Zał. Nr 1 do ZW 16/2020

PROGRAM OF STUDIES

FACULTY: **MANAGEMENT**
MAIN FIELD OF STUDY: Business engineering
BRANCH OF SCIENCE: Social sciences
DISCIPLINES: D1 Management and quality studies (major discipline)
D2* Computer Engineering and Telecommunications

EDUCATION LEVEL: first-level studies
FORM OF STUDIES: full-time studies
PROFILE: general academic
LANGUAGE OF STUDY: Polish

Content:

Resolution no. … of the Senate of Wroclaw University of Science and Technology
In effect since 2023/2024

Zał. Nr 2 do ZW 16/2020

ASSUMED LEARNING OUTCOMES

FACULTY: MANAGEMENT

MAIN FIELD OF STUDY: BUSINESS ENGINEERING

EDUCATION LEVEL: first-level studies

PROFILE: general academic

Location of the main-field-of study:

Branch of science: Social sciences

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

Management and quality studies

Explanation of the markings:
P6U – universal first degree characteristics corresponding to education at the first-level studies - 6 PRK level *
P7U – universal first degree characteristics corresponding to education at the second-level studies - 7 PRK level *

P6S – second degree characteristics corresponding to education at the first-level studies - 6 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

* delete as applicable

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 6 / 7* levels of PRK	Characteristics for qualifications on 6 and 7 levels of PRK, enabling acquiring engineering competences
KNOWLEDGE (W)				
K1_IZ_W01	student has typical knowledge in mathematics, including differential and integral calculus, matrix calculation for solving systems of linear equations and elements of pragmatic logic as well as probability calculus required to understand and design formal descriptions of technical/nontechnical systems and processes, or to solve basic problems in analysis and synthesis for systems and processes	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W02	student has basic knowledge in physics required to understand and explain the influence of the material work environment on the worker, as well as to solve basic ergonomics-related problems in the human-machine system	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W03	student has basic knowledge in economy and understands the relationship between the economy and social and technical sciences, including management and QA sciences in engineering	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W04	student has basic knowledge in social sciences regarding legal, economic and ethical regulations in the functioning of technical and economic systems which is needed to understand and solve basic social problems in various systems and processes	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W05	student has basic knowledge in: engineering design and system engineering comprising: elements of system theory, designing based on the multi-criteria needs analysis, designing as a decision-making process	P6U_W	P6S_WG	P6S_WG_inż

K1_IZ_W06	student has basic knowledge in computer science, including IT, software development, designing and deploying databases, knowledge bases, data warehouses, OLAP analyses and internet technologies	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W07	student has basic knowledge on the organization and functioning of a company with respect to logistics, production, marketing, finances and accounting, human resources and quality	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W08	student has systematic theoretical general knowledge on SIZ implementation tools and technologies, business process modeling, project management engineering, as well as on key issues regarding IT in business	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W09	student has systematic theoretical general knowledge on the management and functioning of a company, as well as on engineering innovation and entrepreneurship	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W10	student has detailed knowledge on the modeling of business processes including notations and methodologies in business process modeling, as well as the analysis and designing of business processes	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W11	student has detailed knowledge on project management at all stages of project development, knows different methodologies of project management, standard and dedicated IT tools supporting project management, including open source tools for small and medium enterprises	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W12	student has basic knowledge on trends in IT implementation in business	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W13	student has basic knowledge on trends in management sciences	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W14	student has basic knowledge on the life cycle and operation of technical systems, such as IT and social systems – companies, performed projects, including needs analysis and management of IT implementation processes	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W15	student knows basic methods, techniques and mathematical tools used in solving simple engineering tasks related to IT implementation in business	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W16	student knows basic methods, techniques and IT tools used in solving engineering problems in management	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż

K1_IZ_W17	student knows basic methods, techniques and IT tools for engineering used in modeling business processes, in particular notations and models of business processes	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W18	student knows basic methods, techniques and mathematical tools used in solving engineering problems in project management	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W19	student has basic knowledge required to understand social, economic, legal, psychological conditions of engineering activity	P6U_W	P6S_WK	P6S_WK_inż
K1_IZ_W20	student explains basic terms and principles related to the protection of intellectual property student knows, understands and justifies the role of intellectual property protection in the development of science and economy	P6U_W	P6S_WK	P6S_WK_inż
K1_IZ_W21	student knows typical principles, methodologies and engineering technologies useful in analyzing, modeling and designing systems and processes being the object of interest to management engineering, in particular business process modeling, project management engineering, SIZ implementation tools and technologies, IT implementation in business	P6U_W	P6S_WG P6S_WK	P6S_WG_inż P6S_WK_inż
K1_IZ_W22	student provides a characteristic of the nature and form of entrepreneurship and identifies the reasons for its development. Student explains the notion of innovation and identifies its types. Student recognizes the features and conditions of innovation in an organization. Student describes the innovation process in an organization	P6U_W	P6S_WG P6S_WK	P6S_WK_inż
K1_IZ_W23	student knows and explains basic notions, legal regulations and economic relationships in the micro- and macro-scale. Student explains the main theories in economy. Student knows the basic purposes and institutions of market economy and their functions	P6U_W	P6S_WG P6S_WK	
K1_IZ_W24	student identifies the relationships between organizations and the interactions of organizations with their environment in the context of national, international and intercultural regulations. Student explains and illustrates the influence of the environment on the activity of an organization	P6U_W	P6S_WG P6S_WK	
K1_IZ_W25	student has basic knowledge on the typical behavior in an organization and on its conditions. Student knows the principles of constructing and operating a team and the factors which influence team efficiency. Student describes the notion of organization culture and its importance in management. Student	P6U_W	P6S_WG P6S_WK	

	knows basic company communication means and systems and the principles of an effective communication process			
K1_IZ_W26	student has basic knowledge on the methods and techniques in diagnosing and improving individual functional areas of an organization and on the selected methods for investigating the company environment. Student knows basic norms and standards in individual functional areas	P6U_W	P6S_WG	P6S_WG_inż
K1_IZ_W27	student describes the nature of managing change in an organization, indicates sources of resistance against changes and means for their neutralization	P6U_W	P6S_WG P6S_WK	
K1_IZ_W28	student distinguishes between and characterizes basic types and forms of organization, identifies their purposes and other elements. Student explains key concepts of organization theory regarding its establishment, functioning, transformation and development	P6U_W	P6S_WG P6S_WK	
SKILLS (U)				
K1_IZ_U01	Student can obtain information required to perform engineering tasks, in particular tasks related to implementations of IT tools in business, from the literature, databases and other properly selected sources, also in English or in another foreign language; student can also integrate the obtained information, interpret it and draw conclusions and formulate/justify the opinions	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U02	student can communicate with the use of various techniques in the work environment, in particular with specialists in social and technical sciences	P6U_U	P6S_UK P6S_UO	
K1_IZ_U03	student can prepare, using Polish, English or other fundamental language used in technical and social sciences, a well-documented report on engineering problems, especially on IT-related problems	P6U_U	P6S_UW P6S_UK	P6S_UW_inż
K1_IZ_U04	student can prepare and present, in Polish or in English, an oral presentation on detailed engineering problems, in particular on problems regarding IT implementations in business	P6U_U	P6S_UW P6S_UK	P6S_UW_inż
K1_IZ_U05	student understands the need for self-development in the area of his/her professional knowledge and skills related to the field of management engineering. Student can independently develop this knowledge and practice these skills.	P6U_U	P6S_UU P6S_UW	P6S_UW_inż

K1_IZ_U06	student has linguistic proficiency in the scientific areas and disciplines related to the field of management engineering, consistent with the requirements of the European Framework of Reference level B2	P6U_U	P6S_UK	
K1_IZ_U07	student can use ICT techniques adequate to the faced engineering tasks, in particular to tasks regarding the implementations of IT tools in business	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U08	when performing engineering tasks, and in particular when performing tasks related to implementations of IT tools in business, student can plan and perform experiments, including measurements and computer simulations, as well as interpret the results and draw conclusions	P6U_U	P6S_UW P6S_UO	P6S_UW_inż
K1_IZ_U09	student can use basic mathematical knowledge regarding calculus, linear algebra, analytical models and methods, simulations and experiments in formulating and solving engineering tasks regarding IT projects, managing business processes, implementations of IT tools in business	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U10	when formulating and solving engineering problems regarding business processes, innovation processes, projects, implementations of IT tools in business, student can notice their systematic aspects and correctly employ norms and standards, also those non-technical: economic, legal, ecological, psychological, professional and moral	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U11	student is prepared to use the acquired knowledge in the industrial environment and knows the work safety regulations	P6U_U	P6S_UO P6S_UW	P6S_UW_inż
K1_IZ_U12	student can economically analyze the micro- and macroeconomic conditions and the social and economic effectiveness of the undertaken engineering activities	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U13	student can critically analyze the functioning of objects, systems and processes and evaluate their solutions with the use of management engineering tools	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U14	student can identify and formulate simple practical engineering tasks regarding various categories of projects, business processes, management systems and subsystems characteristic of management engineering	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U15	student can use mathematical, analytical and IT methods, techniques and tools to solve engineering problems in management, in particular problems regarding IT solutions in business	P6U_U	P6S_UW	P6S_UW_inż

K1_IZ_U16	student can – in accordance with the provided specification – use proper methods, techniques and tools to independently or in a team design and implement an IT object, for example a computer application, a database, a knowledge base, a data warehouse, a decision-making procedure, an IT system or an implementation of a business process and other solutions typical of the management engineering field	P6U_U	P6S_UW P6S_UO	P6S_UW_inż
K1_IZ_U17	student can formulate and solve simple engineering tasks with respect to IT tools in business	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U18	using proper methods and tools, student can design systems, processes and work stations in individual functional areas of an enterprise as well as in projects	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U19	student can identify and interpret cultural, legal, economic, social, technological and ecological aspects of his/her engineering and managerial activity	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U20	student can analyze and evaluate goals, characteristics, elements, processes, functional areas in companies, as well as internal and interorganizational relationships, by using basic notions and theoretical approaches in economy, political economy, management sciences, system analysis and methodology of engineering design	P6U_U	P6S_UW	P6S_UW_inż
K1_IZ_U21	student can analyze the causes and dynamics of phenomena in an organization and its environment, in the conditions of market economy and binding social/economic regulations. Student can identify and analyze typical managerial problems in an organization and its functional areas	P6U_U	P6S_UW P6S_UK	P6S_UW_inż
K1_IZ_U22	student can identify basic typical managerial problems in an organization and its functional areas. Student can formulate alternative solutions, justify them, make choices and verify them in accordance with the selected priorities. Student can plan actions aimed at solving the problems.	P6U_U	P6S_UW P6S_UO P6S_UK	P6S_UW_inż
K1_IZ_U23	student can analyze the causes and dynamics of phenomena in an organization and its environment. Student can identify and analyze typical managerial problems in an organization and its functional areas	P6U_U	P6S_UW	
SOCIAL COMPETENCES (K)				
K1_IZ_K01	student can identify and interpret cultural, legal, ethical, economic, psychological aspects and results of engineering activity focused on mathematical and IT tools supporting management and business processes as	P6U_K	P6S_KO	

	well as projects, including the effect of this activity on the environment and the related responsibility for the decisions taken. Student understands the role of ethics in business and can interpret its rules		P6S_KR	
K1_IZ_K02	student can cooperate and work in teams (assuming various roles). Student can organize the work of small teams and lead them	P6U_K	P6S_KO P6S_KR P6S_KK	
K1_IZ_K03	student is ready to accept responsibility for the entrusted tasks. Student can appropriately set priorities in his/her own work and in cooperation with other employees as a result of assuming different roles in the organization	P6U_K	P6S_KO P6S_KR P6S_KK P6S_KR	
K1_IZ_K04	student is prepared to identify and analyze and solve professional and social problems at work. Student can elastically search for solutions to these problems	P6U_K	P6S_KK P6S_KR	
K1_IZ_K05	student is aware of the social role of a graduate from a technical university, understands the need to participate in preparing social projects, as well as to formulate information and opinion regarding technical developments and other aspects of engineering and to communicate them in a widely understandable manner	P6U_K	P6S_KK P6S_KO	
K1_IZ_K06	student is prepared to initiate changes in the workplace and to participate in their planning and implementation. Student can think and act like an entrepreneur	P6U_K	P6S_KO P6S_KR	
K1_IZ_K07	student is aware of the need for individual and team activity which reaches beyond the activity related to the field of study. Student is certain that self-conscious and systematic physical activity in various forms improves life quality both during studies and after graduation	P6U_K	P6S_KO	
K1_IZ_K08	student is prepared to perform his/her professional roles with respect to the changing social needs	P6U_K	P6S_KR	P6S_UW_inż

Zał. nr 3 do ZW 16/2020
Attachment no. 2. to the Program of Studies

DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study: ***Business Engineering*** **Profile:** ***general academic***

Level of studies: ***first-level studies*** **Form of studies:** ***full-time***

1. General description

1.1 Number of semesters: ***7***	*1.2 Total number of ECTS points necessary to complete studies at a given level:****210***
*1.3 Total number of hours:****2445***	*1.4 Prerequisites (particularly for second-level studies):* Qualifications is based in the results of matriculation exam, in accordance with the terms and recruitment procedure established for a given academic year.
1.5 Upon completion of studies graduate obtains professional degree of: inżynier (**engineer)**	*1.6 Graduate profile, employability:* Graduates from the Business Engineering field of study have basic knowledge and skills related to social sciences (corresponding to the discipline of management and quality studies and to elements of economy, finances, law, psychology and ergonomics) as well as to engineering and technical sciences. They also have engineering competences (corresponding to the discipline of

	information and communication technology and to elements of applied mathematics). Graduates have in-depth knowledge and skills related to: ● management, including problems encountered in particular functional areas of an organization, such as organizational structures and processes and management problems; ● decision-making processes following quantitative and qualitative methods; ● modeling, analyzing and designing IT management systems including modern IT tools and methods for solving business and management problems; ● modeling, designing and improving business processes, tools and technologies for implementing IT management systems and tools supporting project management; ● applying engineering and design in solving typical problems related to management and decision-making problems in organizations. As regards social competences, the graduate can identify, interpret and evaluate the behavior of employee teams and use typical techniques in order to influence such behavior. The graduates can also cooperate and work in teams, including in

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[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	interdisciplinary teams. The graduate describes, analyzes and designs business and decision-making processes in organizations with the use of system approach which integrates engineering skills (mainly IT-related) as well as the knowledge and skills related to economy, management and applied mathematics. Moreover, the graduate can perform complex analysis and solve technical problems with regard to economic and financial as well as organizational aspects. The graduate can initiate and organize a business in a particular organizational and legal form. Owing to their knowledge and skills, the graduates can run their own businesses or start work in companies and other organizations, in such positions as: ● business analyst (modeling, analysis and designing of organizations and decision variants); ● engineer in IT projects (constructing, evaluating, deploying and developing IT systems); ● project manager; ● designer of organization and management systems/processes; ● data analysis specialist (statistical methods and machine learning, databases, data warehouses, programming in R and in Python).

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	The graduate knows a foreign language at the B2 level, including specialist vocabulary in the fields of management and quality assurance, as well as of ICT. The graduate has knowledge and skills on the competence level required for the IPMA-student certificate.
1.7 Possibility of continuing studies: **Second-level studies, postgraduate (post diploma studies)**	*1.8 Relationship with the mission and the development strategy of the University* The Business Engineering field of study is offered at the Management Faculty, Wroclaw University of Science and Technology, and is part of the mission and strategy of a European technical university. Business Engineering is an innovative and future-oriented field of study, where engineers are taught about IT and mathematical tools which support processes related to problem-solving and management in organizations. Its main principle is the application of engineering design methods, modern IT tools, as well as models and methods in applied mathematics to the support of management-related activities in individual functional areas of an organization, as well as in projects and business processes. The field of study is interdisciplinary in its character. It integrates the engineering skills with the knowledge, skills and competences related to the sciences in the management and quality assurance discipline. The concept and study program in

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	the Business Engineering field are consistent with the mission of Wroclaw University of Science and Technology in the following areas: ● shaping creative, critical and tolerant student profiles by including these values in the learning outcomes of the field; ● striving for high quality education and ensuring that both students and teachers have conditions for free discussion and criticism while respecting the truth; ● preserving academic values and tradition, comprehensive cooperation with other universities, participation in the Erasmus student-exchange program and cooperation with employers by offering practice-oriented classes in the form of projects in specific organizations; ● pursuing leading positions in the management and quality assurance discipline among Polish and foreign universities with the use of innovative programs and didactic solutions implemented at the field of Business Engineering. Studies in the Business Engineering field have a general academic profile and the graduate receives an engineer's degree. The study program is consistent with the binding legal regulations and with the Polish Qualifications Frameworks in

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	the area of technical and social sciences. In accordance with the strategy of the University, the study program is an attractive and unique educational offer. It employs a natural – in the economic practice – complementarity of technical and economic education with the use of IT and applied mathematics. In accordance with the strategy of the University and with the development plan of the Faculty, which both point to the need of maintaining a relationship with the region and its economy, the study program of Business Engineering involves creating conditions for contact between students and organizations, in particular with companies. The Faculty also ensures the conditions for systematically improving the quality of education. This goal is achieved by allowing the academic development of the employees and encouraging the development of their didactic competences, as well as by improving the Faculty's infrastructure, for example by modernizing the didactic rooms and laboratories as well as didactic tools.

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2. Detailed description

2.1 Total number of learning outcomes in the program of study: W (knowledge) = 28, U (skills) = 23, K (competences) = 8, W + U + K = 59

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

D1 (major) 32 (this number must be greater than half the total number of learning outcomes)
D2 27
D3 .....
D4 .....

