ECTS Consulting 2 h. 0.08 ECTS Total 47 h. that is 1.88 ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	K1 - ZI_W06 K2 – ZI_W10 S1 – ZI_U05 SC1 – ZI_K01

The name of the field study	Management and Production Engineering
Course title	**Renewable energy** *Energia odnawialna*
Language	English
Type of the course	Elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	5 (2.28/2.72)
Academic title/degree, name and surname of the person responsible for the course	Artur Kraszkiewicz, Associate professor
Didactic unit offering a course	Department of Machine Operation and Production Process Management
Objective of the course	The aim of the course is to provide students with knowledge of theoretical foundations and the practical use of renewable energy sources. These sources belong simultaneously to ecological sources that can be used at the national and regional level as well as in the case of a single economic entity.
Learning outcomes	**Knowledge:**
	K1. Knows the division and resources of renewable energy sources in the country and region.
	K2. Knows the techniques and ways of using renewable energy sources in agriculture and in households.
	Skills:
	S1. Is able to model and discuss the properties of a typical installation using renewable energy sources.
	S2. Is able to manage installations of renewable energy sources for the needs of production and services.
	Social competences:
	Sc1. Is aware of the possibility of protecting the natural environment from excessive emission of CO_2, NOx and other pollutants into the atmosphere.
	Sc2. The acquired knowledge will enable safe management of production and services using renewable energy sources.
Pre-requisites	Basics of Physics and Chemistry
Course contents	Lectures include: Introduction to renewable energy sources. Solid biofuels. Liquid biofuels. Gas biofuels. The energy of the earth's interior and heat pumps. Wind energy. The energy of waters. Solar energy potential and solar collectors. Photovoltaic conversion. Methods and possibilities of energy storage. Integrated energy sources. Forecasts for the use of renewable energy in Poland. Cost management in the aspect of legal regulations regarding the use of renewable energy sources. The classess include: Introduction, program, terminology, Discussion of technologies used in the field of biofuels, interior energy, wind, water and solar energy. Operation of integrated (hybrid) energy production systems. Computer programs as tools supporting renewable energy management.
References	Obligatory literature: 1. Potential and use of renewable energy sources in agriculture / Anna Grzybek, Jan Pawlak. 2015 2. Advances in renewable energy research / editors: Małgorzata Pawłowska & Artur Pawłowski. Taylor & Francis (Londyn). 2017 Recommended literature:

	1. Selected items of English-language professional literature presented during classes.
Teaching methods	discussion, lecture, case studies, performance of control work
Assessment methods	Ways to verify the achieved learning outcomes: K1 – written test, K2 – written test, S1 – assessment of the execution of sample control work, S2 – assessment of the execution of sample control work, Sc1 – assessment of the student's work as a leader and member of the team performing the classes and project, Sc2 – assessment of the student's work as a leader and member of the team performing the classes and project, Forms of documenting achieved results: tests, control work, instructor's diary
ECTS credits balance	- participation in lectures – 15 hours, - participation in auditorium and laboratory classes – 40 hours, - preparation for classes with literature study – 15 hours, - preparation for stage (partial) pass – 2 x 10 hours = 20 hours, - creating a project from selected alternative sources – 15 hours, - preparation for the last assessment – 18 hours, - participation in consultations – 2 hours. The total student workload is 125 hours which corresponds to 5 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 40 hours Participation in consultations – 2 hours Total 57 hours which is 2.28 points ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Directional Effect Code: K1 – ZI_W05, K2 – ZI_W14, S1 – InzZI_U04, S2 – InzZI_U05, Sc1 – ZI_K01, Sc2 – ZI_K04.

The name of the field study	Management and Production Engineering
Course title	**Renewable energy in the food industry** *Energia odnawialna*
Language	English
Type of the course	Elective
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	5 (2.28/2.72)
Academic title/degree, name and surname of the person responsible for the course	Artur Kraszkiewicz, Associate professor
Didactic unit offering a course	Department of Machine Operation and Production Process Management
Objective of the course	The aim of the course is to provide students with knowledge of theoretical foundations and the practical use of renewable energy sources in the food industry. These sources belong simultaneously to ecological sources that can be used at the national and regional level as well as in the case of a single economic entity.
Learning outcomes	**Knowledge:**
	K1. Knows the division and resources of renewable energy sources in the country and region.
	K2. Knows the techniques and ways of using renewable energy sources in the food industry.
	Skills:
	S1. Is able to model and discuss the properties of a typical installation using renewable energy sources.
	S2. Is able to manage installations of renewable energy sources for the food industry.
	Social competences:
	Sc1. Is aware of the possibility of protecting the natural environment from excessive emission of CO_2, NOx and other pollutants into the atmosphere.
	Sc2. The acquired knowledge will enable safe management of production and services using renewable energy sources.
Pre-requisites	Basics of Physics and Chemistry
Course contents	Lectures include: Introduction to renewable energy sources. Solid biofuels. Liquid biofuels. Gas biofuels. The energy of the earth's interior and heat pumps. Wind energy. The energy of waters. Solar energy potential and solar collectors. Photovoltaic conversion. Methods and possibilities of energy storage. Integrated energy sources. Forecasts for the use of renewable energy in Poland. Cost management in the aspect of legal regulations regarding the use of renewable energy sources in food industry. The classes include: Introduction, program, terminology, Discussion of technologies used in the field of biofuels, interior energy, wind, water and solar energy. Operation of integrated (hybrid) energy production systems. Computer programs as tools supporting renewable energy management.
References	Obligatory literature: 3. Potential and use of renewable energy sources in agriculture / Anna Grzybek, Jan Pawlak. 2015

