

PROGRAM OF STUDIES

FACULTY: Faculty of Management

MAIN FIELD OF STUDY: Business Engineering

BRANCH OF SCIENCE: Social sciences / Engineering and Technology

DISCIPLINES:
D1 Management and quality studies (major discipline)
D2 Computer Engineering and Telecommunications

EDUCATION LEVEL: second-level studies

FORM OF STUDIES: full-time studies

PROFILE: general academic

LANGUAGE OF STUDY: English

Content:

1. Assumed learning outcomes – attachment no. 1 to the program of studies
2. Program of studies description – attachment no. 2 to the program of studies
3. Plan of studies - attachment no. 3 to the program of studies

Resolution no. ... of the Senate of Wrocław University of Science and
Technology

In effect since education cycle 2021/2022

ASSUMED LEARNING OUTCOMES

FACULTY: Faculty of Management

MAIN FIELD OF STUDY: Business Engineering

EDUCATION LEVEL: second-level studies

PROFILE: general academic

Location of the main-field-of study:

Branch of science: Social sciences/ Engineering and Technology

Discipline / disciplines (for several disciplines, please indicate the major discipline)

D1: Management and quality studies (major discipline)

D2: Computer Engineering and Telecommunications

Explanation of the markings:

P7U – universal first degree characteristics corresponding to education at the second-level studies - 7 PRK level

P7S – second degree characteristics corresponding to education at the second-level studies - 7 PRK level

W - category "knowledge"

U - category "skills"

K - category "social competences"

K (*faculty symbol*) _W1, K (*faculty symbol*) _W2, K (*faculty symbol*) _W3, ... - main-field-of study learning outcomes related to the category "knowledge"

K (*faculty symbol*) _U1, K (*faculty symbol*) _U2, K (*faculty symbol*) _U3, ... - main-field-of study learning outcomes related to the category "skills"

K (*faculty symbol*) _K1, K (*faculty symbol*) _K2, K (*faculty symbol*) _K3, ... - main-field-of study learning outcomes related to the category "social competences"

S (*faculty symbol*) _W..., S (*faculty symbol*) _W..., S (*faculty symbol*) _W..., ... - specialization learning outcomes related to the category "knowledge"

S (*faculty symbol*) _U..., S (*faculty symbol*) _U..., S (*faculty symbol*) _U..., ... - specialization learning outcomes related to the category "skills"

S (*faculty symbol*) _K..., S (*faculty symbol*) _K..., S (*faculty symbol*) _K..., ... - specialization learning outcomes related to the category "social competences"

... _inż. – learning outcomes related to the engineer competences

Main field of study learning outcomes	Description of learning outcomes for the main-field-of study BUSINESS ENGINEERING After completion of studies, the graduate:	Reference to PRK characteristics		
		Universal first degree characteristics (U)	Second degree characteristics typical for qualifications obtained in higher education (S)	
			Characteristics for qualifications on 7 levels of PRK	Characteristics for qualifications on 6 and 7 levels of PRK, enabling acquiring engineering competences
KNOWLEDGE (W)				
K2_IZ_W1	Knows and understands advanced IT models, methods and tools, especially simulation tools, used to solve management decision-making problems.	P7U_W	P7S_WG P7S_WK	
K2_IZ_W2	Knows and understands the methods and IT tools of data preparation, coming from various sources, necessary to make business decisions.	P7U_W	P7S_WG P7S_WK	
K2_IZ_W3	Knows and understands technologies, the most important functions and applications of IT solutions supporting business.	P7U_W	P7S_WG P7S_WK	
K2_IZ_W4	Knows and understands to a greater extent theoretical methods (mathematical, econometric, statistical, forecasting) used to support decision-making processes, including explaining the complex relationships between the phenomena occurring in these processes in the area of management.	P7U_W	P7S_WG	P7S_WG_inz
K2_IZ_W5	Knows professional IT packages for modeling and statistical and econometric analyzes supporting the solution of decision problems in management processes.	P7U_W	P7S_WG	P7S_WG_inz
K2_IZ_W6	Identifies inter-organizational relations and interactions of the organization with the environment in the context of national, international and intercultural conditions. Explains and illustrates the impact of the environment on the activities of the organization.	P7U_W	P7S_WK	
K2_IZ_W7	Has extended and in-depth substantive knowledge of the organization and functioning of the enterprise in the field of strategic management, logistics, marketing, finance, and business architecture.	P7U_W	P7S_WG P7S_WK	
K2_IZ_W8	Has in-depth knowledge of technical means and IT systems of communication in organizations (including the processes	P7U_W	P7S_WG	P7S_WG_inz

	taking place in their life cycle) and knows the features of an efficient communication process.			
K2_IZ_W9	Has in-depth knowledge of the methods and techniques of diagnosing and improving activities in individual functional areas of the organization and selected methods of researching the environment of the enterprise. He knows the norms and standards in individual functional areas.	P7U_W	P7S_WG	P7S_WG_inż
K2_IZ_W10	He knows and understands the in-depth understanding of the essence of risk, its sources and the need to limit it in the functioning of enterprises. He knows the principles of risk management and the methods of its measurement and methods of its estimation and reduction.	P7U_W	P7S_WG	
K2_IZ_W11	Knows and understands the interactions occurring in selected physical systems between their individual elements and people (employees) functioning within them.	P7U_W	P7S_WK	P7S_WG_inż
K2_IZ_W12	Knows and understands the social decision-making and leadership mechanisms in an organization.	P7U_W	P7S_WG	
K2_IZ_W13	Knows and understands the norms and standards (economic, legal, organizational and ethical) that determine the context of the economy and organization.	P7U_W	P7S_WK	
K2_IZ_W14	Knows and understands the concepts, theories, methods and instruments in the field of economic and legal policy used to regulate the economy.	P7U_W	P7S_WG	
K2_IZ_W15	Knows and deeply understands the process of project management and project portfolio at all stages of its implementation, in particular, he knows the advanced level of agile methodologies as well as mathematical and IT tools.	P7U_W	P7S_WG	P7S_WG_inż P7S_WK_inż
K2_IZ_W16	Has an extended and in-depth knowledge of the principles of building and functioning teams and the factors influencing their efficiency	P7U_W	P7S_WG	
SKILLS (U)				
K2_IZ_U1	Can choose methods and IT tools, especially simulation ones, to build models of management decision problems, and perform experiments to assess the effects of decision variants.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U2	Using IT tools, student can search, combine, organize and present data for the purposes of making business decisions.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U3	Using IT tools student can analyze the requirements of available technologies and plan the use of IT solutions supporting business.	P7U_U	P7S_UW	P7S_UW_inż