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 62,4 % ECTS points
D2 37,6 % ECTS points
D3 .....% ECTS points
D4 .....% ECTS points

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) 191

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)

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2.5 Concise analysis of the consistency of the expected learning outcomes with the requirements of the labor market

The achieved learning outcomes in the field of Business Engineering ensure that graduates are comprehensively prepared for professional work, owing to the combination of the latest achievements in management theory and practice with the ability to use information technologies and quantitative methods supporting decision-making processes. Focusing student education on the ability to solve practical substantive and managerial problems facilitates the adaptation of graduates to the changing requirements and conditions of the labor market.

The expected learning outcomes and the curriculum have been developed as a result of exchanging opinions by academic teachers, students and graduates as well as representatives of employers, inter alia, during the meetings of the Advisory Board of the Faculty of Management. Their opinions allow a conclusion that the learning outcomes are consistent with the following requirements of employers:

- interdisciplinary nature of graduate competences;
- graduate independence together with teamwork skills with respect do diagnosing and offering solutions and their implementation in individual functional areas of a company;
- ability to learn and openness to innovation;
- openness to the use of modern management methods and techniques as well as mathematical and IT tools.

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 BU[1] code) **105,02** ECTS. The maximum number of ECTS performed remotely with the consent of the Dean of the faculty is 75%

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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

Number of ECTS points for obligatory subjects	**23**
Number of ECTS points for optional subjects	**0**
Total number of ECTS points	**23**

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	**73**
Number of ECTS points for optional subjects	**47**
Total number of ECTS points	**120**

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): **0** ECTS points

2.10. Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points): **64** ECTS points

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

The process leading to the achievement of learning outcomes includes active participation in tuition organized at the university: lectures, classes, laboratories, projects and seminars, as well as independent studies allowing for the consolidation, supplementation and extension of knowledge. The student is entitled to individual consultations as needed. The learning outcomes are further developed during obligatory practical internship.

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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. 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]

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

		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]

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.1.4 *Information technologies* block *(min. 2 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	W08IZZ-SI0070G	Information technology (GK)	1		1			K1_IZ_W06 K1_IZ_W12 K1_IZ_U04 K1_IZ_U15	30	60	**2**	2	1	lec:T/Z lab:T	Z (L)		DN	P(1)	KO
		Total	**1**	**0**	**1**	**0**	**0**		**30**	**60**	**2**	**2**	**1**						

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					
1	**0**	**1**	**0**	**0**	**30**	**60**	**2**	**2**	**1**

4.1.2 List of basic sciences blocks

4.1.2.1 *Mathematics* block

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – 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	W13IZZ-SI0001G	Calculus (GK)	2	2				K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	60	225	**9**		2,64	lec:T/Z C:T	E			P(4)	PD
2	W08IZZ-SI0010W	Probability theory	2					K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	30	75	**3**	3	1,2	T/Z	Z		DN		PD
3	W08IZZ-SI0010C	Probability theory		1				K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	25	**1**	1	0,6	T	Z		DN	P	PD
		Total	**4**	**3**	**0**	**0**	**0**		**105**	**325**	**13**	**4**	**4,44**						

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]
1	W08IZZ-SI0072W	Physics of work environment	2					K1_IZ_W02 K1_IZ_W16 K1_IZ_U02 K1_IZ_U11 K1_IZ_U15 K1_IZ_K01 K1_IZ_K02 K1_IZ_K03	30	30	1	1	1	T/Z	Z		DN		PD
2	W08IZZ-SI0072P	Physics of work environment				1		K1_IZ_W02 K1_IZ_W16 K1_IZ_U02, K1_IZ_U11 K1_IZ_U15	15	50	**2**	2	0,6	T	Z		DN	P	PD

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K01 K1_IZ_K02 K1_IZ_K03											
3	W08IZZ-SI0072L	Physics of work environment			1			K1_IZ_W02 K1_IZ_W16 K1_IZ_U02 K1_IZ_U11 K1_IZ_U15 K1_IZ_K01 K1_IZ_K02 K1_IZ_K03	15	50	**2**	2	0,6	T	Z		DN	P	PD
		Total	**2**	**0**	**1**	**1**	**0**		**60**	**130**	**5**	**5**	**2,2**						

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[5]	Practical[6]	Type[7]
		Total																	

other……. Economic sciences

			Weekly number of hours		Number of hours	Number of ECTS points			Course/group of courses

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – 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**)	lec	cl	lab	Pr	sem	Learning effect symbol	ZZU	CNPS	Total	DN classes[5]	BU classes[1]	Form[2] of course/group of courses	Way[3] of crediting	University-wide[4]	Concerning scientific activities[5]	Concerning scientific activities[5]	Type[7]
1	W08IZZ-SI0002W	Economics	2					K1_IZ_W03 K1_IZ_W04 K1_IZ_W19 K1_IZ_W23 K1_IZ_U12 K1_IZ_U19 K1_IZ_U20 K1_IZ_U21 K1_IZ_K01	30	75	3	3	1,44	T/Z	E		DN		PD
2	W08IZZ-SI0002C	Economics		2				K1_IZ_W03 K1_IZ_W04 K1_IZ_W19 K1_IZ_W23 K1_IZ_U12 K1_IZ_U19 K1_IZ_U20 K1_IZ_U21 K1_IZ_K01	30	50	2	2	1,2	T	Z		DN	P	PD
		Total	**2**	**2**	**0**	**0**	**0**		**60**	**125**	**5**	**5**	**2,64**						

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					
8	**5**	**1**	**1**	**0**	**225**	**580**	**23**	**14**	**9,28**

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.3 List of the main field of study blocks

4.1.3.1 *Obligatory main field of study* blocks

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	W08IZZ-SI0021W	Economic analysis of business decisions	2					K1_IZ_W03 K1_IZ_W19 K1_IZ_W26 K1_IZ_U13 K1_IZ_U21 K1_IZ_U23	30	50	2	2	1,2	T/Z	Z		DN		K
2	W08IZZ-SI0021L	Economic analysis of business decisions			1			K1_IZ_W03 K1_IZ_W19 K1_IZ_W26 K1_IZ_U13 K1_IZ_U21 K1_IZ_U23	15	50	2	2	0,6	T	Z		DN	P	K
3	W08IZZ-SI0015W	System analysis and system engineering	2					K1_IZ_W04 K1_IZ_W05 K1_IZ_W14 K1_IZ_U10 K1_IZ_U13 K1_IZ_U18	30	75	3	3	1,2	T/Z	Z		DN		K
4	W08IZZ-SI0015P	Systems analysis and system engineering				1		K1_IZ_W04 K1_IZ_W05 K1_IZ_W14 K1_IZ_U10 K1_IZ_U13 K1_IZ_U18	15	25	1	1	0,6	T	Z		DN	P	K
5	W08IZZ-SI0001W	Databases	2					K1_IZ_W06 K1_IZ_W16	30	50	2	2	1,2	T/Z	Z		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U16 K1_IZ_U17											
6	W08IZZ-SI0001L	Databases			2			K1_IZ_W06 K1_IZ_W16 K1_IZ_U16 K1_IZ_U17	30	75	3	3	1,2	T	Z		DN	P	K
7	W08IZZ-SI0043W	Project controlling	1					K1_IZ_W11 K1_IZ_W18 K1_IZ_W26 K1_IZ_U18 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T/Z	Z		DN		K
8	W08IZZ-SI0043C	Project controlling		1				K1_IZ_W11 K1_IZ_W18 K1_IZ_W26 K1_IZ_U18 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
9	W08IZZ-SI0044W	E-economy	1					K1_IZ_W08 K1_IZ_W21 K1_IZ_U01 K1_IZ_U04 K1_IZ_U15 K1_IZ_U17 K1_IZ_U20 K1_IZ_K06	15	25	1	1	0,6	T/Z	Z		DN		K
10	W08IZZ-SI0044S	E-economy					1	K1_IZ_W08 K1_IZ_W21 K1_IZ_U01 K1_IZ_U04 K1_IZ_U15 K1_IZ_U17 K1_IZ_U20 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
11	W08IZZ-SI0008W	Data warehouses	1					K1_IZ_W06 K1_IZ_W16 K1_IZ_U07 K1_IZ_U16	15	75	3	3	0,84	T/Z	E		DN		K
12	W08IZZ-SI0008L	Data warehouses			2			K1_IZ_W06 K1_IZ_W16	30	50	2	2	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U07 K1_IZ_U16											
13	W08IZZ-SI0079W	Business processes implementation	1					K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14 K1_IZ_U16 K1_IZ_K02	15	50	2	2	0,84	T/Z	E		DN		K
14	W08IZZ-SI0079L	Business processes implementation			2			K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14 K1_IZ_U16 K1_IZ_K02	30	50	2	2	1,2	T	Z		DN	P	K
15	W08IZZ-SI0023W	Innovations and engineering entrepreneurship	2					K1_IZ_W09 K1_IZ_W22 K1_IZ_U20 K1_IZ_K04 K1_IZ_K06	30	30	1	1	1	T/Z	Z		DN		K
16	W08IZZ-SI0023C	Innovations and engineering entrepreneurship		1				K1_IZ_W09 K1_IZ_W22 K1_IZ_U20 K1_IZ_K04 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
17	W08IZZ-SI0003W	Pragmatic logics for engineers	1					K1_IZ_W01 K1_IZ_W15 K1_IZ_W19 K1_IZ_U09 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		K
18	W08IZZ-SI0003C	Pragmatic logics for engineers		1				K1_IZ_W01 K1_IZ_W15 K1_IZ_W19 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	K
19	W08IZZ-SI0025W	Marketing	2					K1_IZ_W07 K1_IZ_U21 K1_IZ_U23 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

20	W08IZZ-SI0025C	Marketing		2				K1_IZ_W07 K1_IZ_U21 K1_IZ_U23 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
21	W08IZZ-SI0030W	Methods of project management	1					K1_IZ_W11 K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	15	50	2	2	0,84	T/Z	E		DN		K
22	W08IZZ-SI0030L	Methods of project management			1			K1_IZ_W11 K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
23	W08IZZ-SI0030C	Methods of project management		2				K1_IZ_W11 K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
24	W08IZZ-SI0077W	Business process notations	1					K1_IZ_W10 K1_IZ_W17 K1_IZ_U07 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		K
25	W08IZZ-SI0077L	Business process notations			2			K1_IZ_W10 K1_IZ_W17 K1_IZ_U07 K1_IZ_U15	30	50	2	2	1,2	T	Z		DN	P	K
26	W08IZZ-SI0009W	Protection of intellectual property	2					K1_IZ_W19 K1_IZ_W20 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	30	50	2	2	1,2	T/Z	Z		DN		K
27	W08IZZ-SI0009C	Protection of intellectual property		1				K1_IZ_W19 K1_IZ_W20	15	25	1	1	0,6	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U10 K1_IZ_U19 K1_IZ_K01											
28	W08IZZ-SI0071W	Organization and management	2					K1_IZ_W09 K1_IZ_W13 K1_IZ_W24 K1_IZ_W28 K1_IZ_U05 K1_IZ_U20 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K
29	W08IZZ-SI0071C	Organization and management		2				K1_IZ_W09 K1_IZ_W13 K1_IZ_W24 K1_IZ_W28 K1_IZ_U05 K1_IZ_U20 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
30	W08IZZ-SI0016W	Essentials of engineering inventics	2					K1_IZ_W09 K1_IZ_W22 K1_IZ_U10 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
31	W08IZZ-SI0016C	Essentials of engineering inventics		1				K1_IZ_W09 K1_IZ_W22 K1_IZ_U10 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
32	W08IZZ-SI0073W	Essentials of software development	2					K1_IZ_W06 K1_IZ_W12 K1_IZ_W16 K1_IZ_U01 K1_IZ_U16	30	75	3	3	1,2	T/Z	Z		DN		K
33	W08IZZ-SI0073L	Essentials of software development			2			K1_IZ_W06 K1_IZ_W12 K1_IZ_W16 K1_IZ_U01 K1_IZ_U16	30	50	2	2	1,2	T	Z		DN	P	K
34	W08IZZ-SI0026W	Fundamentals of project management	2					K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_U14 K1_IZ_K02 K1_IZ_K03	30	50	2	2	1,2	T/Z	Z		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

35	W08IZZ-SI0004W	Law for engineers	2					K1_IZ_W04 K1_IZ_W19 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	30	30	1	1	1	T/Z	Z		DN		K
36	W08IZZ-SI0004C	Law for engineers		1				K1_IZ_W04 K1_IZ_W19 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	15	25	1	1	0,6	T	Z		DN	P	K
37	W08IZZ-SI0018W	Accounting and finance for engineers	2					K1_IZ_W07 K1_IZ_W19 K1_IZ_U12 K1_IZ_U19 K1_IZ_K06	30	75	3	3	1,44	T/Z	E		DN		K
38	W08IZZ-SI0018C	Accounting and finance for engineers		2				K1_IZ_W07 K1_IZ_W19 K1_IZ_U12 K1_IZ_U19 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
39	W08IZZ-SI0011W	Regulations of business activities	2					K1_IZ_W07 K1_IZ_W24 K1_IZ_U18 K1_IZ_U22 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K
40	W08IZZ-SI0011P	Regulations of business activities				1		K1_IZ_W07 K1_IZ_W24 K1_IZ_U18 K1_IZ_U22 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
41	W08IZZ-SI0047W	Feasibility study of infrastructural projects	1					K1_IZ_W04 K1_IZ_W19 K1_IZ_U03 K1_IZ_U12 K1_IZ_U19 K1_IZ_K02	15	25	1	1	0,6	T/Z	Z		DN		K
42	W08IZZ-SI0047P	Feasibility study of infrastructural projects				1		K1_IZ_W04 K1_IZ_W19 K1_IZ_U03	15	50	2	2	0,6	T	Z		DN	P	K

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[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U12 K1_IZ_U19 K1_IZ_K02											
43	W08IZZ-SI0033W	Management information systems	1					K1_IZ_W08 K1_IZ_W14 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14	15	50	2	2	0,6	T/Z	Z		DN		K
44	W08IZZ-SI0033L	Management information systems			1			K1_IZ_W08 K1_IZ_W14 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14	15	25	1	1	0,6	T	Z		DN	P	K
45	W08IZZ-SI0012W	Internet technologies	1					K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04 K1_IZ_U07 K1_IZ_U16 K1_IZ_K04	15	25	1	1	0,6	T/Z	Z		DN		K
46	W08IZZ-SI0012L	Internet technologies			1			K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04 K1_IZ_U07 K1_IZ_U16 K1_IZ_K04	15	50	2	2	0,6	T	Z		DN	P	K
47	W08IZZ-SI0012S	Internet technologies					1	K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04 K1_IZ_U07 K1_IZ_U16 K1_IZ_K04	15	25	1	1	0,6	T	Z		DN	P	K
48	W08IZZ-SI0048L	Management training			2			K1_IZ_W24 K1_IZ_W26 K1_IZ_U20 K1_IZ_U21 K1_IZ_U22 K1_IZ_U23 K1_IZ_K03	30	75	3	3	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K04 K1_IZ_K06											
49	W08IZZ-SI0013W	Introduction to optimization	1					K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		K
50	W08IZZ-SI0013C	Introduction to optimisation		1				K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	K
51	W08IZZ-SI0075W	MIS requirements	1					K1_IZ_W05 K1_IZ_W14 K1_IZ_U10	15	25	1	1	0,6	T/Z	Z		DN		K
52	W08IZZ-SI0075C	MIS requirements		1				K1_IZ_W05 K1_IZ_W14 K1_IZ_U10	15	50	2	2	0,6	T	Z		DN	P	K
53	W08IZZ-SI0014W	Organizational behaviour	2					K1_IZ_W24 K1_IZ_W25 K1_IZ_W27 K1_IZ_U20 K1_IZ_U23 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	2	2	1,2	T/Z	Z		DN		K
54	W08IZZ-SI0014S	Organizational behaviour					1	K1_IZ_W24 K1_IZ_W25 K1_IZ_W27 K1_IZ_U20 K1_IZ_U23 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	15	25	1	1	0,6	T	Z		DN	P	K
55	W08IZZ-SI0034W	Quality management	2					K1_IZ_W07 K1_IZ_W26 K1_IZ_U10 K1_IZ_U18 K1_IZ_K02 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
56	W08IZZ-SI0034C	Quality management		2				K1_IZ_W07 K1_IZ_W26 K1_IZ_U10 K1_IZ_U18	30	50	2	2	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K02 K1_IZ_K06											
57	W08IZZ-SI0049W	Information process management	1					K1_IZ_W08 K1_IZ_W12 K1_IZ_W14 K1_IZ_W21 K1_IZ_U03 K1_IZ_U04 K1_IZ_U16 K1_IZ_U21	15	25	1	1	0,6	T/Z	Z		DN		K
58	W08IZZ-SI0049S	Information process management					1	K1_IZ_W08 K1_IZ_W12 K1_IZ_W14 K1_IZ_W21 K1_IZ_U03 K1_IZ_U04 K1_IZ_U16 K1_IZ_U21	15	25	1	1	0,6	T	Z		DN	P	K
59	W08IZZ-SI0020W	Production and logistic management	2					K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
60	W08IZZ-SI0020C	Production and logistic management		1				K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
61	W08IZZ-SI0020L	Production and logistic management			1			K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	15	50	2	2	0,6	T	Z		DN	P	K
62	W08IZZ-SI0042W	Human Resource Management	2					K1_IZ_W07 K1_IZ_W19 K1_IZ_W27 K1_IZ_U05 K1_IZ_U20	30	75	3	3	1,44	T/Z	E		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K02 K1_IZ_K03 K1_IZ_K04											
64	W08IZZ-SI0042C	Human Resource Management		2				K1_IZ_W07 K1_IZ_W19 K1_IZ_W27 K1_IZ_U05 K1_IZ_U20 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	2	2	1,2	T	Z		DN	P	K
		Total	**47**	**21**	**17**	**3**	**4**		**1380**	**2710**	**108**	**108**	**56,72**						