	4. Advances in renewable energy research / editors: Małgorzata Pawłowska & Artur Pawłowski. Taylor & Francis (Londyn). 2017 Recommended literature: 1. Selected items of English-language professional literature presented during classes.
Teaching methods	discussion, lecture, case studies, performance of control work
Assessment methods	Ways to verify the achieved learning outcomes: K1 – written test, K2 – written test, S1 – assessment of the execution of sample control work (project), S2 – assessment of the execution of sample control work (project), Sc1 – assessment of the student's work as a leader and member of the team performing the classes and project, Sc2 – assessment of the student's work as a leader and member of the team performing the classes and project, Forms of documenting achieved results: tests, control work, instructor's diary
ECTS credits balance	- participation in lectures – 15 hours, - participation in auditorium and laboratory classes – 40 hours, - preparation for classes with literature study – 15 hours, - preparation for stage (partial) pass – 2 x 10 hours = 20 hours, - creating a project from selected alternative sources – 15 hours, - preparation for the last assessment – 18 hours - participation in consultations – 2 hours The total student workload is 125 hours which corresponds to 5 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	Participation in lectures – 15 hours Participation in classes – 40 hours Participation in consultations – 2 hours Total 57 hours which is 2.28 points. ECTS
Relation of course learning outcomes to the learning outcomes of the field of study	Modular Effect Code – Directional Effect Code: K1 – ZI_W05, K2 – ZI_W14, S1 – InzZI_U04, S2 – InzZI_U05, Sc1 – ZI_K01, Sc2 – ZI_K04.

The name of the field study	Management and Production Engineering
Course title	Diploma Seminar 2
Language	English
Type of the course	obligatory
Level of study	First-cycle studies
Form of study	S – full-time
Year of study	IV
Semester of study	7
Number of ECTS credits (contact/non-contact)	3 (1.88/1.12)
Academic title/degree, name and surname of the person responsible for the course	Vice-Dean of the Faculty of Production Engineering
Didactic unit offering a course	Faculty of Production Engineering
Objective of the course	The aim of the module is to provide answers and explanations about the engineering projects presented by students. The seminar presents the latest achievements in the field of engineering projects in the aspect of the field of study.
Learning outcomes	Knowledge:
	1. The student knows IT methods and tools for collecting, analyzing and presenting data in the area of the engineering project.
	2. The student knows the development trends and research methods of individual areas of the company's activities that are related to the engineering project.
	Skills:
	1. The student is able to carry out analyzes and projects related to management and production engineering under the supervision of a research supervisor.
	2. The student is able to develop an engineering project in the field of management and production engineering and prepare and deliver a presentation containing a discussion of the results of its implementation.
	Social competence:
	1. The student is ready to work in a group, organize and manage the work of teams and organizations in the work environment.
	2. The student understands the need to acquire knowledge independently.
Pre-requisites	Previously completed study program.
Course contents	As part of diploma seminar 2, students present individual fragments of an engineering project using multimedia techniques. The academic teacher and students from a given seminar group take part in the discussion and ask questions to the student presenting the individual components of the engineering project. The student provides answers and explanations about the engineering project in question.
References	1. The literature includes items related to the topic of the diploma thesis. 2. The literature is agreed upon during consultations with the diploma thesis supervisor
Teaching methods	lecture, case study of engineering projects, discussion, project presentation
Assessment methods	<u>Ways of verifying the achieved learning outcomes:</u> Knowledge: K1, K2 – knowledge presented during the seminar. Skills: S1, S2 – evaluation of the project presentation. Social competence: SC1, SC2 – assessment of students' work and oral statements.

	<u>Forms of documenting the achieved results:</u> Engineering project presentations, teacher's journal
ECTS credits balance	- participation in classes – 45 hours / 1.80 ECTS - participation in consultations – 2 hours / 0.08 ECTS - preparation of an engineering project – 15 hours / 0.60 ECTS - studying literature – 13 hours / 0.52 ECTS The total student workload is 75 hours which corresponds to 3 ECTS points.
Workload related to classes requiring the direct participation of an academic teacher	- participation in classes – 45 hours / 1.80 ECTS - participation in consultations – 2 hours / 0.08 ECTS Total 47 hours which is 1.88 ECTS points.
Relation of course learning outcomes to the learning outcomes of the field of study	K1 – ZI_W11 K2 – ZI_W12 S1 – ZI_U03 S2 – ZI_U07 SC1 – ZI_K01 SC2 – ZI_K03