K2_IZ_U4	By participating in business decision-making processes, is able to plan and carry out experiments and - by making measurements and computer simulations - to interpret the obtained results and draw conclusions.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U5	Can use analytical, simulation and experimental methods to identify and formulate specifications of engineering tasks and to solve them.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U6	Can make a critical analysis of the functioning of the existing IT tools for management and evaluate these solutions and - in accordance with the given specification - design and implement simple IT tools typical for management, using appropriately selected appropriate methods, techniques, technologies and tools.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U7	Can use knowledge in the selection of sources and information necessary to build complex models of decision-making processes and make a critical and synthetic analysis of this information.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U8	Can use knowledge to formulate and test hypotheses verifying the usefulness of methods and models to support decision-making processes in the area of management.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U9	Can use knowledge in the field of knowledge of professional IT packages for modeling and statistical analyzes for the purpose of solving decision problems in the area of management.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U10	Can use specialized language to communicate in the professional environment in the field of specific issues in the area of management and quality sciences - in Polish and a foreign language (1).	P7U_U	P7S_UK	
K2_IZ_U11	Understands Polish and foreign (1) texts in the field of management, can interpret them, draw conclusions, obtain necessary information, interpret and critically evaluate them, read professional literature, business and organizational documentation with understanding.	P7U_U	P7S_UK	
K2_IZ_U12	Speaks a foreign language (2) sufficiently understandable for a native speaker of the language and uses basic linguistic measures relating to the specific needs of everyday life, both in written and spoken form.	P7U_U	P7S_UK	
K2_IZ_U13	Uses basic skills in a foreign language (2): understands simple spoken and read texts, can establish social contacts,	P7U_U	P7S_UK	

	expresses coherently on a known topic, can write an e-mail, card or note.			
K2_IZ_U14	Distinguishes and uses to a limited extent the official and unofficial variety of a foreign language (2) and uses basic sociocultural knowledge in communication in a given foreign language (2).	P7U_U	P7S_UK	
K2_IZ_U15	Has the ability to analyze the causes and dynamics of phenomena in the organization's environment in the conditions of a market economy and the applicable economic and legal regulations.	P7U_U	P7S_UW P7S_UK	
K2_IZ_U16	Is able to analyze and evaluate goals, features, elements, processes, functional areas in the enterprise as well as internal and inter-organizational relations, using concepts and theoretical approaches in the field of social sciences, in particular the discipline of management and quality science.	P7U_U	P7S_UW P7S_UK	
K2_IZ_U17	Is able, using appropriate methods and tools, to design: systems and processes in the area of logistics, enterprise strategy, business architecture, communication management and projects implemented in the form of projects.	P7U_U	P7S_UW P7S_UK	P7S_UW_inż
K2_IZ_U18	Can formulate innovative alternative solutions to management and substantive problems in the enterprise. Can justify, make a choice and verify them in accordance with the established priorities. Can plan actions to solve them.	P7U_U	P7S_UW P7S_UK	P7S_UW_inż
K2_IZ_U19	Can identify risk factors and assess their impact on the course and results of the process and propose preventive actions.	P7U_U	P7S_UW P7S_UK	P7S_UW_inż
K2_IZ_U20	Can plan the course of measurements and evaluation of the parameters of selected physical systems, also taking into account the human factor.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U21	Can describe selected issues encountered in everyday and professional life using mathematical and physical formalism and draw conclusions.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U22	Can solve problems in communicating with diverse groups of recipients in team forms of work organization.	P7U_U	P7S_UK	
K2_IZ_U23	Can identify behavioral factors and methods influencing team work management, decision making and assuming the role of a leader in the organization.	P7U_U	P7S_UO	
K2_IZ_U24	Can use his knowledge to analyze economic phenomena and solve economic problems as well as adapt, justify and apply	P7U_U	P7S_UW	

	appropriate norms and standards (economic, legal, social) in specific activities in the organization.			
K2_IZ_U25	Can use his knowledge to identify the potential effects of the introduced economic and legal regulations for enterprises.	P7U_U	P7S_UW	
K2_IZ_U26	Has developed research skills: formulates simple hypotheses and research problems, selects adequate methods, techniques and research tools, develops, presents and interprets research results, draws conclusions, indicates directions for further research in the field of management and quality sciences, technical information technology and telecommunications.	P7U_U	P7S_UW	P7S_UW_inż
K2_IZ_U27	Is able to identify - at an advanced level, complex and unusual management and substantive problems in projects implemented in the form of a project.	P7U_U	P7S_UW P7S_UK	P7S_UW_inż
SOCIAL COMPETENCES (K)				
K2_IZ_K1	Is ready to take actions to comply with the principles of professional ethics.	P7U_K	P7S_KR	
K2_IZ_K2	Can cooperate and work in group and team forms of work organization (assuming different roles in them).	P7U_K	P7S_KR P7S_KO	
K2_IZ_K3	is ready to flexibly search for and select methods and tools for solving problems arising in the workplace.	P7U_K	P7S_KK	
K2_IZ_K4	Is ready to lead and take responsibility for the group, organize and manage his own and others' work, taking into account the changing individual, team and organizational needs.	P7U_K	P7S_KR P7S_KO	
K2_IZ_K5	Is ready to critically assess and resolve problems (recognizing the importance of expert knowledge and opinions) regarding decision-making and leadership in the group and organization, including meeting social obligations and initiating activities for the public interest and the social environment.	P7U_K	P7S_KK P7S_KO	
K2_IZ_K6	Is aware of the need for an independent, critical assessment of the scope and level of his knowledge and professional skills, both in the field of management and quality sciences, technical informatics and telecommunications, as well as in the interdisciplinary dimension. Is prepared to independently search for areas of knowledge to supplement and skills to improve.	P7U_K	P7S_KK P7S_KO P7S_KR	
K2_IZ_K7	Is prepared to behave in a professional and ethical manner; perceives and formulates ethical dilemmas related to his own and someone else's work; seeks appropriate solutions and the	P7U_K	P7S_KK P7S_KO	