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					
47	**21**	**17**	**3**	**4**	**1380**	**2710**	**108**	**108**	**56,72**

4.1.4. List of specialization blocks

4.1.4.1. *Obligatory specialization blocks (min. 12 pkt ECTS)*:

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – 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	W08IZZ-SI0078G	Systems simulation **(GK)**	2		1			K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U08 K1_IZ_U09 K1_IZ_U17	45	125	**5**	5	1,8	lec: T/Z; lab: T	Z (Lec)		DN	P(2)	S
2	W08IZZ-SI0038W	Design of business analysis tools	1					K1_IZ_W10 K1_IZ_W15 K1_IZ_W17 K1_IZ_U09 K1_IZ_U17	15	50	**2**	2	0,6	T/Z	Z		DN		S
3	W08IZZ-SI0038L	Design of business analysis tools			2			K1_IZ_W10 K1_IZ_W15 K1_IZ_W17 K1_IZ_U09 K1_IZ_U17	30	50	**2**	2	1,2	T	Z		DN	P	S
4	W08IZZ-SI0041W	Analytical systems	1					K1_IZ_W05 K1_IZ_W16 K1_IZ_W21 K1_IZ_U13 K1_IZ_U17 K1_IZ_K02	15	25	**1**	1	0,6	T/Z	Z		DN		S
5	W08IZZ-SI0041L	Analytical systems			2			K1_IZ_W05 K1_IZ_W16 K1_IZ_W21 K1_IZ_U13 K1_IZ_U17 K1_IZ_K02	30	75	**3**	3	1,2	T	Z		DN	P	S
		Total	**4**		**5**				**135**	**325**	**13**	**13**	**5,4**						

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					
4	**0**	**5**	**0**	**0**	**135**	**325**	**13**	**13**	**5,4**

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.2 List of optional blocks

4.2.1 List of general education blocks

4.2.1.1 Liberal-managerial subjects blocks *(min. 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	IZZ-SI3ZIBKS1	Social competences I					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
2	IZZ-SI6ZIBKS2	Social competences II	1				2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	45	75	**3**	3	1,8	lec:T/Z S: T	Z		DN	P (2)	KO
3	IZZ-SI7ZIBKS3	Social competences III (**GK**)	1				1	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	30	1	1	1	lec:T/Z S:T	Z(Lec)		DN	P(1)	KO
		Total	**2**	**0**	**0**	**0**	**5**		**105**	**155**	**6**	**6**	**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 cl	Way[3] of crediting lab	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	łączna	zajęć DN[5]	lec			pr	sem	o char. prakt.[6]	ZZU
1		**Social competences I**																	
	W08IZZ-SI0080S	Effective teamwork					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	W08IZZ-SI0081S	Interpersonal communication					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0082S	Presentation techniques					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0083S	Developing social skills					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0084S	Storytelling					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0085S	Applied anthropology					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
2		**Social competences II**																	
	W08IZZ-SI0063W	Stress coping strategies	1					K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	15	25	**1**	1	0,6	T/Z	Z		DN		KO
	W08IZZ-SI0063S	Stress coping strategies					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0087W	Developing cognitive and decision-making competences	1					K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	15	25	**1**	1	0,6	T/Z	Z		DN		KO
	W08IZZ-SI0087S	Developing cognitive and decision-making competences					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
	W08IZZ-SI0088W	Developing managerial skills	1					K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	15	25	**1**	1	0,6	T/Z	Z		DN		KO
	W08IZZ-SI0088S	Developing managerial skills					2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	KO
3		**Social competences III**																	
	W08IZZ-SI0086W	Diversity management and inclusion (**GK**)	1				1	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	30	**1**	1	1	lec:T/Z S:T	Z(Lec)		DN	P(1)	KO
	W08IZZ-SI0089W	Mediations and elements of negotiations (**GK**)	1				1	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	30	**1**	1	1	lec:T/Z S:T	Z(Lec)		DN	P(1)	KO

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	Total	**2**	**0**	**0**	**0**	**5**		**105**	**155**	**6**	**6**	**4**						

4.2.1.2 *Foreign languages* block *(min. 5 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		Foreign language B2.1		4				K1_IZ_U02 K1_IZ_U03 K1_IZ_U04 K1_IZ_U06	60	70	**2**		1,5	T	Z	O		P	KO
2		Foreign language B2.2		4				K1_IZ_U02 K1_IZ_U03 K1_IZ_U04 K1_IZ_U06	60	80	**3**		2,5	T	Z	O		P	KO
		Total	**0**	**8**	**0**	**0**	**0**		**120**	**150**	**5**		**4,0**						

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]
1		Sporting classes		2				K1_IZ_K07	30	30	**0**		0	T	Z	O		P	KO
2		Sporting classes		2				K1_IZ_K07	30	30	**0**		0	T	Z	O		P	KO
		Total	**0**	**4**	**0**	**0**	**0**		**60**	**60**	**0**		**0**						

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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:

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					
2	**12**	**0**	**0**	**5**	**285**	**365**	**11**	**6**	**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]

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

		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]
		Total																	

4.2.2.3 *Chemistry* 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]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

		Total																	

Altogether for basic science 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					

4.2.3 List of *main field of study* blocks

4.2.3.1 Optional main field of study blocks (min. 23 pkt ECTS):

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		Engineering project workshops																	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	W08IZZ-SI0106P	Designing a visual marketing message				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K
	W08IZZ-SI0065P	Ergonomic diagnosis and design of workstations				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K
	W08IZZ-SI0090P	Improvement of organizational information systems				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K
	W08IZZ-SI0067P	Mathematical methods - decision optimization				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K
	W08IZZ-SI0068P	The process of generating and implementing innovations				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K
	W08IZZ-SI0069P	Theory and practice of engineering creativity				2		K1_IZ_U01 K1_IZ_U08 K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	**2**	2	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

2	W08IZZ-SI0045D	Diploma project				2		K1_IZ_U01 K1_IZ_U03 K1_IZ_U04 K1_IZ_U05 K1_IZ_U08 K1_IZ_U15 K1_IZ_K01 K1_IZ_K04 K1_IZ_K05	30	350	**14**	14	8	T/Z	Z		DN	P	K
3	W08IZZ-SI0027Q	Internship (4th or 5th semester) 4 weeks						K1_IZ_K08 K1_IZ_U02 K1_IZ_U11	0	150	**5**		1,5	T	Z			P	K
4	W08IZZ-SI0039S	Diploma seminar					1	K1_IZ_U01 K1_IZ_U03 K1_IZ_U04	15	50	**2**	2	0,6	T	Z		DN	P	K
		Total	**0**	**0**	**0**	**4**	**1**		**75**	**600**	**23**	**18**	**11,3**						

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					
0	**0**	**0**	**4**	**1**	**75**	**600**	**23**	**18**	**11,3**

4.2.4 List of specialization blocks

4.2.4.1 *Specialization subjects (e.g. whole specialization)* blocks *(min. 30 ECTS points):*

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – 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		**Statistics**																	
	W08IZZ-SI0092W	Statistics for engineers	2					K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	30	100	4	4	1,44	T/Z	E		DN		S
	W08IZZ-SI0092L	Statistics for engineers			1			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	S
	W08IZZ-SI0093W	Statistical modeling	2					K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	30	100	4	4	1,44	T/Z	E		DN		S
	W08IZZ-SI0093L	Statistical modeling			1			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	S
2		**Quantitative methods**																	
	W08IZZ-SI0094W	Operations research	2					K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17	30	75	3	3	1,44	T/Z	E		DN		S
	W08IZZ-SI0094L	Operations research			2			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17	30	50	2	2	1,2	T	Z		DN	P	S
	W08IZZ-SI0095W	Optimization methods	2					K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17	30	75	3	3	1,44	T/Z	E		DN		S
	W08IZZ_ SI0095L	Optimization methods			2			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09	30	50	2	2	1,2	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U13 K1_IZ_U15 K1_IZ_U17											
3		**Data mining**																	
	W08IZZ-SI0096W	Techniques of data mining	1					K1_IZ_W01 K1_IZ_W16 K1_IZ_U01 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		S
	W08IZZ-SI0096P	Techniques of data mining				1		K1_IZ_W01 K1_IZ_W16 K1_IZ_U01 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	S
	W08IZZ-SI0097W	Machine learning	1					K1_IZ_W01 K1_IZ_W16 K1_IZ_U01 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		S
	W08IZZ-SI0097P	Machine learning				1		K1_IZ_W01 K1_IZ_W16 K1_IZ_U01 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	S
4		**Visual analysis in business**																	
	W08IZZ-SI0098W	Data analysis and classification	1					K1_IZ_W08 K1_IZ_W15 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17 K1_IZ_K03	15	50	2	2	0,6	T/Z	Z		DN		S
	W08IZZ-SI0098L	Data analysis and classification			1			K1_IZ_W08 K1_IZ_W15 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17 K1_IZ_K03	15	50	2	2	0,6	T	Z		DN	P	S
	W08IZZ-SI0099W	Business data analysis and visualisation	1					K1_IZ_W08 K1_IZ_W15 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17	15	50	2	2	0,6	T/Z	Z		DN		S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K03										
	W08IZZ-SI0099L	Business data analysis and visualisation			1			K1_IZ_W08 K1_IZ_W15 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17 K1_IZ_K03	15	50	2	2	0,6	T	Z		DN	P	S
5		**IT tools supporting decision making**																
	W08IZZ-SI0100W	IT tools in managerial decision making	2					K1_IZ_W05 K1_IZ_W06 K1_IZ_W12 K1_IZ_U15 K1_IZ_U17 K1_IZ_K01	30	50	2	2	1,2	T/Z	Z		DN		S
	W08IZZ-SI0100L	IT tools in managerial decision making			1			K1_IZ_W05 K1_IZ_W06, K1_IZ_W12 K1_IZ_U15 K1_IZ_U17 K1_IZ_K01	15	50	2	2	0,6	T	Z		DN	P	S
	W08IZZ-SI0101W	IT tools in decision making in services	2					K1_IZ_W05 K1_IZ_W06 K1_IZ_W12 K1_IZ_U15 K1_IZ_U17 K1_IZ_K01	30	50	2	2	1,2	T/Z	Z		DN		S
	W08IZZ-SI0101L	IT tools in decision making in services			1			K1_IZ_W05 K1_IZ_W06, K1_IZ_W12 K1_IZ_U15 K1_IZ_U17 K1_IZ_K01	15	50	2	2	0,6	T	Z		DN	P	S
6		**Management systems design**																
	W08IZZ-SI0102W	Management systems design in process oriented organisations	1					K1_IZ_W05 K1_IZ_W21 K1_IZ_U18 K1_IZ_U20 K1_IZ_U22 K1_IZ_K01	15	50	2	2	0,84	T/Z	E		DN		S
	W08IZZ-SI0104L	Management systems design in process oriented organisations				2		K1_IZ_W05 K1_IZ_W21 K1_IZ_U18 K1_IZ_U20 K1_IZ_U22 K1_IZ_K01	30	50	2	2	1,2	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

	W08IZZ-SI0103W	Management systems design in project oriented organisations	1					K1_IZ_W05 K1_IZ_W21 K1_IZ_U18 K1_IZ_U20 K1_IZ_U22 K1_IZ_K01	15	50	2	2	0,84	T/Z	E		DN		S
	W08IZZ-SI0103P	Management systems design in project oriented organisations				2		K1_IZ_W05 K1_IZ_W21 K1_IZ_U18 K1_IZ_U20 K1_IZ_U22 K1_IZ_K01	30	50	2	2	1,2	T	Z		DN	P	S
7		**Engineering design**																	
	W08IZZ-SI0104W	Workstations design	2					K1_IZ_W02 K1_IZ_U11 K1_IZ_U15 K1_IZ_U18	30	50	2	2	1,2	T/Z	Z		DN		S
	W08IZZ-SI0104L	Workstations design			2			K1_IZ_W02 K1_IZ_U11 K1_IZ_U15 K1_IZ_U18	30	50	2	2	1,2	T	Z		DN	P	S
	W08IZZ-SI0105W	Interactive systems design	2					K1_IZ_W02 K1_IZ_U11 K1_IZ_U15 K1_IZ_U18	30	50	2	2	1,2	T/Z	Z		DN		S
	W08IZZ-SI0105L	Interactive systems design			2			K1_IZ_W02 K1_IZ_U11 K1_IZ_U15 K1_IZ_U18	30	50	2	2	1,2	T	Z		DN	P	S
		Total	**11**	**0**	**7**	**3**	**0**		**315**	**750**	**30**	**30**	**13,32**						

4.2.4.2 ……*(e.g. diploma profile)* block *(min. .... ECTS points):*

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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					
11	**0**	**7**	**3**	**0**	**315**	**750**	**30**	**30**	**13,32**

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			**Internship**	
Number of ECTS points	**Number of ECTS points DN[5]**	**Number of ECTS points for BU[1] classes**	**Training crediting mode**	**Code**
5		**1,5**	Crediting student internship The student internship is individually credited on the basis of: ● certificate from the company or institution in which the internship was held; ● written report on the results of the internship; In the case when the student internship is credited on the basis of student employment: ● certificate confirming that the student was employed including the employment time and the description of the tasks performed by the student, ● certificate of apprenticeship (internship) organized by AIESEC or another	W08IZZ-SI0027Q

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

			student organization of a similar character. The credit for the internship is awarded to the student by the Dean in the electronic student grade system	

	Training duration	**Training objective**
	4 weeks	Purpose of the internship The purposes of student internship in the Management Faculty include: a. introducing students to the specific nature of the professional environment and to the operating principles of companies and enterprises, b. introducing students to the documentation processing methods and the related good practices in particular job positions, c. introducing students to the principles of work organization: company structures, division of competences, procedures, task planning and control, d. practicing skills related to team cooperation, in particular to effective communication, independent work and decision-making, e. practicing particular work-related skills related directly to the place of the internship, f. verifying, developing and practical use of the knowledge gained during studies, g. practicing the ability to organize own work, teamwork, as well as effective time management, conscientiousness and responsibility for the performed tasks, h. developing active approach, entrepreneurship and the ability to work in a team, and to self-evaluate their own work in order to more effectively compete in the labor market, as well as gaining experience and knowledge of the labor market and about the skills required at work.

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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

Type of diploma dissertation	inżynier	
Number of diploma dissertation semesters	**Number of ECTS points**	**Code**
2	**2** **14**	**W08IZZ-SI0039S** **W08IZZ-SI0045D**
Character of diploma dissertation		
project		
Number of BU[1] ECTS points	**8,6**	
Number of ECTS points DN[5]	**16**	

5. Ways of verifying assumed learning outcomes

Type of classes	**Ways of verifying assumed learning outcomes**
lecture	exam, open test, close test
classes	test, written assignment in the form of a report, diagnostic report and/or project report, oral presentation with the use of modern means of communication
laboratory	attendance, laboratory report, task report
project	report, project presentation, project defense
seminar	discussion, topic presentation, essay
student internship	written report approved by the internship supervisor on behalf of the Employer, certificate of internship signed by the Employer
diploma dissertation	written diploma dissertation

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

6. Range of diploma examination

No.	course	Issue
1	Economics Regulations of business activity	Market and types of competition (models of market structures) as well as macro and microeconomic tools for their regulation
2	Law for engineers Protection of intellectual property	Sources of law and basis legal regulations binding in economic and social activity.
3	Accounting and finance for engineers Economic analysis of business decisions	Goals and basic stages of the analysis of liquidity, profitability and property and capital situation.
4	Organization and management Management system design	Management processes, functions and instruments.
5	Production and logistics management Quality management	Management systems, principles and methods.
6	Organizational behaviour Human Resources Management	Principles of forming effective teams in an organization.
7	Essentials of engineering inventics Inventions and engineering entrepreneurship	Characteristics of invention and innovativeness
8	Feasibility study of infrastructural projects Fundamentals of project management Methods of project management Project controlling	Nature of a project and project management tools.

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

9	Marketing	Marketing strategies and concepts.
10	Physics of work environment Workstations design	Influence of selected physical factors in the working environment on human body.
11	Business processes implementation Business process notations System analysis and system engineering	Methodologies, languages and notations used in the modeling of business processes.
12	Management Information Systems MIS requirements Information process management	Nature, purpose and principles of managing IT implementation processes.
13	E-economy Internet technologies	E-economy solutions in the B2B and B2C markets.
14	Databases Data warehouses Essentials of software development IT tools supporting decision making	Databases and data warehouses in decision-making processes.
15	Introduction to optimization Operational research	Mathematical models and algorithms for finding optimal solutions for routine decision-making problems – illustrative implementations.
16	Calculus Pragmatic logics for engineers	Calculus as a measure of uncertainty.
17	Statistics for engineers Techniques of data mining Analytical systems Data analysis and classification Design of business analysis tools	Nature of exploratory data analysis and statistical deduction.
18	Systems simulation	Simulation methods in management.

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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

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. ……)

Approved by faculty student government legislative body:

....
Date name and surname, signature of student representative

....
Date Dean's signature

*delete as appropriate

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Zał. nr 4 do ZW 16/2020
Attachment no. … to Program of Studies

PLAN OF STUDIES

FACULTY: **MANAGEMENT**

MAIN FIELD OF STUDY: BUSINESS ENGINEERING

EDUCATION LEVEL: first-level (inżynier) studies

FORM OF STUDIES: full-time studies

PROFILE: general academic

SPECIALIZATION: **Applications of IT in business**

LANGUAGE OF STUDY: POLISH

In effect since: **2023/2024**

*delete as applicable

Plan of studies structure (optionally)

1) in ECTS point layout- Internship after 3rd semester 150 CNPS i 5 ECTS

CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	
765	**30**	**755**	**30**	**780**	**30**	**800**	**30**	**755**	**30**	**780**	**30**	**755**	**30**	27
														26
				Sporting classes				Foreign language B2.2						25
		Regulations of business activities		**30**	**0 ECTS**	Foreign language B2.1		**80**	**3 ECTS**	Sporting classes				24
Pragmatic logics for engineers		**75**	**3 ECTS**	Social competences I		**70**	**2 ECTS**			**30**	**0 ECTS**			23
75	**3 ECTS**			**50**	**2 ECTS**					Diploma seminar				22
										50	**2 ECTS**			
		Probability theory		Systems analysis and				Management systems		Social competences II				21
Calculus		**100**	**4 ECTS**	system engineering		Quantitative methods		design		**75**	**3 ECTS**			20
225	**9 ECTS**			**100**	**4 ECTS**	**125**	**5 ECTS**	**100**	**4 ECTS**					19
		Physics of		Statistics				IT tools supporting				Social competences III		18
		work environment				Data mining		decision making		Systems simulation		**30**	**1 ECTS**	17
Economics		**130**	**5 ECTS**	**150**	**6 ECTS**	**75**	**3 ECTS**	**100**	**4 ECTS**	**125**	**5 ECTS**	Diploma project		16
125	**5 ECTS**			Production and logistics		Fundamentals of project management		Visual analysis in business		Design of business		**350**	**14 ECTS**	15
		Introduction to optimisation		management				**100**	**4 ECTS**	analysis tools		Engineering design		14
Law for engineers		**75**	**3 ECTS**	**125**	**5 ECTS**	**50**	**2 ECTS**	Methods of project		**100**	**4 ECTS**	**100**	**4 ECTS**	13
55	**2 ECTS**	Protection of intellectual				Innovations and engineering		management		Analytical systems				12
		property		Accounting and		entrepreneurship		**125**	**5 ECTS**	**100**	**4 ECTS**			11
		75	**3 ECTS**	finance for engineers		**55**	**2 ECTS**					Engineering project workshops		10
Organization and management		Organizational behaviour		**125**	**5 ECTS**			Management Information Systems		Management training		**50**	**2 ECTS**	9
100	**4 ECTS**	**75**	**3 ECTS**			Marketing		**75**	**3 ECTS**	**75**	**3 ECTS**	Project controlling		8
				Essentials of engineering		**100**	**4 ECTS**			Human Resource		**50**	**2 ECTS**	7
Information technology		Internet technologies		development				Quality management		Management		Feasibility study of infrastructural projects		6
60	**2 ECTS**	**100**	**4 ECTS**	**75**	**3 ECTS**	Economic analysis of		**100**	**4 ECTS**	**125**	**5 ECTS**	**75**	**3 ECTS**	5
Databases				Essentials of software		business decisions						E-economy		4
125	**5 ECTS**	Data warehouses		development		**100**	**4 ECTS**			Business processes		**50**	**2 ECTS**	3
		125	**5 ECTS**	**125**	**5 ECTS**	MIS requirements		Business process notations		implementation		Information process management		2
						75	**3 ECTS**	**75**	**3 ECTS**	**100**	**4 ECTS**	**50**	**2 ECTS**	1
I		**II**		**III**		**IV**		**V**		**VI**		**VII**		**Total**
23 / 345		**24 / 360**		**25 / 375**		**24 / 360**		**25 / 375**		**24/360**		**18/270**		163/2445

2) in hourly layout

CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	CNPS	ECTS	
765	**30**	**755**	**30**	**780**	**30**	**800**	**30**	**755**	**30**	**780**	**30**	**755**	**30**	27
														26
				Sporting classes **O2OOO**				Foreign language B2.2 **O4OOO**						26
		Regulations of business activities **2OO1O E**		Social competences I **OOOO2**		Foreign language B2.1 **O4OOO**				Sporting classes **O2OOO**				25
Pragmatic logics for engineers **11OOO**										Diploma seminar **OOOO1**				24
Calculus **22OOO E**		Probability theory **21OOO**		Systems analysis and system engineering **2OO1O**		Quantitative methods **2O2OO E**		Management systems design **1OO2O E**		Social competences II **1OOO2**				23
		Physics of work environment **2O11O**		Statistics **2O1OO E**		Data mining **1OO1O**		IT tools supporting decision making **2O1OO**		Systems simulation **2O1OO**		Social competences III **1OOO1**		22
Economics **22OOO E**				Production and logistics management **211OO**		Fundamentals of project management **2OOOO**		Visual analysis in business **1O1OO**		Design of business analysis tools **1O2OO**		Diploma project **OOO2O**		21
Law for engineers **21OOO**		Introduction to optimisation **11OOO**				Innovations and engineering entrepreneurship **21OOO**		Methods of project management **121OO E**		Analytical systems **1O2OO**		Engineering design **2O2OO**		20
- Organization and management **22OOO E**		Protection of intellectual property **21OOO**		Accounting and finance for engineers **22OOO E**		Marketing **22OOO E**		Management Information Systems **1O1OO**		Management training **OO2OO**		Engineering project workshops **OOO2O**		19
		Organizational behaviour **2OOO1**		Essentials of engineering inventics **21OOO**		Economic analysis of business decisions **2O1OO**		Quality management **22OOO**		Human Resource Management **22OOO E**		Project controlling **11OOO**		18
Information technology **1O1OO**		Internet technologies **1O1O1**		Essentials of software development **2O2OO**		MIS requirements **11OOO**		Business process notations **1O2OO**		Business processes implementation **1O2OO E**		Feasibility study of infrastructural projects **1OO1O**		17
Databases **2O2OO**		Data warehouses **1O2OO E**										E-economy **1OOO1**		16
												Information process management **1OOO1**		15
I		**II**		**III**		**IV**		**V**		**VI**		**VII**		**Total**
23 / 345		**24 / 360**		**25 / 375**		**24 / 360**		**25 / 375**		**24/360**		**18/270**		163/2445

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 30**

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	W13IZZ-SI0001G	Calculus (GK)	2	2				K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	60	225	9		2,64	lec:T/Z cl:T	E			P(4)	PD
2	W08IZZ-SI0001W	Databases	2					K1_IZ_W06 K1_IZ_W16 K1_IZ_U16 K1_IZ_U17	30	50	2	2	1,2	T/Z	Z		DN		K
3	W08IZZ-SI0001L	Databases			2			K1_IZ_W06 K1_IZ_W16 K1_IZ_U16 K1_IZ_U17	30	75	3	3	1,2	T	Z		DN	P	K
4	W08IZZ-SI0002W	Economics	2					K1_IZ_W03 K1_IZ_W04 K1_IZ_W19 K1_IZ_W23 K1_IZ_U12 K1_IZ_U19 K1_IZ_U20 K1_IZ_U21 K1_IZ_K01	30	75	3	3	1,44	T/Z	E		DN		PD
5	W08IZZ-SI0002C	Economics		2				K1_IZ_W03 K1_IZ_W04 K1_IZ_W19 K1_IZ_W23 K1_IZ_U12 K1_IZ_U19 K1_IZ_U20 K1_IZ_U21 K1_IZ_K01	30	50	2	2	1,2	T	Z		DN	P	PD
6	W08IZZ-SI0003W	Pragmatic logics for engineers	1					K1_IZ_W01 K1_IZ_W15 K1_IZ_W19 K1_IZ_U09	15	25	1	1	0,6	T/Z	Z		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U15											
7	W08IZZ-SI0003C	Pragmatic logics for engineers		1				K1_IZ_W01 K1_IZ_W15 K1_IZ_W19 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	K
8	W08IZZ-SI0071W	Organization and management	2					K1_IZ_W09 K1_IZ_W13 K1_IZ_W24 K1_IZ_W28 K1_IZ_U05 K1_IZ_U20 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K
9	W08IZZ-SI0071C	Organization and management		2				K1_IZ_W09 K1_IZ_W13 K1_IZ_W24 K1_IZ_W28 K1_IZ_U05 K1_IZ_U20 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
10	W08IZZ-SI0004W	Law for engineers	2					K1_IZ_W04 K1_IZ_W19 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	30	30	1	1	1	T/Z	Z		DN		K
11	W08IZZ-SI0004C	Law for engineers		1				K1_IZ_W04 K1_IZ_W19 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	15	25	1	1	0,6	T	Z		DN	P	K
12	W08IZZ-SI0070G	Information technology (GK)	1		1			K1_IZ_W06 K1_IZ_W12 K1_IZ_U04 K1_IZ_U15	30	60	2	2	1	Lec: T/Z Lab:T	Z (Lab)		DN	P(1)	KO
		Total	**12**	**8**	**3**	**0**	**0**		**345**	**765**	**30**	**21**	**14,12**						

Optional courses / groups of courses (minimum …… hours in semester , ……. 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																	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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					
12	**8**	**3**	**0**	**0**	**345**	**765**	**30**	**21**	**14,12**

Semester 2

Obligatory courses / groups of courses **Number of ECTS points 30**

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	W08IZZ-SI0072W	Physics of work environment	2					K1_IZ_W02 K1_IZ_W16 K1_IZ_U02 K1_IZ_U11 K1_IZ_U15 K1_IZ_K01 K1_IZ_K02 K1_IZ_K03	30	30	1	1	1	T/Z	Z		DN		PD
2	W08IZZ-SI0072P	Physics of work environment				1		K1_IZ_W02 K1_IZ_W16 K1_IZ_U02 K1_IZ_U11 K1_IZ_U15 K1_IZ_K01 K1_IZ_K02 K1_IZ_K03	15	50	2	2	0,6	T	Z		DN	P	PD
3	W08IZZ-SI0072L	Physics of work environment			1			K1_IZ_W02 K1_IZ_W16 K1_IZ_U02 K1_IZ_U11 K1_IZ_U15 K1_IZ_K01 K1_IZ_K02 K1_IZ_K03	15	50	2	2	0,6	T	Z		DN	P	PD
4	W08IZZ-SI0008W	Data warehouses	1					K1_IZ_W06 K1_IZ_W16 K1_IZ_U07 K1_IZ_U16	15	75	3	3	0,84	T/Z	E		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

5	W08IZZ-SI0008L	Data warehouses			2			K1_IZ_W06 K1_IZ_W16 K1_IZ_U07 K1_IZ_U16	30	50	2	2	1,2	T	Z		DN	P	K
6	W08IZZ-SI0009W	Protection of intellectual property	2					K1_IZ_W19 K1_IZ_W20 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	30	50	2	2	1,2	T/Z	Z		DN		K
7	W08IZZ-SI0009C	Protection of intellectual property		1				K1_IZ_W19 K1_IZ_W20 K1_IZ_U10 K1_IZ_U19 K1_IZ_K01	15	25	1	1	0,6	T	Z		DN	P	K
8	W08IZZ-SI0010W	Probability theory	2					K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	30	75	3	3	1,2	T/Z	Z		DN		PD
9	W08IZZ-SI0010C	Probability theory		1				K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	25	1	1	0,6	T	Z		DN	P	PD
10	W08IZZ-SI0011W	Regulations of business activities	2					K1_IZ_W07 K1_IZ_W24 K1_IZ_U18 K1_IZ_U22 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K
11	W08IZZ-SI0011P	Regulations of business activities				1		K1_IZ_W07 K1_IZ_W24 K1_IZ_U18 K1_IZ_U22 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
12	W08IZZ-SI0012W	Internet technologies	1					K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04 K1_IZ_U07 K1_IZ_U16 K1_IZ_K04	15	25	1	1	0,6	T/Z	Z		DN		K
13	W08IZZ-SI0012L	Internet technologies			1			K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04 K1_IZ_U07 K1_IZ_U16 K1_IZ_K04	15	50	2	2	0,6	T	Z		DN	P	K
14	W08IZZ-SI0012S	Internet technologies					1	K1_IZ_W06 K1_IZ_W12 K1_IZ_U03 K1_IZ_U04	15	25	1	1	0,6	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
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[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U07 K1_IZ_U16 K1_IZ_K04											
15	W08IZZ-SI0013W	Introduction to optimisation	1					K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		K
16	W08IZZ-SI0013C	Introduction to optimisation		1				K1_IZ_W01 K1_IZ_U09 K1_IZ_U15	15	50	2	2	0,6	T	Z		DN	P	K
17	W08IZZ-SI0014W	Organizational behaviour	2					K1_IZ_W24 K1_IZ_W25 K1_IZ_W27 K1_IZ_U20 K1_IZ_U23 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	2	2	1,2	T/Z	Z		DN		K
18	W08IZZ-SI0014S	Organizational behaviour					1	K1_IZ_W24 K1_IZ_W25 K1_IZ_W27 K1_IZ_U20 K1_IZ_U23 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	15	25	1	1	0,6	T	Z		DN	P	K
		Total	**13**	**3**	**4**	**2**	**2**		**360**	**755**	**30**	**30**	**14,68**						

Optional courses / groups of courses (minimum …… hours in semester, ……. 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																	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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]	Total number of ECTS points for DN classes[5]
lec	cl	lab	pr	sem					
13	**3**	**4**	**2**	**2**	**360**	**755**	**30**	**30**	**14,68**

Semester 3

Obligatory courses / groups of courses Number of ECTS points 22

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	W08IZZ-SI0015W	System analysis and system engineering	2					K1_IZ_W04 K1_IZ_W05 K1_IZ_W14 K1_IZ_U10 K1_IZ_U13 K1_IZ_U18	30	75	3	3	1,2	T/Z	Z		DN		K
2	W08IZZ-SI0015P	System analysis and system engineering				1		K1_IZ_W04 K1_IZ_W05 K1_IZ_W14 K1_IZ_U10 K1_IZ_U13 K1_IZ_U18	15	25	1	1	0,6	T	Z		DN	P	K
3	W08IZZ-SI0016W	Essentials of engineering inventics	2					K1_IZ_W09 K1_IZ_W22 K1_IZ_U10 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
4	W08IZZ-SI0016C	Essentials of engineering inventics		1				K1_IZ_W09 K1_IZ_W22 K1_IZ_U10 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
5	W08IZZ-SI0073W	Essentials of software development	2					K1_IZ_W06 K1_IZ_W12 K1_IZ_W16 K1_IZ_U01 K1_IZ_U16	30	75	3	3	1,2	T/Z	Z		DN		K
6	W08IZZ-SI0073L	Essentials of software development			2			K1_IZ_W06	30	50	2	2	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_W12 K1_IZ_W16 K1_IZ_U01 K1_IZ_U16										
7	W08IZZ-SI0018W	Accounting and finance for engineers	2					K1_IZ_W07 K1_IZ_W19 K1_IZ_U12 K1_IZ_U19 K1_IZ_K06	30	75	3	3	1,44	T/Z	E		DN		K
8	W08IZZ-SI0018C	Accounting and finance for engineers		2				K1_IZ_W07 K1_IZ_W19 K1_IZ_U12 K1_IZ_U19 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
9	W08IZZ-SI0020W	Production and logistics management	2					K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
10	W08IZZ-SI0020C	Production and logistics management		1				K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
11	W08IZZ-SI0020L	Production and logistics management			1			K1_IZ_W07 K1_IZ_W26 K1_IZ_U12 K1_IZ_U20 K1_IZ_U22 K1_IZ_K06	15	50	2	2	0,6	T	Z		DN	P	K
		Total	**10**	**4**	**3**	**1**	**0**		**270**	**550**	**22**	**22**	**11,04**						

Optional courses / groups of courses (minimum 105 hours in semester, 8 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 classes[5]	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical 6	type 7
1	IZZ-SI3ZIBSTAT	Statistics	2		1			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U15	45	150	6	6	2,04	W:T/ZL: T	E(W)		DN	P(2)	S
2	IZZ-SI3ZIBKS1	Social competences I					2	K1_IZ_W25 K1_IZ_K02	30	50	2	2	1,2	T	Z		DN	P	KO

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K04											
3		Sporting classes		2				K1_IZ_K07	30	30	0		0	T	Z	O		P	KO
		Total	**2**	**2**	**1**	**0**	**2**		**105**	**230**	**8**	**8**	**3,24**						

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					
12	**6**	**4**	**1**	**2**	**375**	**780**	**30**	**30**	**14,28**