	possibility of correcting irregularities in their attitudes and behavior in the workplace.		P7S_KR	
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DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study: Business Engineering

Profile: general academic

Level of studies: second-level studies

Form of studies: full-time studies

1. General description

<i>1.1 Number of semesters:3</i>	<i>1.2 Total number of ECTS points necessary to complete studies at a given level:90</i>
<i>1.3 Total number of hours:900</i>	<i>1.4 Prerequisites (particularly for second-level studies):</i> Graduate at least of first-level studies (bachelor of engineering). According to the resolution No. 37/3/2020-2024 of PWr Senate. from 19 November 2020
<i>1.5 Upon completion of studies graduate obtains professional degree of: Master of Science</i>	<i>1.6 Graduate profile, employability:</i> Description Responding to the needs of the market, the studies combine managerial competences with the improvement of IT skills. In both specializations, students will improve their skills in analyzing data from the market environment of enterprises, predictive analysis, algorithmic business thinking, cloud services for business, business

	<p>psychology, digital marketing as well as project and business management. The best students will be able to conduct research with our scientists with the prospect of working in an academic environment.</p> <p>At the second degree of Business Engineering (BE), students can deepen their acquired knowledge and extend it by choosing one of two specializations: English-language specialization (Business Intelligence, BI) focused on aspects related to business analytics or Polish-language specialization (Project Management, ZPR) oriented on the management of various types of projects (business, IT, social, public, scientific, etc.).</p> <p>Business Intelligence (BI) is designed to provide students with cutting edge business knowledge and a strong foundation in both analytics – including computational statistics and machine learning – and core business areas, building a solid platform for a successful career. This specialization focuses on how to analyze data in order to identify and predict patterns and on how to visualize and present results to support managerial decisions and lead to innovative thinking in today’s organizations.</p> <p>Acquired skills and competences</p> <p>Students will learn how to:</p> <ul style="list-style-type: none"> ● Use data analytics to stimulate business growth with newly discovered quantitative and qualitative skills. ● Stay on top of the latest methods and approaches in computational statistics and machine learning.
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¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	<ul style="list-style-type: none"> ● Use cutting-edge techniques to immerse in case studies and apply new approaches to own data challenges. ● Use visualization software to identify trends, explore hypotheses, challenge assumptions, and create a more detailed, data-driven understanding of business activities. ● Conduct top-tier research and report the results to managers, peers and the public. ● Simulate realistic future paths of all kinds of business processes. ● Predict outcomes to enable making informed business decisions and developing winning strategies. ● Reach the right customers with the right products and communications. ● Leverage the power of data to make informed business decisions and thrive in a rapidly changing environment. <p>Career</p> <p>The demand for business analytics is high. Graduates who complete the Business Intelligence program in Business engineering will acquire computational skills and management expertise that the business world is actively seeking. Our program prepares students for data-driven decision support that is crucial for today's business activities across a broad range of industries including ICT, financial, energy and healthcare. The BE curriculum provides the skills to fill positions not only as business intelligence analysts, but also data analysts and consultants, revenue optimization analysts, risk managers, market analysts and many more. Given that the students</p>
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	will have the opportunity to conduct research with affiliated faculty and senior staff, the program also prepares for careers in Academia.
<p>1.7 Possibility of continuing studies: doctoral school, postgraduate (post diploma) studies</p>	<p>1.8 Indicate connection with University's mission and its development strategy:</p> <p>Business engineering graduates acquire business, analytical, social and technical competences. The educational program in Business engineering is coherent with the mission of Wrocław University of Science and Technology in the following areas:</p> <ul style="list-style-type: none"> • Developing the professionalism and hard skills of graduates in business data analysis and project management that determine the functioning of the TechnoSphere • Aiming to provide high quality courses and providing the students of Business engineering and lecturers with conditions enabling open discussion and constructive criticism; • Developing the values and tradition of higher education, wide-ranging cooperation with other universities all over the world via students taking part in scientific conferences and the Erasmus program, and with employers via practical learning, carried out in the form of projects in specific organizations; • Developing creative, critical and tolerant graduates, as studying a course in Business engineering emphasizes on appropriate skills and attitudes development; • Striving to obtain a worthy place in the field of training specialists in the field of management among domestic and foreign universities.