Semester 4

Obligatory courses / groups of courses Number of ECTS points 15

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	lsb	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1	W08IZZ-SI0021W	Economic analysis of business decisions	2					K1_IZ_W03 K1_IZ_W19 K1_IZ_W26 K1_IZ_U13 K1_IZ_U21 K1_IZ_U23	30	50	2	2	1,2	T/Z	Z		DN		K
2	W08IZZ-SI0021L	Economic analysis of business decisions			1			K1_IZ_W03 K1_IZ_W19 K1_IZ_W26 K1_IZ_U13 K1_IZ_U21 K1_IZ_U23	15	50	2	2	0,6	T	Z		DN	P	K
3	W08IZZ-SI0075W	MIS requirements	1					K1_IZ_W05 K1_IZ_W14 K1_IZ_U10	15	25	1	1	0,6	T/Z	Z		DN		K
4	W08IZZ-SI0075C	MIS requirements		1				K1_IZ_W05 K1_IZ_W14 K1_IZ_U10	15	50	2	2	0,6	T	Z		DN	P	K
5	W08IZZ-SI0023W	Innovations and engineering entrepreneurship	2					K1_IZ_W09 K1_IZ_W22 K1_IZ_U20	30	30	1	1	1	T/Z	Z		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_K04 K1_IZ_K06										
6	W08IZZ-SI0023C	Innovations and engineering entrepreneurship		1				K1_IZ_W09 K1_IZ_W22 K1_IZ_U20 K1_IZ_K04 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
7	W08IZZ-SI0025W	Marketing	2					K1_IZ_W07 K1_IZ_U21 K1_IZ_U23 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,44	T/Z	E		DN		K
8	W08IZZ-SI0025C	Marketing		2				K1_IZ_W07 K1_IZ_U21 K1_IZ_U23 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
9	W08IZZ-SI0026W	Fundamentals of project management	2					K1_IZ_W18 K1_IZ_U03 K1_IZ_U10, K1_IZ_U14 K1_IZ_K02 K1_IZ_K03	30	50	2	2	1,2	T/Z	Z		DN		K
		Total	**9**	**4**	**1**	**0**	**0**		**210**	**380**	**15**	**15**	**8,44**						

Optional courses / groups of courses (minimum 150 hours in semester, 15 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	IZZ-SI4ZIBMI	Quantitative methods	2		2			K1_IZ_W01 K1_IZ_W15 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17	60	125	5	5	2,64	Lec:T/ Z Lab: T	E(W)		DN	P(2)	S
2	IZZ-SI4ZIBED	Data mining	1			1		K1_IZ_W01 K1_IZ_W16 K1_IZ_U01 K1_IZ_U09 K1_IZ_U13 K1_IZ_U15	30	75	3	3	1,2	Lec:T/ Z Lab: T	Z		DN	P(2)	S
3	W08IZZ-SI0027Q	Internship (4th lub 5th semester) 4weeks						K1_IZ_K08	0	150	5		1,5	T	Z			P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U02 K1_IZ_U11											
4		Foregin language B2.1		4				K1_IZ_U02, K1_IZ_U03, K1_IZ_U04, K1_IZ_U06	60	70	2		1,5	T	Z	O		P	KO
		Total	**3**	**4**	**2**	**1**	**0**		**150**	**420**	**15**	**8**	**6,84**						

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					
12	**8**	**3**	**1**	**0**	**360**	**800**	**30**	**23**	**15,28**

Semester 5

Obligatory courses / groups of courses Number of ECTS points 15

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	W08IZZ-SI0030W	Methods of project management	1					K1_IZ_W11 K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	15	50	2	2	0,84	T/Z	E		DN		K
2	W08IZZ-SI0030L	Methods of project management			1			K1_IZ_W11 K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

3	W08IZZ-SI0030C	Methods of project management		2				K1_IZ_W11, K1_IZ_W18 K1_IZ_U03 K1_IZ_U10 K1_IZ_K02 K1_IZ_K03 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
4	W08IZZ-SI0077W	Business process notations	1					K1_IZ_W10 K1_IZ_W17 K1_IZ_U07 K1_IZ_U15	15	25	1	1	0,6	T/Z	Z		DN		K
5	W08IZZ-SI0077L	Business process notations			2			K1_IZ_W10 K1_IZ_W17 K1_IZ_U07 K1_IZ_U15	30	50	2	2	1,2	T	Z		DN	P	K
6	W08IZZ-SI0033W	Management information systems	1					K1_IZ_W08 K1_IZ_W14 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14	15	50	2	2	0,6	T/Z	Z		DN		K
7	W08IZZ-SI0033L	Management information systems			1			K1_IZ_W08 K1_IZ_W14 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14	15	25	1	1	0,6	T	Z		DN	P	K
8	W08IZZ-SI0034W	Quality management	2					K1_IZ_W07 K1_IZ_W26 K1_IZ_U10 K1_IZ_U18 K1_IZ_K02 K1_IZ_K06	30	50	2	2	1,2	T/Z	Z		DN		K
9	W08IZZ-SI0034C	Quality management		2				K1_IZ_W07 K1_IZ_W26 K1_IZ_U10 K1_IZ_U18 K1_IZ_K02 K1_IZ_K06	30	50	2	2	1,2	T	Z		DN	P	K
		Total	**5**	**4**	**4**	**0**	**0**		**195**	**375**	**15**	**15**	**8,04**						

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Optional courses / groups of courses (minimum 180 hours in semester, 15 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	IZZ-SI5ZIBAWB	Visual analysis in business	1		1			K1_IZ_W08 K1_IZ_W15 K1_IZ_U13 K1_IZ_U15 K1_IZ_U17 K1_IZ_K03	30	100	4	4	1,2	lec:T/Z lab: T	Z		DN	P(2)	S
2	IZZ-SI5ZIBNIWPD	IT tools supporting decision making	2		1			K1_IZ_W05 K1_IZ_W06 K1_IZ_W12 K1_IZ_U15 K1_IZ_U17 K1_IZ_K01	45	100	4	4	1,2	lec:T/Z lab: T	Z		DN	P (2)	S
3	IZZ-SI5ZIBPSZ	Management systems design	1			2		K1_IZ_W05 K1_IZ_W21 K1_IZ_U18 K1_IZ_U20 K1_IZ_U22 K1_IZ_K01	45	100	4	4	2,04	lec:T/Z lab: T	E(W)		DN	P(2)	S
4		Foreign language B2.2		4				K1_IZ_U02 K1_IZ_U03 K1_IZ_U04 K1_IZ_U06	60	80	3		2,5	T	Z	O		P	KO
		Total	**4**	**4**	**2**	**2**	**0**		**180**	**380**	**15**	**12**	**7,54**						

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					
9	**8**	**6**	**2**	**0**	**375**	**755**	**30**	**27**	**15,58**

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Semester 6

Obligatory courses / groups of courses Number of ECTS points 25

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 hours			Form[2] of course/group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	Lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1	W08IZZ-SI0079W	Business processes implementation	1					K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14 K1_IZ_U16 K1_IZ_K02	15	50	2	2	0,84	T/Z	E		DN		K
2	W08IZZ-SI0079L	Business processes implementation			2			K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U13 K1_IZ_U14 K1_IZ_U16 K1_IZ_K02	30	50	2	2	1,2	T	Z		DN	P	K
3	W08IZZ-SI0038W	Design of business analysis tools	1					K1_IZ_W10 K1_IZ_W15 K1_IZ_W17 K1_IZ_U09 K1_IZ_U17	15	50	2	2	0,6	T/Z	Z		DN		S
4	W08IZZ-SI0038L	Design of business analysis tools			2			K1_IZ_W10 K1_IZ_W15 K1_IZ_W17 K1_IZ_U09 K1_IZ_U17	30	50	2	2	1,2	T	Z		DN	P	S
5	W08IZZ-SI0078G	Systems simulation (**GK**)	2		1			K1_IZ_W10 K1_IZ_W17 K1_IZ_W21 K1_IZ_U08 K1_IZ_U09 K1_IZ_U17	45	125	5	5	1,8	lec: T/Z lab:T	Z(lec)		DN	P(2)	S
6	W08IZZ-SI0041W	Analytical systems	1					K1_IZ_W05 K1_IZ_W16 K1_IZ_W21 K1_IZ_U13 K1_IZ_U17 K1_IZ_K02	15	25	1	1	0,6	T/Z	Z		DN		S
7	W08IZZ-SI0041L	Analytical systems			2			K1_IZ_W05 K1_IZ_W16 K1_IZ_W21	30	75	3	3	1,2	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U13 K1_IZ_U17 K1_IZ_K02										
8	W08IZZ-SI0048L	Management training			2			K1_IZ_W24 K1_IZ_W26 K1_IZ_U20 K1_IZ_U21 K1_IZ_U22 K1_IZ_U23 K1_IZ_K03 K1_IZ_K04 K1_IZ_K06	30	75	3	3	1,2	T	Z		DN	P	K
9	W08IZZ-SI0042W	Human Resource Management	2					K1_IZ_W07 K1_IZ_W19 K1_IZ_W27 K1_IZ_U05 K1_IZ_U20 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	75	3	3	1,44	T/Z	E		DN		K
10	W08IZZ-SI0042C	Human Resource Management		2				K1_IZ_W07 K1_IZ_W19 K1_IZ_W27 K1_IZ_U05 K1_IZ_U20 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04	30	50	2	2	1,2	T	Z		DN	P	K
		Total	**7**	**2**	**9**	**0**	**0**		**270**	**625**	**25**	**25**	**11,28**						

Optional courses / groups of courses (minimum 90 hours in semester, 5 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 classes[5]	BU classes[1]			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1		Sporting classes		2				K1_IZ_K07	30	30	0	0	0	T	Z	O		P	KO
2	IZZ-SI6ZIBKS2	Social competences II	1				2	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	45	75	3	3	1,8	Lec:T/Z S: T	Z		DN	P (1)	KO
3	W08IZZ-SI0039S	Diploma seminar					1	K1_IZ_U01 K1_IZ_U03 K1_IZ_U04	15	50	2	2	0,6	T	Z		DN	P	K
		Total	**1**	**2**	**0**	**0**	**3**		**90**	**155**	**5**	**5**	**2,4**						

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

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					
8	**4**	**9**	**0**	**3**	**360**	**780**	**30**	**30**	**13,68**

Semester 7

Obligatory courses / groups of courses **Number of ECTS points 10**

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 classes[5]	BU classes[1]			Course/group of courses	Concerning scientific activities[5]	Practical[6]	Type[7]
1	W08IZZ-SI0043W	Project controlling	1					K1_IZ_W11 K1_IZ_W18 K1_IZ_W26 K1_IZ_U18 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T/Z	Z		DN		K
2	W08IZZ-SI0043C	Project controlling		1				K1_IZ_W11 K1_IZ_W18 K1_IZ_W26 K1_IZ_U18 K1_IZ_K03 K1_IZ_K06	15	25	1	1	0,6	T	Z		DN	P	K
3	W08IZZ-SI0044W	E-economy	1					K1_IZ_W08 K1_IZ_W21 K1_IZ_U01 K1_IZ_U04 K1_IZ_U15 K1_IZ_U17 K1_IZ_U20 K1_IZ_K06	15	25	1	1	0,6	T/Z	Z		DN		K
4	W08IZZ-SI0044S	E-economy					1	K1_IZ_W08 K1_IZ_W21 K1_IZ_U01 K1_IZ_U04 K1_IZ_U15 K1_IZ_U17	15	25	1	1	0,6	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U20 K1_IZ_K06											
5	W08IZZ-SI0047W	Feasibility study of infrastructural projects	1					K1_IZ_W04 K1_IZ_W19 K1_IZ_U03 K1_IZ_U12 K1_IZ_U19 K1_IZ_K02	15	25	1	1	0,6	T/Z	Z		DN		K
6	W08IZZ-SI0047P	Feasibility study of infrastructural projects				1		K1_IZ_W04 K1_IZ_W19 K1_IZ_U03 K1_IZ_U12 K1_IZ_U19 K1_IZ_K02	15	50	2	2	0,6	T	Z		DN	P	K
7	W08IZZ-SI0049W	Information process management	1					K1_IZ_W08 K1_IZ_W12 K1_IZ_W14 K1_IZ_W21 K1_IZ_U03 K1_IZ_U04 K1_IZ_U16 K1_IZ_U21	15	25	1	1	0,6	T/Z	Z		DN		K
8	W08IZZ-SI0049S	Information process management					1	K1_IZ_W08 K1_IZ_W12 K1_IZ_W14 K1_IZ_W21 K1_IZ_U03 K1_IZ_U04 K1_IZ_U16 K1_IZ_U21	15	25	1	1	0,6	T	Z		DN	P	K
		Total	**4**	**1**	**0**	**1**	**2**		**120**	**225**	**9**	**9**	**4,8**						

Optional courses / groups of courses (minimum 150 hours in semester, 21 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	IZZ-SI7ZIBPI	Engineering design	2		2			K1_IZ_W02 K1_IZ_U11 K1_IZ_U15 K1_IZ_U18	60	100	4	4	2,4	lec:T/Z lab: T	Z		DN	P (2)	S
2	IZZ-SI7ZIBIWP	Engineering project workshops				2		K1_IZ_U01 K1_IZ_U08	30	50	2	2	1,2	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1_IZ_U14 K1_IZ_U15 K1_IZ_K02 K1_IZ_K03 K1_IZ_K04											
3	W08IZZ-SI0045D	Diploma project				2		K1_IZ_U01 K1_IZ_U03 K1_IZ_U04 K1_IZ_U05 K1_IZ_U08 K1_IZ_U15 K1_IZ_K01 K1_IZ_K04 K1_IZ_K05	30	350	14	14	8	T/Z	Z		DN	P	K
4	IZZ-SI7ZIBKS3	Social competences III (**GK**)	1				1	K1_IZ_W25 K1_IZ_K02 K1_IZ_K04	30	30	1	1	1	Lec: T/Z Sem:T	Z(L)		DN	P(1)	KO
		Total	**3**	**0**	**2**	**4**	**1**		**150**	**530**	**21**	**21**	**12,6**						

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**	**2**	**5**	**3**	**270**	**755**	**30**	**30**	**17,4**

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

2. Set of examinations in semestral arrangement

Course / group of courses code	Names of courses / groups of courses ending with examination	Semester
W13IZZ-SI0001G	Calculus (GK)	1
W08IZZ-SI0002W	Economics	1
W08IZZ-SI0071W	Organization and management	1
W08IZZ-SI0008W	Data warehouses	2
W08IZZ-SI0011W	Regulations of business activities	2
IZZ-SI3ZIBSTAT	Statistics	3
W08IZZ-SI0018W	Accounting and finance for engineers	3
IZZ-SI4ZIBMI	Quantitative methods	4
W08IZZ-SI0025W	Marketing	4
IZZ-SI5ZIBPSZ	Management systems design	5
W08IZZ-SI0026W	Methods of project management	5
W08IZZ-SI0079W	Business process implementation	6
W08IZZ-SI0042W	Human Resource Management	6

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

Semester	Allowable deficit of ECTS points after semester
1	14
2	20
3	12
4	11
5	9
6	9
7	0
8	-

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Opinion of student government legislative body

.....	.....
Date	Name and surname, signature of student representative
.....	.....
Date	Dean’s signature

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[2]Traditional – enter T, remote – enter Z
[3]Exam – 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)
[4]University-wide course /group of courses – enter O
[5]DN - 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
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: **Bazy danych**
Name of subject in English: **Databases**
Main field of study: Business Engineering
Specialization
Profile: **academic**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **W08IZZ-SI0001**
Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**50**		**75**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**3**		
including number of ECTS points for practical classes (P)			**3**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

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SUBJECT OBJECTIVES

C1 To acquire students' knowledge of relational database systems and how to create and use databases in management information systems.
C2 To teach students how to develop and use relational database systems in obtaining ad hoc information for business management purposes.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01. Knows the structure of a relational database and the basic problems and methods of its design and implementation.
PEU_W02. Knows the operations of relational algebra as the basis for using a relational database system in collecting, storing, and sharing data and the database system query language.
relating to skills:
PEU_U01. Can design and implement a simple relational database system.

PEU_U02. Can retrieve ad hoc information from a relational database by defining data retrieval processes in query language.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Description of the course syllabus, organization of classes, rules of obtaining credit and evaluation. Technology of relational databases. Database management system. Relational database and its structure. Creating tables.	2
Lec 2	Data update operations. Integrity constraints. Referential actions. Examples solved together with students.	2
Lec 3	Definition, application and implementation of operations on tables: selection, projection, grouping, sorting. Examples.	2
Lec 4	Definition, application, and implementation of table operations: equality-join. Composition of selection, projection, and equality-join operations. Examples.	2
Lec 5	Outer joins. Views. Subqueries. Queries with parameters. Examples.	2
Lec 6	Definition, application and implementation of operations on tables: set-theory operations: union, intersection, asymmetric difference, set complement.	2
Lec 7	Definition, application, and implementation of table operations: division and theta-join.	2
Lec 8	Management information system. The role of databases in management information systems. The information requirements analysis process and the role of data modeling. Conceptual data modeling and its place in conceptual business modeling. Approaches to conceptual data modeling. Structural approach: entity relationship model.	2
Lec 9	Building entity relationship models - a case study.	2
Lec 10	Mapping entity relationship model into relational database schema – methodological basics.	2
Lec 11	Mapping entity relationship model into relational database schema – a case study. An object-oriented approach to conceptual modeling of data: the UML class model.	2
Lec 12	Fundamentals of relational database normalization: functional relations and their types, decomposition of relations and their schemas, normal forms of relation schemas, denormalization.	2
Lec 13	Normalization of a relational database – a case study.	2
Lec 14	Theoretical test.	2
Lec 15	Selected advanced SQL capabilities: window and ranking functions, user functions, conditional statements and loops, triggers. Summary.	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Discussing the lab class rules. An example relational database management system and its functions; creating a database; defining the structure of database tables.	2

Lab 2	Defining data properties, defining primary and foreign keys.	2
Lab 3	Verification of the functioning of integrity constraint control mechanisms.	2
Lab 4	Practical test on the computer (1) - database implementation.	2
Lab 5	A case study of a trading company database. Selecting queries and creating-table queries. Defining queries. Defining processes of selecting data from one table. Implementing projection and selection operations.	2
Lab 6	Defining processes for selecting data from multiple tables. Defining calculated columns, grouping, selection, data aggregation, aggregating functions.	2
Lab 7	Defining table union processes. Joining queries. Implementation of set-theory sum operations.	2
Lab 8	Defining processes for finding the common part of tables. Implementing product operations on tables. Defining processes for subtracting tables. Deletion queries. Implementation of asymmetric difference and set complement operations.	2
Lab 9	Implementation of the theta-join and divide operations.	2
Lab 10	Practical test on the computer (2) - implementation of data search.	2
Lab 11	Building a data model for a given application.	2
Lab 12	Mapping a data model into a database schema.	2
Lab 13	Proof of normalization of the database schema.	2
Lab 14	Practical design test - database design.	2
Lab 15	Summary and crediting.	2
	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentation. N2. Laboratory instructions. N3. MS SQL Server and MS SQL Management Studio software.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_U01	Practical test on the computer (1)
F2	PEU_W02 PEU_U01 PEU_U02	Practical test on the computer (2)
F3	PEU_W01 PEU_U01	Practical design test
F4	PEU_W01 PEU_W02	Lecture test

Laboratory: P=(F1+F2+F3)/3
Lecture: P=F4

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Niksa-Rynkiewicz T. Projektowanie wiedzy: relacyjne bazy danych. Wydawnictwo Politechniki Gdańskiej 2017.
[2] Barker R. Case*Method: modelowanie związków encji. Warszawa, WNT 1996.
[3] Database management system documentation.

SECONDARY LITERATURE:

[1] Ullman J., Widom J. Podstawowy wykład z systemów baz danych. WNT 2000.
[2] Date C. Wprowadzenie do baz danych. WNT 2000.
[3] Fowler M. UML w kropelce. Warszawa, Oficyna Wydawnicza LTP 2005.
[4] Wrycza S., Marcinkowski B., Wyrzykowski K. Język UML 2.0 w modelowaniu systemów informatycznych: diagramy języka UML, modelowanie biznesowe, metodyki projektowe oparte na UML, narzędzia CASE. Gliwice, Wydawnictwo Helion 2005.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Michał Jarema, michal.jarema@pwr.edu.pl
Maria Galant-Pater, maria.galant-pater@pwr.edu.pl (consultant)

Załącznik nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Ekonomia
Name of subject in English: Economics
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0002
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of classes organized by the University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**75**	**50**			
Form of crediting	**Examination**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**3**	**2**			
including number of ECTS points for practical (P) classes		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
No prerequisites

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge about the theory of management, economic categories and laws, as well as market economy institutions and their functions in the economic system on a micro and macroeconomic scale.
C2 Understanding the principles of making optimal decisions by market entities and the function of the state in the economy in the context of economic growth and development.
C3. Acquiring the ability to use basic economic tools to describe real economic problems and developing the ability to identify and analyze the factors of the macroeconomic environment in connection with the implemented economic policy.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Knows the basic concepts, theories, phenomena and rules of economics and understands the relationships between them. Has basic knowledge of the markets, production factors, and the principles and conditions for making rational decisions by market entities.

PEU_W02 Knows the basic goals and institutions of the market economy and the economic policy instruments.

relating to skills:

PEU_U01 Can identify and interpret the economic aspects and effects of engineering activities

PEU_U02 Is able to make conclusions using the principles and economic laws and apply the instruments of economic regulation.

relating to social competences:

PEU_K01 Is able to identify and interpret the economic aspects and effects of engineering activities supporting management and business processes.

PROGRAMME CONTENT

Lecture		Number of hours
Lec.1	Organisational activities. Economics as a science. Microeconomics and macroeconomics. Positive economics and normative economics. Regularities and economic rights. Tools and methods of economic analysis. The search for economic data. The inference of economics.	2
Lec.2	The historical process of the development of economic thought - economic trends and schools. The functioning of the market - demand, supply, market equilibrium	2
Lec.3	Elasticity of demand and elasticity of supply	2
Lec.4	Theory proceedings manufacturer. The choice of optimal technology production in the short and long term. Marginal rate of technical substitution. The product average and marginal product of factor of production	2
Lec.5	Costs in the company (total, average, marginal). The costs in the short and long term. Economies of scale. The economic costs. The principle of sound management	2
Lec.6	Revenue and earnings of the company. Market structure - general characteristics	2
Lec.7	General equilibrium, welfare and efficiency. Conditions for economic efficiency - Edgeworth box. Optimal production.	2
Lec.8	The role of the state in a market economy	2
Lec.9	The measurement of economic activity; production and income. Fluctuations in GDP, production and income. Consumer demand and investment demand.	2
Lec.10	Development and economic growth. Models of economic growth. Fluctuations in the market economy. Passive and active anti-cyclical policy.	2
Lec.11	The monetary-credit system	2
Lec.12	Unemployment and inflation	2
Lec.13	The state budget, the budget deficit and public debt. The economic importance of the public debt	2
Lec.14	Balance of payments and exchange rates	2

Lec.15	Globalization and international specialization. The advantage of absolute und the comparative advantage	2
	Sum of hours	**30**

Classes		**Number of hours**
C.1	Organisational activities. The process management and decision- making in economics - rationality of action. The curve of production capacity, the election of a "something for something") and the opportunity cost. The basic economic laws in the short term (the law of increasing opportunity cost, total product and marginal, the law of diminishing marginal product). The curve of production capacity and the short-term and long-term decisions, the principle of optimization decisions.	2
C.2	The market and the market economy. Elements of the market and the errors market in terms of different schools of economics. Relationship between producers and consumers (model roundabout, manufacturing capabilities, budget constraint)	2
C.3	Demand and the law of demand. Supply and the law of supply – problem solving	2
C.4	The market mechanism and the elasticity of demand and supply - case study, discussion and problem solving	2
C.5	The technique and the volume of production - discussion, problem solving.	2
C.6	The costs of the company in the short and long term - a case study, problem solving	2
C.7	General equilibrium. Edgeworth box	2
C.8	The institutions and the functioning of the market. Transaction costs and economic activity	2
C.9	Creation and distribution of national income	2
C.10	Business cycle. Anti-cyclical policy	2
C.11	The nature and monetary policy instruments	2
C.12	Fiscal policy and the state budget	2
C.13	Inflation and unemployment	2
C.14	Exchange rate and its importance for decision-making and production company capital	2
C.15	Final test.	2
	Sum of hours	**30**

TEACHING TOOLS USED
N1. Problem lecture with the use of a multimedia presentation N2. Solving practical tasks. N3. Activity and teamwork during classes. N4. Lists of exercises for own work N5. Analysis of source texts (economic literature, press), N6. Case studies N7. Written tests

EVALUATION OF EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement

F1	PEU_W01, PEU_W02 PEU_U01, PEU_U02 PEU_K01	Measurement of preparation for discussion, solutions to case studies, evaluation of the student's own work, written tests
F2	PEU_W01, PEU_W02 PEU_U01, PEU_U02	Final test
F3	PEU_W01, PEU_W02 PEU_U01, PEU_U02	Written exam
P (Lecture) = F3 P (Classes) = 0,5*F1+0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Mankiw, N. Gregory; Taylor, John B. (2015), *Mikroekonomia*, Warszawa, Państwowe Wydawnictwo Ekonomiczne.

[2] Mankiw, N. Gregory; Taylor Mark P. (2016), *Makroekonomia*, Warszawa, Państwowe Wydawnictwo Ekonomiczne.

[3] Samuelson P.A., Nordhaus W.D.(2012), *Ekonomia*, Warszawa, PWN.

SECONDARY LITERATURE:

[1] Hall, Robert E.; Taylor, John B. (2000), Makroekonomia, Warszawa: Państwowe Wydawnictwo Naukowe.

[2] *Podstawy ekonomii*, pod red. Milewskiego R., Kwiatkowskiego E. (2018), Warszawa, Wydawnictwo Naukowe PWN.

[3] Samuelson F. W., Marks S.(2008), *Ekonomia menedżerska*, Warszawa, PWE.

[4] Varian, Hal R. (2021): *Mikroekonomia. Kurs średni - ujęcie nowoczesne,* Warszawa, Wydawnictwo Naukowe PWN.

[5] Czarny, B., Czarny, E., Bartkowiak, R., Rapacki R., *Podstawy ekonomii*, (2010), Warszawa, PWE

SUPERVISOR (IMIĘ, NAZWISKO, ADRES E-MAIL)

Małgorzata Rutkowska, malgorzata.rutkowska@pwr.edu.pl

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Logika pragmatyczna dla inżynierów
Name of subject in English: Pragmatic logics for engineers
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0003
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**	**15**			
Number of hours of total student workload (CNPS)	**25**	**50**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**2**			
including number of ECTS points for practical classes (P)		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

SUBJECT OBJECTIVES

C1. Showing the classic propositional calculus, predicate calculus and basis of the set and relation theory.
C2. Presentation of basic inference rules and methods of theorem proving.
C3. Acquiring the ability to formulate sentences logically correct.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 - Has basic knowledge of logic and set theory.
PEU_W02 – Knows basic methods to prove the correctness of reasoning.

relating to skills:

PEU_U01 – Can recognize correct and incorrect reasonings.
PEU_U02 – Can draw the correct conclusions from the assumptions made.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Propositional calculus	2
Lec 2	Tautologies of propositional logic	2
Lec 3	Propositional proofs	2
Lec 4	Predicate calculus	2
Lec 5	Predicate calculus	2
Lec 6	Algebra of sets	2
Lec 7	Cartesian products and relations	2
Lec 8	Written test	1
	Total hours	15

Classes		**Number of hours**
Cl 1	Propositional calculus	2
Cl 2	Propositional calculus, propositional proofs.	2
Cl 3	Propositional calculus, propositional proofs.	2
Cl 4	Predicate calculus.	2
Cl 5	Predicate calculus.	2
Cl 6	Sets and relations.	2
Cl 7	Sets and relations.	2
Cl 8	Preparation for the test	1
	Total hours	15

TEACHING TOOLS USED
N1. Presentation N2. List of tasks

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written test
F2	PEU_W01 PEU_W02 PEU_U01 PEU_U02	Soving tasks
P (Lecture) = F1 P (Classes) = 0.8 F1 + 0.2 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Słupecki, K. Hałkowska, K. Piróg-Rzepecka, Logika i teoria mnogości, PWN, Warszawa 1994.

[2] B. Stanosz. Wprowadzenie do logiki formalnej. PWN, 2016.

[3] B. Stanosz. Ćwiczenia z logiki. PWN, 2005.

SECONDARY LITERATURE:

[1] H. J. Gensler. Introduction to logic. Routledge Taylor and Francis Group. New York 2002

[2] K. Ross, C. Wright. Discrete mathematics. Prentice Hall 2002.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Prawo dla inżynierów
Name of subject in English: Law for engineers
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0004
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**			
Number of hours of total student workload (CNPS)	**30**	**25**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**1**			
including number of ECTS points for practical classes (P)		**1**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. General knowledge of society, economy, law and state

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SUBJECT OBJECTIVES

C1To acquaint students with the basic knowledge of the law, especially legal regulations concerning the business activity of enterprises
C2 Discussion of legal responsibility's formal and organizational aspects - professional engineer in the business.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 has basic knowledge in the field of legal conditions needed to understand and solve elementary problems of a social nature occurring in business
PEU_W02 has the basic knowledge necessary to understand the legal requirements of engineering activities

relating to skills:
PEU_U01 can analyze the causes and dynamics of phenomena in the organization and its environment in the market economy conditions and the applicable economic and legal regulations. Can identify and analyze typical management and content-related problems in the organization and its functional areas
PEU_U02 can identify - at the basic level, typical management and substantive issues in the organization and its functional areas. Can formulate alternative solutions to them, justify, make a choice, and verify them according to the established priorities. Can plan actions aimed at solving them
PEU_U03 is able to identify legal aspects of his/her engineering and managerial activities
relating to social competences:
PEU_K01
is prepared to initiate changes in the workplace and participate in their planning and implementation
PEU_K02
is able to interpret the legal effects of engineering activities

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussing the organization of the course and the rules of completing the course The concept, essence and significance of legal provisions in business activity of enterprises.	**1**
Lec 2	Organizational and legal forms of enterprises - general characteristics	**2**
Lec 3	Legal aspects of engineering entrepreneurship	**2**
Lec 4	Typology and review of contracts in trade	**2**
Lec 5	Legal and practical aspects of the rules of interpreting contracts used in business activity of enterprises	**2**
Lec 6	Legal status of engineering projects	**2**
Lec 7	The process of implementing engineering projects - legal and organizational aspects	**2**
Lec 8	Protection of design, technical and utility documentation	**2**
Lec 9	Public procurement law - tender procedures and their importance in the economic activity of the enterprise	**2**
Lec 10	Legal issues of "public" and "private" tender procedures	**2**
Lec 11	Elements of labor law of engineers	**2**
Lec 12	Engineering qualifications in the light of national and European regulations	**2**
Lec 13	Engineer manager - technical leader, people management	**2**
Lec 14	Legal and professional responsibility of an engineer	**2**
Lec 15	Written knowledge test	**2**
	Total hours	**30**

Classes	**Number of hours**

Cl 1	Overview of the organization and rules for passing the course Introduction to the subject of contracts	1
Cl 2	Employment contracts in the light of applicable law. Characteristics of civil law contracts	2
Cl 3	A management contract as the basis for the employment of an engineer	2
Cl 4	Disciplinary and professional responsibility of an engineer	2
Cl 5	Legal status and duties of an engineer in project management in FIDIC procedures - formal and legal issues	2
C 6	The engineer's tort and contractual liability in the implementation of investment projects	2
C 7	Legal aspects of the ethical performance of the engineering profession. Code of Professional Ethics for Engineers	2
C 8	Written test	2
	Total hours	15

TEACHING TOOLS USED
N1. presentations N2. case studies N3. discussion

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written knowledge test
F2	PEU_U01 PEU_U02 PEU_U03 PEU_K01 PEU_K02	Written test
P lecture = F1 P classes = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Furnier Camille, Od inżyniera do menedżera.Tajniki lidera zespołów technicznych, Wyd. Onepress
Warszawa, 2017.
[2] FIDIC/SIDIR, Warunki kontraktowe dla budowy: dla robót inżynieryjno-budowlanych projektowanych przez zamawiającego, Kraków 2005.
[3] Terlecki E., Szok N., Prawo pracy w praktyce, Wyd. C.H. Beck Warszawa 2015.

SECONDARY LITERATURE:

[1] Kidyba A., Umowy w obrocie gospodarczym, Wyd. Wolters Kluwer, Warszawa 2015.
[2] Masłyk-Musiał E. Rakowska A., Krajewska-Bińczyk E., Zarządzanie dla inżynierów, PWE Warszawa 2012.
[3] .Kruszewska M. Nowoczesny inżynier, Wyd. KaBe, Warszawa 2020.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Hurtownie danych
Name of subject in English: Data warehouses
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code W08IZZ-SI0008
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**30**		
Number of hours of total student workload (CNPS)	**75**		**50**		
Form of crediting	Examination		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	**3**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points for direct teacher-student contact (BU) classes	**0,84**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has a basic knowledge of business management and decision making process. He has a general knowledge of information technics in management.
2. Student know basic software for solving management problems, specially relational database management system.
3. Student has a basic practical skills in SQL software.

SUBJECT OBJECTIVES

C1. Knowledge acquisition for a concept and an organisation a typical data warehouse
C2. Learning selected problems in designing, developing and using data warehouse as a component architecture supporting business management, especially its role in the decision-making process.
C3. Getting basic skills of designing, creating and using data warehouse as a component architecture supporting a decision-making process in the selected database management system.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01: Student has a basic knowledge in designing, developing and using data warehouse, during the decision-making process of a selected business decision by the selected database management system.

relating to skills:

PEU_U01: The student, in the environment of the database management system: (i) can identify and analyze the needs of business decision makers in the designing, developing and using data warehouse and (ii) can design, create and use data warehouses to solve selected problems of decision making.

relating to social competences:

PEU_K01: The student is able to independently enlarge his knowledge and engineering skills in designing, developing and using data warehouse to solve selected business decision problems.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discuss the organization and content of the course and the rules for the exam. Introduction to decision making aided IT, business case and the concept of data warehouse (DW) and data processing OLTP/OLAP.	**2**
Lec 2	Multidimensional basic data models in DW	**2**
Lec 3	Introduction to the DW environment (database management system, SQL)	**1**
Lec 4	The problems of designing and developing DW, DW architecture, ETL processes and other mechanisms to support work of DW	**2**
Lec 5	Metadata in DW and the base of the query language to DW	**2**
Lec 6	Design and development of DW in the selected system - defining business requirements, data sources, and creating data cubes	**2**
Lec 7	Design and development of DW in the selected system - preparation of business analysis	**2**
Lec 8	Design and development of DW in the selected system - creating reports	**2**
	Total hours	**15**

Laboratory		**Number of hours**
Lab 1	Introduction to the activities (including safety training)	**1**
Lab 2	Understanding the work environment laboratory, analysis of standard data warehouse (SDW) and its data sources	**2**
Lab 3	Analysis of the basic structures in a standard data warehouse (SDW): The structure of snowflake and star	**1**
Lab 4	Fundamentals of Integration Services in the SDW: identification, acquisition, integration, storage and sharing of multi-dimensional data in the decision-making process	**2**

Lab 5	Fundamentals of Analysis Services SDW: analysis data cubes, dimensions, partitions, aggregations, perspectives and KPI	**2**
Lab 6	Fundamentals of Reporting Services in the SDW: data analysis and reporting	**2**
Lab 7	Navigating the aggregations, the base query language for data warehousing and OLAP components	**3**
Lab 8	A test on the computer	**1**
Lab 9	Analysis of the needs of the decision maker, data sources and decision support in designed data warehouse (CDW)	**2**
Lab 10	The design and implementation of the basic structure of the data in the CDW	**2**
Lab 11	The design and implementation of Integration Services in CDW: identification, acquisition, extraction, transformation, integration and loading data to CDW from data sources	**2**
Lab 12	The design and implementation of Analysis Services in CDW: creating data cubes, dimensions, partitions, aggregations, perspectives and KPI	**3**
Lab 13	The design and implementation: creating reports	**2**
Lab 14	The design and implementation: creating graphs and pivot tables	**3**
Lab 15	Examination of laboratory work at the computer	**2**
	Total hours	**30**