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	<p>The Faculty's development plan is in line with the University's strategy. In particular, the Faculty "... combines theoretical, research and expert competences with didactic and educational competences. The Faculty is a leading research and teaching center in Poland and a significant center on an international scale. The didactic and scientific-research profile as well as the quality of education and research in economic and technical sciences ensure it a suitable place in national and international rankings". Conducting Business engineering studies is a permanent element of the Faculty's development strategy. In line with the principle adopted at Wrocław University of Science and Technology, studies in the field of Business engineering have a general academic profile. The study curriculum meets all the requirements resulting from applicable law, including the Polish Qualifications Framework and the characteristics of obtaining engineering competences. In line with the University's strategy, in order to increase the attractiveness of studies on the educational market, the MSc studies education program is unique in that it uses the natural - in economic practice - complementarity of technical and economic education, enriched with an IT module. In accordance with the University's strategy and the Faculty's development plan, which indicate the need for links with the region and the economy, conditions are created and systematic contacts between students and enterprises and other institutions are forced in the didactic process.</p> <p>In line with the University's development strategy, the quality of education is systematically improved. This is achieved thanks to the scientific development of employees and the increase in their teaching competences, as well as thanks to the systematic enrichment of the Faculty's infrastructure, including the modernization of the rooms as well as teaching and laboratory aids.</p>
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	<p>At the second degree of studies in the field of Business engineering, the study curriculum includes a set of learning outcomes and the corresponding substantive content of education, enabling graduates to effectively compete on the labor market. Students are prepared to continue their third-cycle studies at the Doctoral School and to conduct their own research. Graduates are also aware of the need to constantly act for their own professional development in cooperation with their home university.</p>
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2. Detailed description

2.1 Total number of learning outcomes in the program of study: W (knowledge) =16, U (skills) = 27, K (competences) =7, W + U + K = 50

2.2 For the main field of study assigned to more than one discipline - the number of learning outcomes assigned to the discipline:

D1 Management and quality science (major): 35 (this number must be greater than half the total number of learning outcomes)

D2 Information and Technology Science: 15

2.3 For the main field of study assigned to more than one discipline - percentage share of the number of ECTS points for each discipline:

D1 51% ECTS points

D2 49 % ECTS points

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2.4a. For the general academic profile of the main field of study – the number of ECTS points assigned to the classes related to the University's academic activity in the discipline or disciplines to which the main field of study is assigned – DN (must be greater than 50% of the total number of ECTS points from 1.2) 87

2.4b. For the practical profile of the main field of study - the number of ECTS points assigned to the classes shaping practical skills (must be greater than 50% of the total number of ECTS points from 1.2)

2.5 Concise analysis of compliance of the assumed learning outcomes with the needs of the labor market

The assumed learning outcomes correspond to the requirements set by employers for employees/ graduates on the labor market, in particular in the field of:

- solving decision problems with the use of advanced data analysis methods, optimization and simulation methods with the use of professional IT systems,
- identifying and analyzing the needs of IT system users, managing the implementation of these systems and testing their usability,
- building a project portfolio and managing it in accordance with the goals of the organization,
- identifying, at the level of the entire organization, the real needs of individual business domains, in connection with the overall strategy of the organization,
- identifying and delivering the expected value to customers by managing relationships with them focused on achieving the goals of the organization.

Learning outcomes meet the demand for specialists/ managers prepared for data-driven decision support that is crucial for today's business activities across a broad range of industries including ICT, financial, energy and healthcare. The BI curriculum provides the skills to fill positions not only as business intelligence analysts, but also data analysts and consultants, revenue optimization analysts, risk managers, market analysts and many more. BE graduates are capable of integrating engineering knowledge and skills in the field of management and quality sciences in relation to solving complex substantive and managerial problems. The competences obtained in the course of education will enable the graduate to effectively carry out tasks in individual areas of the organization's activities, in particular in the field of:

- decision optimization,
- flexibility and risk management,
- supporting managerial decisions,
- information systems management.

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The program of studies in the field of Business Engineering at the second-cycle studies and many years of experience of the teaching staff create conditions for the graduates to achieve the assumed learning outcomes and meet the above requirements formulated by employers.

2.6. The total number of ECTS points that a student must obtain in classes requiring direct participation of academic teachers or other persons conducting classes and students (enter the sum of ECTS points for courses / groups of courses marked with the BU¹ code) **62,9 ECTS**

2.7. Total number of ECTS points, which student has to obtain from basic sciences classes

Number of ECTS points for obligatory subjects	11
Number of ECTS points for optional subjects	0
Total number of ECTS points	11

2.8. Total number of ECTS points, which student has to obtain from practical classes, including project and laboratory classes (enter total number of ECTS points for courses/group of courses denoted with code P)

Number of ECTS points for obligatory subjects	27
Number of ECTS points for optional subjects	39
Total number of ECTS points	66

2.9. Minimum number of ECTS points, which student has to obtain doing education blocks offered as part of University-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code O)

3 ECTS points

2.10. Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points)

48 ECTS points

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3. Description of the process leading to learning outcomes acquisition:

The process leading to the achievement of the learning outcomes includes active participation in classes organized at the university: lectures, classes, laboratories, projects and seminars, as well as independent studies allowing for consolidation, supplementation and extension of knowledge. If necessary, the student can take advantage of individual consultations.

4. List of education blocks:

4.1. List of obligatory blocks:

4.1.1 List of general education blocks

4.1.1.1 Liberal-managerial subjects block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Total																	

4.1.1.2 Foreign languages block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours	Learning effect symbol	Number of hours	Number of ECTS points	Form ² of course/group of courses	Way ³ of crediting	Course/group of courses

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

group of courses code	lec	cl	lab	pr	sem	Learning effect symbol	ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes	University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
Total															

4.1.1.3 *Sporting classes block (0 ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Total																	

4.1.1.4 *Information technologies block (min. ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Total																	

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Altogether for general education blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					

4.1.2 List of basic sciences blocks

4.1.2.1 Mathematics block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	MAZ2581W	Descriptive analytics	2					K2_IJ_W2,4,5 U2,8-11, K1	30	120	4	4	2,8	T/Z	E		DN	P	PD
2.	MAZ2581L	Descriptive analytics			2			K2_IJ_W2,4,5 U2,8-11, K1	30	90	3	3	2,1	T	Z		DN	P	PD
Total			2	0	2	0	0		60	210	7	7	4,9						

4.1.2.2 Physics block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
	FZZ2515WI	Physics of complex systems GK	1		1			K2_IJ_W11 U10,11,20,21 K1	30	120	4	4	2,1	w:T/Z l:T	Z		DN	P (2)	PD

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴MS⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	Total	1	0	1	0	0		30	120	4	4	2,8						
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4.1.2.3 Chemistry block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁶	Practical ⁶	Type ⁷
		Total																	

Altogether for basic sciences blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
3	0	3	0	0	90	330	11	11	7,7

4.1.3 List of the main field of study blocks

4.1.3.1 Obligatory main field of study blocks

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2000P	Creative and design thinking workshop					2	K2_IJ_W9 U10,11,18,22,23 K1-7	30	60	2	2	2,1	T	Z		DN	P	K
2.	IZZ2001Lw	Business simulations GK	1		2			K2_IJ_W1 U1,4,5,10,11, K1	45	150	5	5	3,5	w:T/Z l:T	Z		DN	P	K
3.	IZZ2001P	Business simulations				1		K2_IJ_W1 U1,4,5,10,11, K1	15	30	1	1	0,7	T	Z		DN	P	K
4.	EKZ2506Sw	Contemporary economics GK	1				1	K2_IJ_W6,7,9,13,14,U10, 11,15,16,18,24,25, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (1)	K
5.	ZMZ2661S	Contemporary management					2	K2_IJ_W6,7,9,13,14, U10,11,15-18,24,25, K1	30	60	2	2	1,4	T	Z		DN	P	K
6.	IZZ2003Pwl	Digital marketing and social media GK	1		2	1		K2_IJ_W7,9 U10,11,15, K1	60	120	4	4	2,8	w:T/Z l:T	Z		DN	P (3)	K
7.	IZZ2004W	Games and decisions in management	2					K2_IJ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		K
8.	IZZ2004L	Games and decisions in management			2			K2_IJ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T	Z		DN	P	K
9.	ZMZ2662W	Project management	1					K2_IJ_W8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T/Z	E		DN		K
10.	ZMZ2662L	Project management			2			K2_IJ_W8-10,15,16 U10, 11, 17, 19, 22, 27, K1	30	60	2	2	1,4	T	Z		DN	P	K
11.	ZMZ2662P	Project management				1		K2_IJ_W8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T	Z		DN	P	K
12.	IZZ2007SI	Cloud computing services GK			1		1	K2_IJ_W3 U3,6,10,11, K1	30	120	4	4	2,8	T	Z		DN	P	K
Total			6	0	9	3	6		360	930	31	31	21,7						

4.1.3.2 block

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Total																	

Altogether (for main field of study blocks):

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
6	0	9	3	6	360	930	31	31	21,7

4.2 List of optional blocks

4.2.1 List of general education blocks

4.2.1.1 Liberal-managerial subjects blocks (*min. ECTS points*):

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.		Social competences module					2		30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2509S	Business psychology					2	K2_IJ_W12,16 U7,10,11,22,23, K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2510S	Leading teams and work groups					2	K2_IJ_W12,16 U7,10,11,22,23 K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
2.		Business module	1				1		30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2663Wp	Business planning GK	1				1	K2_IJ_W6,7,14 U7,10,11,15-17,24,25 K1	30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2664Pw	Business models in developing environment GK	1				1	K2_IJ_W6,7,14 U10,11,15-18,24,25 K1	30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2665Ws	Corporate Social Responsibility GK	1				1	K2_IJ_W6,7,14 U10,11,15,16,18,24, 25, K1	30	60	2	2	1,4	T	Z		DN	P	KO
		Total	1	0	0	1	2		60	120	4	4	2,8						

4.2.1.2 Foreign languages block (min.3 ECTS points):

No.	Course/		Weekly number of hours	Learning effect symbol	Number of hours	Number of ECTS points	Form ² of course/group of courses	Way ³ of crediting	Course/group of courses
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¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
									K2_IJ_U10-14 K2_IJ_K1										
1.	JZL	Foreign language (B2+)		1					15	30	1		0,5	T	Z	O		P	KO
2.	JZL	Foreign language (A1 or A2)		3					45	60	2		1,5	T	Z	O		P	KO
Total			0	4	0	0	0		60	90	3		2,0						

4.2.1.3 Sporting classes block (0. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
Total																			

4.2.1.4 Information technologies block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
Total																			

Altogether for general education blocks:

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴MS⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ³	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
1	4	0	1	2	120	210	7	4	4,8

4.2.2 List of basic sciences blocks

4.2.2.1 Mathematics block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Total																	

4.2.2.2 Physics block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴MS University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

2.	MAZ2582W1	Predictive analytics GK	2		2			K2_IJ_W1,4,5 U1,5,8-11,26,K1	60	180	6	6	4,2	w:T/Z l:T	E (lec)		DN	P (3)	S
3.	IZZ2005Lw	Visual analytics GK	1		1			K2_IJ_W1-4 U1,2,3,9-11, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (2)	S
4.	IZZ2006Lw	Web scraping and analysis GK	1		1			K2_IJ_W2 U2,6,7,10,11, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (2)	S
5.	MAZ2583W	Prescriptive analytics	2					K2_IJ_W1,4,5 U1,4,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		S
6.	MAZ2583L	Prescriptive analytics			2			K2_IJ_W1,4,5 U1,4,5,8-11,26, K1	30	90	3	3	2,1	T	Z		DN	P	S
Total			7	0	8	1	0		240	690	23	23	16,1						

4.2.4.2 Diploma profile block (min. ECTS points):

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2008S	Diploma seminar I (BI Day)					1	K2_IJ_U10,11,26 K2_IJ_K1,5,6,7	15	30	1	1	0,7	T	Z		DN	P	S
2.	IZZ2009S	Diploma seminar II					1	K2_IJ_U10,11,26 K2_IJ_K1,6,7	15	60	2	2	1,4	T	Z		DN	P	S
3.	IZZ2010D	MSc Thesis				4		K2_IJ_U10,11,26 K2_IJ_K1,6,7	60	450	15	15	10,5	T/Z	Z		DN	P	S
Total			0	0	0	4	2		90	540	18	18	12,6						

Altogether for specialization blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴MS⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

7	0	8	5	2	330	1230	41	41	28,7
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4.3 Training block - concerning principles of training crediting – attachment no. ...