TEACHING TOOLS USED
N1. Multimedia presentation N2. Software: MS Access, MS Excel, MS Visio, SQL Server N3. Laboratory instruction. N4. Project documentation template. N5. Web pages with descriptions of teaching activities

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating educational effect achievement
F1: attendance		presence
F2: activity	PEU_U01, PEU_K01,	Rating for: answering questions, asking questions and proposing solutions to partial problems
F3: DW structure identification report	PEU_U01, PEU_K01,	Rating for the report on the identification of the warehouse structure – Task1
F4: DW operation report	PEU_U01, PEU_K01,	Assessment for documentation of aggregation in a data warehouse – Task2
F5: exam	PEU_W01	Assessment of the test
P (lecture) = F5 P (laboratory) = 0,08*F1 + 0,09*F2 + 0,43*F3 + 0,40*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Chodkowska-Gyurics A. Hurtownie danych, PWN, Warszawa, 2020.
[2] Todman Ch., Projektowanie hurtowni danych, Wyd. WN-T, 2003.
[3] Paulraj Ponniah, Data warenhousing. Fundamentals for IT Professionals, Wiley, 2010

SECONDARY LITERATURE:

[1] Jarke M., Lenzerini M., Vassiliou Y., Vassiliadis P., Hurtownie danych. Podstawy organizacji i funkcjonowania. WSiP, Warszawa, 2003
[2] Poe V., Klauer P., Brobst S., Tworzenie hurtowni danych, WN-T, 2000
[3] Surma J., Business intelligence Systemy wspomagania decyzji biznesowych, PWN, Warszawa, 2009
[4] Januszewski A., Funkcjonalność informatycznych systemów zarządzania. Systemy business intelligence, Wyd. Nauk. PWN, Warszawa 2008
[5] Knight G., Excel. Analiza danych biznesowych. Wyd. HELION, Gliwice, 2006.
[6] Larose D.T., Odkrywanie wiedzy z danych. Wprowadzenie do eksploracji danych. , Wyd. Nauk. PWN, Warszawa 2006
[7] Paulraj Ponniah, Data warenhousing. Fundamentals for IT Professionals, Wiley, 2010
[8] Radosiński E., Systemy informatyczne w dynamicznej analizie decyzyjnej, Wyd. PWN, 2001.
[9] Sej-Kolasa M., Zielińska A., Excel w statystyce, Wyd.. AE, Wrocław, 2004, ss. 112-141
[10] Surma J., Business intelligence. Making Decisions trough Data Analytics, Business Expert Press, New York, 2011
[11] Urban W., Siemieniako D., Lojalność klientów, PWN, Warszawa, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Ochrona własności intelektualnej
Name of subject in English: Protection of intellectual property
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0009
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**			
Number of hours of total student workload (CNPS)	**50**	**25**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**2**	**1**			
including number of ECTS points for practical classes (P)		**1**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. General knowledge of invention and innovation

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SUBJECT OBJECTIVES

C1 To introduce students to the basic knowledge of institutional intellectual property protection.
C2 Discuss basic national, European and international procedures concerning the protection of knowledge resources in an organization.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01
explains the basic concepts and principles of intellectual property protection. Knows, understands and justifies the role of intellectual property protection in the development of science and economy

PEU_W02
characterizes the essence and forms of entrepreneurship and identifies its formation and development premises. Explains the concept of innovation and distinguishes between their types. Recognizes the features and conditions of innovation in an organization. Describes the innovative process taking place in the organization
relating to sills:
PEU_U01
Can identify and interpret the legal aspects of his engineering and managerial activities
PEU_U02
can, when formulating and solving engineering tasks related to innovative processes, see their systemic aspects and use appropriate legal, professional and moral norms and standards
relating to competences:
PEU_K01
Can identify and interpret the legal aspects of his/her engineering activities systemic aspects and use appropriate legal, professional and moral norms and standards

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussion and topics of the course and credit policy Subjects of intellectual property protection - overview of basic categories of intellectual property. Purpose and scope of protection	**2**
Lec 2	Institutionalization of Intellectual Property protection - a review of basic national, European and international legal regulations concerning intellectual property protection	**2**
Lec 3	Characteristics of Intellectual Property categories - works, inventions, utility models, industrial designs, trademarks, geographical indications, topography of integrated circuits	**2**
Lec 4	Managing Intellectual Property in a company - the essence of intellectual property management (in connection with knowledge management)	**2**
Lec 5	The place of intellectual property in corporate management strategy . Goodwill and Intellectual Property	**2**
Lec 6	National and international experience in managing intellectual property - case study (economic and legal aspects). Examples of companies' activities in the field of Intellectual Property. Selected international examples of tools supporting IP management.	**2**
Lec 7	Financing of intellectual property protection.	**2**
Lec 8	Protection of know-how and commercial information in a company.	**2**
Lec 9	Non disclosure agreements - NDA and their meaning in company's market activity.	**2**
Lec 10	Technology transfer.	**2**
Lec 11	Agreements in the field of intellectual property - review and characteristics of basic agreements	**2**
Lec 12	Analysis of selected contractual clauses in contracts in the field of intellectual property against the background of the freedom of contract principle	**2**
Lec 13	Specialist judiciary in the field of intellectual property	**2**
Lec 14	Resolution of disputes concerning intertextual property	**2**

Lec 15	Written credit in the form of a test	**2**
	Total hours	**30**

Classes		**Number of hours**
Cl 1	Discussion and topics of the course and credit policy Introduction to intellectual property	1
Cl 2	Intellectual property system	2
Cl 3	How intellectual property can be used - franchising, outsourcing, licensing. Financial and tax benefits - IP Box. Competitiveness through the IP system and market value of the company. IP management based on corporate objectives. Building competitive advantages. Principles of taking care of one's own and others' IP - state of the art research.	2
Cl 4	Employees' intellectual property.	2
Cl 5	Designing management processes and model documentation for IP protection in a company.	2
C 6	Cost/benefit analysis of property protection.	2
C 7	Independent preparation of procedure in the field of intellectual property protection based on the example of a selected company.	2
C 8	Credit on the basis of a prepared project	2
	Total hours	15

TEACHING TOOLS USED
N1. multimedia presentations N2. scripts N3. case study N4. group work with the presentation of the results

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written test
F2	PEU_W01 PEU_W02 PEU_U01 PEU_U02 PEU_K01	Preparation and presentation of the project
P lecture = F1 P classes = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Dereń A.M., Zarządzanie własnością intelektualną w transferze technologii, Wyd. Difin, Warszawa 2014
[2] Niewęgłowski A., Nowak I., Własność intelektualna w działalności gospodarczej, Wyd. C.H. Beck, Warszawa 2017.
[3] Wetoszka D., Prawo własności intelektualnej, Wy. C.H. Beck, Warszawa 2019.

SECONDARY LITERATURE:

[1] Szczepanowska-Kozłowska K., Własność intelektualna. Wybrane zagadnienia praktyczne, .Wyd. LexisNexis Warszawa 2013.
[2] Michniewicz G., Ochrona własności intelektualnej, Wyd. C.H. Beck, Warszawa 2019, wyd.4.
[3] Nowak-Gruca A., Własność intelektualna w przedsiębiorstwie, Wyd. Ośrodek Doradztwa i Doskonalenia Kadr, Warszawa 2018.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Rachunek prawdopodobieństwa
Name of subject in English: Probability theory
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0010
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**			
Number of hours of total student workload (CNPS)	**75**	**25**			
Form of crediting	**Crediting with grade**	**Crediting with grade**			
For group of courses mark final course with (X)					
Number of ECTS points	**3**	**1**			
including number of ECTS points for practical (P) classes		**1**			
including number of ECTS points for direct teacher-student contact (BU) classes	**1,2**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Competences acquired in the course: Calculus

SUBJECT OBJECTIVES

C1 Knowledge of theory probability that can be used in the description of uncertainty.
C2 The ability to build probabilistic models and their interpretation in the context of management problems.

SUBJECT LEARNING OUTCOMES

relating to knowledge:
PEU_W01 – Broad knowledge of the concepts of probability and the tools used in the analysis of uncertain data.

relating to skills:
PEU_U01 – Ability to build and interpret simple probabilistic models supporting the management process.

PROGRAM CONTENT		
Lectures		**Number of hours**
Lec 1	Conditions of obtaining credit. Fundamentals of set theory and combinatorial analysis.	2
Lec 2	Experiment, event space, event. Axiomatic definition of probability.	2
Lec 3	Independence of events and conditional probability. Bayes' rule and the law of total probability.	2
Lec 4	One-dimensional random variable: probability distribution, cumulative distribution function, density function.	2
Lec 5&6	Selected continuous and discrete distributions. Expected value and variance.	4
Lec 7	Characteristics of the random variable: central moments and ordinary moments, median and quartile. Coefficients of variation, skewness and kurtosis.	2
Lec 8	Multivariate random variable. Joint and marginal distribution.	2
Lec 9	Conditional distributions and independence of random variables. Distribution of the sum of independent random variables.	2
Lec 10	Expected value, covariance and correlation.	2
Lec 11	Conditional expectation and variance. First and second order regression lines.	2
Lec 12	Multivariate normal distribution.	2
Lec 13	Inequalities and limit theorems.	2
Lec 14	Revision of the material.	2
Lec 15	Test	2
	Total hours	30

Classes		**Number of hours**
Cl 1	Conditions of obtaining credit, guidelines for the organization of classes. Operations on sets.	1
Cl 2	Combinatorics. Calculation of probabilities.	2
Cl 3	Conditional and total probabilities. Independence of events.	2
Cl 4&5	Distributions of univariate random variable and their applications. Selected characteristics of the random variable	4
Cl 6	Total and boundary distributions of a two-dimensional random variable.	2
Cl 7	Conditional expected value and conditional variance. Correlation.	2
Cl 8	Test	2
	Total hours	15

TEACHING TOOLS USED

N1. Presentation N2. Interactive charts N3. Case study N4. Set of exercises for individual study

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_W01	Written test
F2	PEU_U01	Written test
P(lecture)=F1		
P(class)=F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Plucińska A., Pluciński E., *Probabilistyka: rachunek prawdopodobieństwa, statystyka matematyczna, procesy stochastyczne.* Wydawnictwo Naukowo-Techniczne. Warszawa 2006.

[2] Krysicki W., Bartos J., Dyczka W., Królikowska K., Wasilewski M. *Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach. Część 1 – Rachunek prawdopodobieństwa*, Wydawnictwo Naukowe PWN, Warszawa 2012.

SECONDARY LITERATURE:

[1] Jakubowski, R. Sztencel, *Rachunek prawdopodobieństwa dla (prawie) każdego*, Script, Warszawa 2006.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Regulacje działalności gospodarczej
Name of subject in English: Regulations of business activities
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0011
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**			**15**	
Number of hours of total student workload (CNPS)	**50**			**25**	
Form of crediting	**Examination**			**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points	**2**			**1**	
including number of ECTS points for practical classes (P)				**1**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**			**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. basic knowledge of economics and entrepreneurship.

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SUBJECT OBJECTIVES

C1 - To teach the students about the regulatory influence of the government on the economy.
C2 - To provide students with knowledge concerning decision-making by economic entities operating on various competitive markets..
C3 - To teach the students how to prepare a business plan for new business activity.
C4 - To shape and solidify social competences consisting of the ability to act entrepreneurially and to work in a team.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 – Student knows selected theories of regulation and understands the influence of social and economic regulations and instruments of government interventionism at the national level on business activity.

PEU_W02 – Student knows and understands economic conditions of undertaking and conducting business activity in a competitive market.

relating to skills:

PEU_U01 – Student can prepare in Polish language a well-documented business plan for the proposed business activity.

PEU_U02 – Student can make micro and macro environment analysis, financial analysis and risk analysis of the proposed business activity.

PEU_U03 – Student can identify and interpret the consequences of substantive and managerial decisions concerning the selected activity.

relating to social competences:

PEU_K01 – Student is ready to take responsibility for the tasks entrusted to him. Can appropriately determine priorities in his/her own work and in cooperation with others..

PEU_K02 – Student is able to think and act in entrepreneur manner.

PROGRAMME CONTENT

	Lecture	**Number of hours**
Lec 1	Presentation of the rules of work in class. **Fundamentals of regulation theory.** Definitions of regulation, social and economic regulation. State interventionism.	2
Lec 2	**The theory of regulation - part I.** Normative approach, theories of regulation as action in pursuit of the public interest, market failures.	2
Lec 3	**The theory of regulation – part II.** Positive approach, theories of regulation as a result of interest group pressure, including economic theory of regulation	2
Lec 4	**Starting a business.** The Business Constitution Act, forms of business activity, forms of taxation, Polish classification of activity, company registration procedure, concessions and permits.	2
Lec 5	**Decision making in companies.** Macro-environmental analysis - PESTLE, SWOT, venture risk analysis.	2
Lec 6	**Calculation of total addressable market.** Market segmentation, building a profile of the end user, addressable market. Case studies.	2
Lec 7	**Financial analysis of a business.** Contribution margin calculation, revenue and cost analysis, break-even point calculation. Case studies.	2
Lec 8	**Market structure.** Basic market structures, market structures of suppliers and market structures of sellers, characteristics of the product and market structure, conditions of entrance on the market and conditions of existence on the market.	2
Lec 9	**Monopoly.** Main principles, natural monopoly and government monopoly, barriers of entry, concessions, differentiation of prices, social surplus, deadweight losses	2
Lec 10	**Regulation of monopoly.** The role of the government in economy, anti-trust policy in USA, UE and Poland, withdrawal from monopoly, examples of regulatory actions.	2

Lec 11	**Oligopoly.** Main principles, competition or cooperation (collusion), the game theory, Cournot, Stackelberg and Bertrand oligopoly, prisoners' dilemma.	2
Lec 12	**Regulation of companies actions on oligopoly market.** Rules of regulations, regulations instruments (tools), examples of regulatory actions.	2
Lec 13	**Measurement of concentration.** Concentration ratio, Herfindahl-Hirschman Index, Lehrner Index, contestable market, dominant firm theory, entry deterrence.	2
Lec 14	**Cost Benefit Analysis.** Principles and methods of analysis, application of CBA to regulation, social dimension of CBA.	2
Lec 15	**The impact of regulation on businesses** – case studies.	2
	Total hours	**30**

Project		**Number of hours**
Pr1	Presentation of the principles of work in the classroom.	1
Pr2	Choice of organisational and legal form of activity, choice of location, description of qualifications and competencies of employees, regulated activity	2
Pr3	Analysis of competition for the chosen activity	2
Pr4	Market analysis, including calculation total addressable market for the selected activity	2
Pr5	Marketing plan for the selected activity	2
Pr6	Financial analysis of the business, calculation of the break-even point	2
Pr7	Analysis and risk assessment of the chosen activity, SWOT or PESTLE analysis	2
Pr8	Short multimedia presentations prepared by students	2
	Total hours	15

TEACHING TOOLS USED
Lecture: N1 – information lecture, N2 – multimedia presentation, N3 – problematic lecture, N4 – case studies. Project: N5 – work in group/team N6 – problem tasks, workshops, problematic discussion, N7 – multimedia presentation of business idea.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
P1	PEU_W01, PEU_W02	examination
F1	PEU_W02, PEU_U01, PEU_U02, PEU_U03, PEU_K01, PEU_K02	partial assignments handed in before the class and activity during the class

F2	PEU_W02, PEU_U01, PEU_K01	evaluation of the written version of the business plan
F3	PEU_W02, PEU_U02, PEU_U03, PEU_K01	evaluation for the presentation of the business idea
Lecture: P1 Project: P2 = 0,7*F1 + 0,05*F2 + 0,25*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Red A.N., Business regulation and public policy: the costs and benefits of compliance. New York : Springer Science+Business Media, 2009.
[2] Surdej A., Determinanty regulacji administracyjnoprawnych w oddziaływaniu państwa na gospodarkę. Wydawnictwo Akademii Ekonomicznej, Kraków, 2006.
[3] Tokarski A., Tokarski M., Wójcik J., Biznes plan w praktyce. Wyd. IV, CeDeWu, Warszawa, 2020.

SECONDARY LITERATURE:

[1] Baye M., Prince J.T., Managerial Economics & Business Strategy. McGraw-Hill Education, 2017.
[2] Ferrell O.C., Hirt G.A., Ferrell L., Business. A changing world. Ninth Edition. McGraw-Hill Irwin, New York, 2014.
[3] Markowski W.J., ABC small business'u. Wyd. MARCUS s.c., Łódź, 2012.
[4] Opolski K., Waśniewski K.A., Biznes plan : jak go budować i analizować? CeDeWu, Warszawa, 2007.
[5] Samuelson P.A., Nordhaus W.D., Ekonomia, REBIS, Poznań 2012.
[6] Szpringer W., Regulacja konkurencji a konkurencja regulacyjna: ujęcie instytucjonalne. Poltext, Warszawa, 2010.
[7] Webster T.J., Managerial Economics: Tools for Analyzing Business Strategy. Lexington Books, London, 2015.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Technologie internetowe
Name of subject in English: Internet technologies
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0012
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**15**		**15**
Number of hours of total student workload (CNPS)	**25**		**50**		**25**
Form of crediting	**crediting with grade**		**crediting with grade**		**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points	**1**		**2**		**1**
including number of ECTS points for practical classes (P)			**2**		**1**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**0,6**		**0,6**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
None

SUBJECT OBJECTIVES
C1 Acquire knowledge and skills in the field of functioning and capabilities of modern information and Internet technologies.
C2 Acquire knowledge and skills in the field of applications of Internet technologies in supporting the management of modern organizations and in the engineer-manager job.