Opinion of the Advisory Faculty Council concerning the rules of crediting training block

Name of training			
Number of ECTS points	Number of ECTS points for BU¹ classes	Training crediting mode	Code
Training duration		Training objective	

4.4 „Diploma dissertation” block (*if it is foreseen at first level studies*)

Type of diploma dissertation	Magister inżynier	
Number of diploma dissertation semesters	Number of ECTS points	Code
2	1	IZZ2008S Diploma seminar I (BI Day)
	2	IZZ2009S Diploma seminar II
	15	IZZ2010D MSc Thesis
Character of diploma dissertation		
Literature survey, project, computer program, etc.		
Number of BU¹ ECTS points	12,6	

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

5. Ways of verifying assumed learning outcomes

Type of classes	Ways of verifying assumed learning outcomes
lecture	e.g. examination, progress/final test
class	e.g. progress/final test
laboratory	e.g. pretest, report from laboratory
project	e.g. project defence
seminar	e.g. participation in discussion, topic presentation, essay
training	e.g. report from training
diploma dissertation	prepared diploma dissertation

6. Range of diploma examination

Creative and design thinking workshop

1. Real-world applications of design thinking
 - 1.1. Give and describe two examples of products developed using the design thinking process
2. Creative thinking techniques
 - 2.1. Give and describe two techniques of creative thinking with examples of their application from real-world businesses.

Physics of complex systems

3. Models of complex systems
 - 3.1. Give one example of a model of a complex system and describe its applications.
4. Complex Networks
 - 4.1. What are the three main models of complex networks? Compare two of them, selected by you.

Business simulations

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

5. The concept of simulation. The cycle of simulation study
 - 5.1. What is simulation and what are the goals of a simulation? List and briefly discuss the basic steps in a simulation study.
6. Main simulation methods used in management
 - 6.1. Name main simulation methods used to support decision making in management and characterize one of them. Give examples of applications.

Descriptive analytics

7. Random variables and their distributions
 - 7.1. Name and describe the main measures which describe the distribution of a random variable.
8. Linear relationship between variables
 - 8.1. What is a linear regression and how can you estimate it?
9. Nonlinear relationship between variables
 - 9.1. Provide and describe an example of a nonlinear model which can be used to describe a relationship between variables. How can you estimate it?

Business intelligence workplace

10. Descriptive analytics - data visualization tools
 - 10.1. What tools can be used (in your preferred programming language) to visualize categorical, discrete and continuous data. Provide examples and elaborate on the pros and cons.
11. Predictive analytics tools and models
 - 11.1. Describe a sample forecasting problem. What type of methods (algorithms, models) and what software would you use to compute the forecasts? Elaborate on the pros and cons of your choice.

Contemporary economics

12. Phases of the business cycle
 - 12.1. List and characterize the phases of the business cycle (4 phases).
13. Market structures
 - 13.1. List the basic structures of the market and characterize one.

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²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

^{MS}University-wide course /group of courses – enter O

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Contemporary management

14. New business models and organizational designs

14.1. Describe a virtual organization. Give an example.

15. Leadership and decision making

15.1. What are the differences between leadership and management?

Digital marketing and social media

16. Search Engine Optimization (SEO) techniques

16.1. Describe at least 5 things that are crucial for SEO techniques.

17. Social media marketing content

17.1. Describe the underlying factors that you would consider before designing content for social media marketing.

18. Social media marketing, branding and Public Relations (PR)

18.1. Describe the differences among the objectives of marketing, branding, and PR through Social Media.

Game and decisions in management

19. Risk and uncertainty modeling in optimization problems

19.1. What are risk measures? Give examples of risk measures with their interpretations.

20. Non-cooperative games

20.1. Describe the concept of equilibrium in non-cooperative games.

21. Cooperative games

21.1. Describe solution concepts of cooperative games.

Predictive analytics

22. Regression vs neural networks

22.1. Describe the similarities and differences between regression and neural network models (linearity, training, stability of forecasts, computational time).

23. Point and probabilistic forecasts

23.1. Describe the concept of quantile regression and quantile regression averaging (QRA).

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^{MS}University-wide course /group of courses – enter O

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⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Visual analytics

24. Application of statistical methods in the visualization and analysis of business data.

24.1. Give examples of statistical methods used in data visualization. Describe the concept of one of them.

24.2. What is the trend line used for in the visualization and analysis of business data? Provide examples and interpretation.

25. Application of cluster analysis and decision trees algorithms in visualization to support managerial decisions.

25.1. Give examples of cluster analysis algorithms that are used in data visualization and analysis. Describe the concept of one of them.

25.2. What are the decision trees used for data visualization and analysis, and what is their interpretation?

Web scraping and analysis

26. Methods of web scraping

26.1. What is HTML parsing and what tools will you use in this regard?

26.2. Explain what is data extraction via API? Point out its pros and cons.

Project management

27. Time management of project implementation

27.1. Discuss the Earned Value Method (EVM) for project control.

28. Project stakeholders management

28.1. Discuss at least three ways to classify project stakeholders and at least three types of project stakeholder management activities.

29. Project metrics

29.1. Assuming the definition of project success based on the value provided to stakeholders, present the principles of selecting metrics for a project.

Cloud computing services

30. Cloud services for business - applications, advantages, disadvantages, and security

30.1. What are the features and business applications of Microsoft cloud services?

30.2. What are the features and business applications of Google cloud services?

Prescriptive analytics

31. Decision making: methods to evaluate alternatives

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^{MS4}University-wide course /group of courses – enter O

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- 31.1. Describe the differences among the main Multi-Criteria Decision Making methods.
- 32. Decision making: efficiency assessment
 - 32.1. Describe three scalarizing functions that can be used in Multi-objective Mathematical Programming.
- 33. Decision making: building composite indicators
 - 33.1. Describe the methods that can be used to build composite indices.

Business module

- 34. The role of planning in an organization
 - 34.1. Explain why proper planning in an organization is crucial for its success.
- 35. Sustainable development of an organization - methods, values
 - 35.1. How to develop a sustainable system for an organization?

Social competences module

Business psychology

- 37.A. Psychology of leadership
 - 37.1.A. What factors determine a successful relationship between the leader and employees?
- 38.A. Psychology at work
 - 38.1.A. Provide three main sources of occupational stress along with an argument why you chose these sources of stress.

Leading teams and work groups

- 37.B. Emergence, development, and leadership of teams
 - 37.1.B. Briefly present team processes of the 2 most innovative teams of the world.
- 38.B. Managing diversity, conflict resolution, team reconstruction; performance appraisal of a team and individual team members
 - 38.1.B. What are the main obstacles to communicate effectively in culturally diverse teams?

7. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular blocks

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^{MS4}University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

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No.	Course / group of courses code	Name of course / group of courses	Crediting by deadline of... (number of semester)

8. Plan of studies (attachment no. 3)

Approved by faculty student government legislative body:

18.10.2021

Date

Maciej Bartosik

name and surname, signature of student representative

19.10.2021

Date

Dean's signature

DZIEKAN
Katarzyna Tworek

dr hab. inż. Katarzyna Tworek, prof. uczelni

(1)

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PLAN OF STUDIES

FACULTY: Faculty of Management

MAIN FIELD OF STUDY: Business Engineering

EDUCATION LEVEL: second-level studies

FORM OF STUDIES: full-time studies

PROFILE: general academic

SPECIALIZATION: Business Intelligence

LANGUAGE OF STUDY: English

In effect since educational cycle 2021/2022

Plan of studies structure (optionally)

1) in ECTS point layout

23		Foreign language (B2+) (1)		23
22		Diploma seminar I (BI Day) (1)		22
21		Diploma seminar II (2)		21
20	Physics of complex systems (4)	Games and decisions in management (4)		20
19				19
18	Descriptive analytics (7)	Digital marketing and social media (4)	Foreign language (A1 or A2) (2)	18
17				17
16				16
15	Business simulations (6)	Project management (6)	MsC Thesis (15)	15
14				14
13				13
12				12
11	Creative and design thinking workshop (2)	Visual analytics (3)	Business module (2)	11
10				10
9	Contemporary management (2)	Web scraping and analysis (3)	Social competences module (2)	9
8				8
7				7
6	Contemporary economics (3)	Cloud computing services (4)		6
5				5
4	Business intelligence workplace (6)	Predictive analytics (6)	Prescriptive analytics (5)	4
3				3
2				2

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1				1
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2) in hourly layout

23		Foreign language (B2+) (01000)		23
22		Diploma seminar I (BI Day) (00001)		22
21		Diploma seminar II (00001)		21
20	Physics of complex systems (10100)	Games and decisions in management (20200)		20
19				19
18	Descriptive analytics (20200)	Digital marketing and social media (10210)	Foreign language (A1 or A2) (03000)	18
17				17
16				16
15				15
14	Business simulations (10210)	Project management (10210)	MsC Thesis (00040)	14
13				13
12				12
11	Creative and design thinking workshop (00020)		Business module (10010)	11
10				10
9	Contemporary management (00002)	Visual analytics (10100)	Social competences module (00002)	9
8				8
7				7
6	Contemporary economics (10010)	Web scraping and analysis (10100)	Cloud computing services (00101)	6
5				5
4	Business intelligence workplace (10210)	Predictive analytics (20200)	Prescriptive analytics (20200)	4
3				3

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³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

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2				2
1				1

1. Set of obligatory and optional courses and groups of courses in semestral arrangement

Semester 1

Obligatory courses / groups of courses Number of ECTS points 24

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2000P	Creative and design thinking workshop					2	K2_IZ_W9 U10,11,18,22,23 K1-7	30	60	2	2	2,1	T	Z		DN	P	K
2.	FZZ2515W1	Physics of complex systems GK	1		1			K2_IZ_W11 U10,11,20,21 K1	30	120	4	4	2,1	lec:T/Z lab:T	Z		DN	P (2)	PD
3.	IZZ2001Lw	Business simulations GK	1		2			K2_IZ_W1 U1,4,5,10,11, K1	45	150	5	5	3,5	lec:T/Z lab:T	Z		DN	P(3)	K
4.	IZZ2001P	Business simulations				1		K2_IZ_W1 U1,4,5,10,11, K1	15	30	1	1	0,7	T	Z		DN	P	K
5.	MAZ2581W	Descriptive analytics	2					K2_IZ_W2,4,5 U2,8-11, K1	30	120	4	4	2,8	T/Z	E		DN		PD
6.	MAZ2581L	Descriptive analytics			2			K2_IZ_W2,4,5 U2,8-11, K1	30	90	3	3	2,1	T	Z		DN	P	PD
7.	EKZ2506Sw	Contemporary economics GK	1				1	K2_IZ_W6,7,9,13,14, U10,11,15,16,18,24,25, K1	30	90	3	3	2,1	lec:T/Z sem:T	Z		DN	P (1)	K
8.	ZMZ2661S	Contemporary management					2	K2_IZ_W6,7,9,13,14, U10,11,15-18,24,25, K1	30	60	2	2	1,4	T	Z		DN	P	K
Total			5	0	5	1	3		240	720	24	24	16,8						

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²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

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Optional courses / groups of courses (minimum 60 hours in semester, 6 ECTS points)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2002Wlp	Business intelligence workplace GK	1		2	1		K2_IZ_W1-3, 5 K2_IZ_U3,9-11 K2_IZ_K1	60	180	6	6	4,2	lec:T/Z lab,pr:T	Z		DN	P (5)	S
Total			1		2	1		60	180	6	6	4,2							

Altogether in semester

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
6	0	7	5	2	300	900	30	30	21,0

Semester 2

Obligatory courses / groups of courses

Number of ECTS points 14

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours	Learning effect symbol	Number of hours	Number of ECTS points	Form ² of course/group of courses	Way ³ of crediting	Course/group of courses
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²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	group of courses code		lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2003PwI	Digital marketing and social media GK	1		2	1		K2_IJ_W7,9 U10,11,15, K1	60	120	4	4	2,8	lec:T/Z lab,pr:T	Z		DN	P (3)	K
2.	IZZ2004W	Games and decisions in management	2					K2_IJ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		K
3.	IZZ2004L	Games and decisions in management			2			K2_IJ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T	Z		DN	P	K
4.	ZMZ2662W	Project management	1					K2_IJ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T/Z	E		DN		K
5.	ZMZ2662L	Project management			2			K2_IJ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	30	60	2	2	1,4	T	Z		DN	P	K
6.	ZMZ2662P	Project management				1		K2_IJ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T	Z		DN	P	K
Total			4	0	6	2	0		180	420	14	14	9,8						

Optional courses / groups of courses (minimum 165 hours in semester, 16 ECTS points)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	MAZ2582W1	Predictive analytics GK	2		2			K2_IJ_W1,4,5 U1,5,8-11,26,K1	60	180	6	6	4,2	lec:T/Z lab:T	E (lec)		DN	P (3)	S
2.	IZZ2005Lw	Visual analytics GK	1		1			K2_IJ_W1-4 U1,2,3,9-11, K1	30	90	3	3	2,1	lec:T/Z lab:T	Z		DN	P (2)	S
3.	IZZ2006Lw	Web scraping and analysis GK	1		1			K2_IJ_W2 U2,6,7,10,11, K1	30	90	3	3	2,1	lec:T/Z lab:T	Z		DN	P (2)	S
4.	IZZ2008S	Diploma seminar I (BI Day)					1	K2_IJ_U10,11,26 K2_IJ_K1,5,6,7	15	30	1	1	0,7	T	Z		DN	P	S
5.	IZZ2009S	Diploma seminar II					1	K2_IJ_U10,11,26 K2_IJ_K1,6,7	15	60	2	2	1,4	T	Z		DN	P	S
6.	JZL	Foreign language (B2+)		1				K2_IJ_U10-14 K2_IJ_K1	15	30	1		0,5	T	Z	O		P	KO

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³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

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⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	Total	4	1	4	0	2		165	480	16	15	11,0						
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Altogether in semester

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
7	1	11	2	2	345	900	30	29	20,8

Semester 3

Obligatory courses / groups of courses

Number of ECTS points 4

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University- wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	IZZ2007S1	Cloud computing services GK			1		1	K2_IJ_W3 U3,6,10,11, K1	30	120	4	4	2,8	T	Z		DN	P(4)	K
		Total			1		1		30	120	4	4	2,8						

Optional courses / groups of courses (minimum 225 hours in semester, 26 ECTS points)

No.	Course/		Weekly number of hours						Number of hours	Number of ECTS points	Form ² of course/group of courses	Way ³ of crediting	Course/group of courses
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²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

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	group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	lec	cl	lab	pr	sem	Learning effect symbol	ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1.	MAZ2583W	Prescriptive analytics	2					K2_IZ_W1,4,5 U1,4,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		S
2.	MAZ2583L	Prescriptive analytics			2			K2_IZ_W1,4,5 U1,4,5,8-11,26, K1	30	90	3	3	2,1	T	Z		DN	P	S
3.	IZZ2010D	MsC Thesis				4		K2_IZ_U10,11,26 K2_IZ_K1,6,7	60	450	15	15	10,5	T	Z		DN	P	S
4.	JZL	Foreign language (A1 or A2)		3				K2_IZ_U10-14 K2_IZ_K1	45	60	2		1,5	T	Z	O		P	KO
5.		Social competences module					2		30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2509S	Business psychology					2	K2_IZ_W12,16 U7,10,11,22,23, K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2510S	Leading teams and work groups					2	K2_IZ_W12,16 U7,10,11,22,23 K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
6.		Business module	1			1			30	60	2	2	1,4	T	Z		DN	P(1)	KO
	ZMZ2663Wp	Business planning GK	1			1		K2_IZ_W6,7,14 U7,10,11,15-17,24,25 K1	30	60	2	2	1,4	lec:T/Z pr:T	Z		DN	P(1)	KO
	ZMZ2664Pw	Business models in developing environment GK	1			1		K2_IZ_W6,7,14 U10,11,15-18,24,25 K1	30	60	2	2	1,4	lec:T/Z pr:T	Z		DN	P(1)	KO
	ZMZ2665Ws	Corporate Social Responsibility GK	1				1	K2_IZ_W6,7,14 U10,11,15,16,18,24, 25, K1	30	60	2	2	1,4	lec:T/Z sem:T	Z		DN	P(1)	KO
		Total	3	3	2	5	6		225	780	26	24	18,3						

Altogether in semester

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

3	3	3	5	3	255	900	30	28	21,1
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2. Set of examinations in semestral arrangement

Course / group of courses code	Names of courses / groups of courses ending with examination	Semester
MAZ2581W	1.Descriptive analytics	1
MAZ2582W1 ZMZ2662W	1. Predictive analytics GK 2. Project management	2

3. Numbers of allowable deficit of ECTS points after particular semesters

Semester	Allowable deficit of ECTS points after semester
1	12
2	12
3	0

Opinion of student government legislative body

13.10.2021

Date

19.10.2021

Date

.....
Marek Bartak Bartosik
 Name and surname, signature of student representative

.....
DZIEKAN

Dean's signature

Uotay Man

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

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