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEU_W01 Has knowledge of the fundamentals of computer networks, Internet and cloud technologies and their applications in organizations and in the engineer-manager job, nowadays and future trends.
relating to skills:

PEU_U01 Can obtain and present information necessary to identify modern technologies, can compare suppliers' offers on the market and match them to the needs of the organization.

PEU_U02 Can identify the features, advantages, disadvantages and applications of existing Internet and cloud technologies and can implement selected solutions to support the functioning of organizations and engineer-manager job.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec1	Introduction to the lecture. Discussing the conditions of obtaining credit.	1
Lec2	Computer networks, network protocols, Internet, network diagnostics.	2
Lec3	Security of communications, data, networks.	2
Lec4	Security pt 2: encrypting data and communications. Electronic signature.	2
Lec5	Client-server and three-layer architecture. Web applications. Server hosting and domain registration services.	2
Lec6	Application servers, platforms and tools for launching and programming web applications. Network databases.	2
Lec7	Overview of features and applications of web and cloud applications and services in management and in the engineer's job.	2
Lec8	Crediting	2
	Total hours	15

Laboratory		**Number of hours**
Lab1	Discussion of laboratory tasks, credit conditions, working environment and safety rules in the computer lab.	1
Lab2	Task 1: computer network diagnostics; secure communications.	2
Lab3	Task 1: presentation of students and discussion of results.	2
Lab4	Task 2: application servers, hosting services, programming tools.	2
Lab5	Task 2: presentation of students and discussion of results.	2
Lab6	Task 3: individual or team project in the field of Internet technologies (web application, cloud service, e-commerce etc.).	4
Lab7	Task 3: presentation of students and discussion of results.	2
	Total hours	15

Seminar		**Number of hours**
Se1	Introduction to the seminar. Discussing the conditions of obtaining credit. Assignment of topics for presentations.	1
Se2	Computer networks - network devices, VPN, access control and traffic filtering, monitoring and blocking access to non-work related websites.	2
Se3	Security - monitoring of facilities, employees, infrastructure, WiFi and GSM traffic, communications, documentation; security policy.	2
Se4	Communications - Internet electronic communication technologies, audio/video transmissions, teleconferences, VoIP Internet telephony.	2

Se5	Remote and group work - Internet technologies of remote work, virtual environments and teamwork support.	2
Se6	E-economy - e-business and e-society in Poland and worldwide. Social networks in management and marketing. Website positioning.	2
Se7	Applications - web, cloud and mobile applications in engineer and managerial jobs.	2
Se8	Trends - directions of Internet technologies development, e.g. Internet of things (IoT), digital currency etc.	2
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture using multimedia presentations, videos and demonstrations N2. Task lists to be performed individually or in teams, in the computer lab and at home N3. Discussion of the effects (or reasons of failure) during the presentation of the student's work results N4. Presentation prepared by students (slides or software demo) N5. Discussion.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01	Final test
F2	PEU_W01, PEU_U01, PEU_U02	Evaluation of the results of the tasks and understanding of their issues (during the presentation and discussion of the results)
F3	PEU_W01, PEU_U02	Evaluation of task reports (way of performing tasks and final conclusions)
F4	PEU_W01, PEU_U01	Evaluation of preparation and delivery of presentation
F5	PEU_W01, PEU_U01	Evaluation of participation in seminar discussion
F6	PEU_W01, PEU_U01, PEU_U02	Recognition bonus
F7		Class attendance and activity
P(lecture) = 0,8*F1 + 0,2*F7 P(laboratory) = 0,7*F2 + 0,1*F3 + 0,1*F6 + 0,1*F7 P(seminar) = 0,7*F4 + 0,2*F5 + 0,1*F7		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Bradford R., Podstawy sieci komputerowych, WKŁ 2019. [2] Liderman K., Bezpieczeństwo informacyjne, WN PWN 2020.

[3] Ciborowska A., Lipiński J., WordPress 5 dla początkujących, Helion 2019.

SECONDARY LITERATURE:

[1] Strony internetowe dostawców oprogramowania/usług oraz vortale technologiczne.
[2] Kołodziej M., Kluska M., Litwiński P., Wanio G., Vademecum administratora Bepieczeństwa Informacji, Beck 2016.
[3] Castells M., Społeczeństwo sieci, WN PWN 2020.
[4] Rosenberg J., Mateos A., Chmura obliczeniowa. Rozwiązania dla biznesu, Helion 2021.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Wprowadzenie do optymalizacji
Name of subject in English: Introduction to optimisation
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0013
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**	**15**			
Number of hours of total student workload (CNPS)	**25**	**50**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**2**			
including number of ECTS points for practical classes (P)		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competences corresponding to the courses: mathematical analysis, logic for engineers

SUBJECT OBJECTIVES

C1. To acquaint students with basic mathematical tools used in optimization.
C2. Defining the optimization problem and presenting its basic properties.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Has knowledge of basic mathematical methods used in optimization.
PEU_W02 Has a basic knowledge of optimization models and their properties.

relating to skills:
PEU_U01 Can use the mathematical methods used in optimization to solve engineering problems.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1-2	Introduction to the course. Matrix operations	3
Lec 3	Solving systems of linear equations	2
Lec 4	Gradient and Hessian of functions. Checking the convexity of functions	2
Lec 5	Unconstrained optimization problems. Local and global extrema. Optimality conditions	2
Lec 6-7	Constrained optimization problems. The Lagrangian function. Kuhn-Tucker optimality conditions	4
Lec8	Applications of optimization models in management	2
	Total hours	**15**

Classes		**Number of hours**
Cl 1-2	Solving problems related to operation on matrices	3
Cl 3	Solving systems of linear equations	2
Cl 4	Calculation of the gradient and Hessian of functions. Checking the convexity of functions	2
Cl 5	Solving unconstrained optimization problems	2
Cl 6-7	Solving constrained optimization problems	4
Cl 8	Written test	2
	Total hours	**15**

TEACHING TOOLS USED
N1. Presentation N2. List of tasks

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written test
F2	PEU_W01 PEU_W02 PEU_U01	Solving tasks
P (Lecture) = F1 P (Classes) = 0.8 F1 + 0.2 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Teresa Jurlewicz, Zbigniew Skoczylas. Algebra Liniowa 1. Definicje, twierdzenia, wzory. Oficyna Wydawnictwa GiS, Wrocław 2007.
2. Ronald R. Radin. Optimization in Operations Research. Pearson 2017.
3. J. K. Sharma. Operations Research. Theory and Applications. Trinity Press 2017.

SECONDARY LITERATURE:

4. Teresa Jurlewicz, Zbigniew Skoczylas. Algebra Liniowa 1. Przykłady i zadania. Oficyna Wydawnictwa GiS, Wrocław 2007
5. S. Boyd, L. Vandenberghe. Convex Optimization. Cambridge University Press 2009.
6. Zbiór zadań z programowania matematycznego, cz. II, pod red. Z. Galasa, I. Nykowskiego, PWN, Warszawa 1988
7. E. K. P. Chong, S. H. Żak. An Introduction to Optimization. Wiley 2013

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zachowania organizacyjne
Name of subject in English: Organizational behaviour
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0014
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**				**15**
Number of hours of total student workload (CNPS)	**50**				**25**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points	**2**				**1**
including number of ECTS points for practical (P) classes					**1**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU	**1,2**				**0,6**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Completed course aimed on Theory of Organization and Management.

SUBJECT OBJECTIVES

C1 Understanding the essence and correctness of organizational behavior.
C2 Identification of organizational behavior's conditions and assessment of their impact on the functioning of the organization
C3 Managing the organizational behavior of modern organizations

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Knows the importance and goals shaping organizational behavior.
PEU_W02 Knows the determinants of organizational behavior and understands their impact on the functioning of the organization.
PEU_W03 Knows the models and mechanisms of their operation regarding the creation and change of organizational and inter-organizational behavior.

relating to skills:

PEU_U01 Is able to identify key factors shaping organizational behavior and understand the impact of the environment on the activities of the organization

PEU_U02 Is able to use the sets of tools for shaping organizational behavior in practice.

relating to social competences:

PEU_K01 Is oriented to ethical behavior and responsible in specific situations in the practice of the functioning of the organization.

PEU_K02. Is aware of the requirement to spend time and effort to assess the situation affecting organizational behavior.

PEU_K03 It has a reliable perception of relations between the supervisor and subordinates and between employees.

PROGRAMME CONTENT		
Lectures		**Number of hours**
Lec 1	Organization and principles of realization and completion of the lecture. Genesis and sense of organisational behavior.	2
Lec 2	Organisational behavior features. Definitions and their interpretation.	2
Lec 3	The behavior of an individual in the organization. Solidarity and cohesion in the group.	2
Lec 4	Group behavior in the organization. Conflicts (inside and between groups) and their solutions.	2
Lec 5	Inter-organizational behavior. Integration and competition	2
Lec6	Basic relations of the organization with the environment. Cooperation.	2
Lec7	Strategic reactions of the organization to the environment.	2
Lec8	Methods and techniques of shaping behaviors and organizational attitudes.	2
Lec9	Leadership and management styles. Leader competence profile.	2
Lec10	Relational capital in the organization - networks, relationships and communication processes. Communication tools.	2
Lec11	Individuals and changes in the organization. Negotiations vs. resisting changes. Methods and styles of negotiations.	2
Lec12	Fatigue, fatigue, discouragement and burnout - causes, manifestations, overcoming.	2
Lec13	Ethics of behavior in the organization. Organizational culture. Corporate social responsibility.	2
Lec14	Evaluation of student's knowledge - exam	2
Lec15	Presenting and discussing the results of the exam.	2
	Total hours	30

Seminar		**Number of hours**
Sem 1	Organization and rules of completion and passing the course.	1

Sem 2	Leadership in organization. Organizational behavior and leadership in an international organization.	2
Sem 3	Solidarity in the organization, or about the cohesion of the group and organization. Together or separately, that is individualism vs group activities and the efficiency, efficiency and cohesion of the organization.	2
Sem 4	The importance of organizational culture for shaping behavior in the organization. Is there a global culture, or about the penetration of cultures in the organization.	2
Sem 5	Communication in the organization. Motivating in the organization.	2
Sem 6	Making decisions in the organization. Conflicts in the organization.	2
Sem 7	Failures in shaping organizational behavior. A worker difficult in organization - the role of the group and leadership.	2
Sem 8	Ethical standards in the organization. Pathology in organization.	2
	Total hours	15

TEACHING TOOLS USED
N1. Problem lecture with the use of a multimedia presentation N2. Group work N3. Case studies N4. Group discussion

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01,PEU_W02, PEU_W03	Final test
F2	PEU_W02, PEU_W03, PEU_U01, PEU_U02	Measurement of presentation preparation
F3	PEU_W01,PEU_W02, PEU_W03, PEU_K01,PEU_K03	Measuring the preparation for a panel discussion
F4	PEU_W02, PEU_K02	Measuring the preparation of own studies
P lecture=F1 P seminar= 0,35F2 +0,35F3 +0,3F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Biesok G., Wyród-Wróbel J. (red.), Człowiek w organizacji, Wydawnictwo CeDeWu, 2021
[2] Gros U. ,Zachowania organizacyjne w teorii i praktyce, PWN, Warszawa, 2021
[3] Robbins S.P., Zachowania w organizacji, PWE Warszawa 2004

SECONDARY LITERATURE:

[1] Bednarska-Wnuk I., Michalak J.M, Świątek-Barylska I., Zachowania organizacyjne. Organizacja jako przestrzeń kształtowania zachowań pracowników, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 2015
[2] Kmiotek K., Piecuch T., Zachowania organizacyjne. Teoria i przykłady, Difin, Warszawa 2012
[3] Kołodziejczak M., Czajkowska M., Januszkiewicz K., Zachowania organizacyjne Relacje społeczne w przestrzeni zmian, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 2015
[4] Penc J. Zachowania organizacyjne w przedsiębiorstwie, Wolters Kluwer, Warszawa 2011
[5] Szostek D., Kontrproduktywne zachowania organizacyjne w kontekście jakości relacji interpersonalnych w zespołach pracowniczych, Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika, Toruń 2019

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza systemowa i inżynieria systemów
Name of subject in English: System analysis and system engineering
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0015
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**			**15**	
Number of hours of total student workload (CNPS)	**75**			**25**	
Form of crediting	**crediting with a grade**			**crediting with a grade**	
For group of courses mark final course with (X)	**-**				
Number of ECTS points	**3**			1	
including number of ECTS points for practical (P) classes				1	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**			**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
none

SUBJECT OBJECTIVES

Providing knowledge, taking into account its application aspects and the development of basic skills regarding:
C1 - selected elements of general systems theory;
C2 - properties and workflow in system analysis;
C3 - application of selected methods of system analysis and systems engineering.

SUBJECT LEARNING OUTCOMES

Relating to knowledge:

PEU_W01: has a basic knowledge about general theory of systems

PEU_W02: understands basics of the procedure in system analysis, and the principles and the process of the systems engineering (with emphasis on the company as a system)

PEU_W03: has a knowledge about the selected methods of system analysis and systems engineering (also in relation to the analysis and the improvement of the company as a system)

Relating to skills:

PEU_U01: identifies the type and the structure of real system

PEU_U02: analyses and evaluates critically the functioning of the systems (with emphasis on the company as a system)

PEU_U03: applies the selected methods of system analysis and systems engineering (also in relation to the analysis and the improvement of the company as a system)

Relating to social competences:

PEU_K01: is ready to identify, critically analyse and solve problems arising during the execution of assigned tasks

PEU_K02: is ready to prioritize individual and team tasks and to select the methods and tools to solve assigned tasks

PEU_K03: is prepared to take responsibility for the assigned tasks

PROGRAM CONTENT

Lectures		**Number of hours**
Lec 1	Organizational information. Introduction to systems approach.	2
Lec 2-3	Systems Science and Engineering: system definitions and elements, classification of systems, systems science, transition to the *Systems Age*, systems engineering	4
Lec 4-5	Bringing Systems into Being: the engineered system, system life-cycle engineering, the systems engineering process, system design considerations, system synthesis, analysis, and evaluation, implementing systems engineering	4
Lec 6-8	The System Design Process: conceptual, preliminary, detail system design and system test, evaluation, and validation	6
Lec 9	Systems Analysis and Design Evaluation: alternatives and models in decision making	2
Lec 10	Optimization in Design and Operations Queuing Theory and Analysis	2
Lec 11	System Control Concepts and Methods	2
Lec 12	Design for Operational Feasibility	2
Lec 13-14	Systems Engineering Management: systems engineering planning, organization, program management, control, and evaluation	4
Lec 15	Final assessment	2
	Total hours	**30**

Project		Number of hours
P 1	Introduction – the purpose and the scope of classes, organizational issues	1
P 2	System identification	2
P 3	Identification the structural elements of the system	2
P 4	Identification the system purposes and objectives	2
P 5	Identification of the inputs and the outputs of the system	2
P 6	Engineering the lifecycle of the system	2
P 7	Evaluation of the effectiveness of the system	2
P 8	Final presentation	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Traditional lecture with multimedia presentations
N2. Questions to students during lecture
N3. Case studies
N4. Discussion of selected issues
N6. Self-study: classes preparation and final assessment preparation
N7. Presentations prepared by students

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU _U01-3 PEU _K01-3	Students' involvement during classes
F2	PEU _U01-3	Students' presentations of selected, self-solved issues
P1	Project P1=60%*F1+40%*F2	
F3	PEU _W01-3	Final test
F4	PEU _W01-3 PEU _K01	Students' involvement in discussions during lecture
P (Project)=60%*F1+40%*F2 P (Lecture)=80%*F3+20%*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Blanchard B.S., Fabrycky W.J., Systems engineering and analysis, Prentice Hall, New Jersey 2011.
[2] Senge P. M., Piata dyscyplina - teoria i praktyka organizacji uczących się, Wyd. ABC, Warszawa 1998.
[3] Łunarski J., Inżynieria systemów i analiza systemowa, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2010.

SECONDARY LITERATURE:

[1] Cempel Cz., Teoria i inżynieria systemów – zasady i zastosowania myślenia systemowego, Instytut Technologii Eksploatacji Państwowy Instytut Badawczy, Radom 2008.
[2] Liu D., Systems Engineering: Design Principles and Models, CRC Press, 2015.
[3] Kowalska-Napora E., Inżynieria systemów i analiza systemowa w zarządzaniu, Kęty: Wydawnictwo Marek Derewiecki, 2015.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Podstawy inwentyki inżynierskiej
Name of subject in English: Essentials of engineering inventics
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0016
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**			
Number of hours of total student workload (CNPS)	**50**	**25**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**2**	**1**			
including number of ECTS points for practical classes (P)		**1**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

No prerequisites

SUBJECT OBJECTIVES

C1: Getting to know inventic methods and their use to solve organizational problems.
C2. Improving the skills to initiate organizational and participation in their planning and implementation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Knows about inventic methods
PEU_W02 Knows about the methods of generating ideas, solving organizational problems
relating to skills:
PEU_U01 Can select inventic methods due to their role in the problem-solving process
PEU_U02 Can use inventic methods for real organizational problems

relating to social competences:
PEU_K01 Is prepared to initiate changes in the organization and participate in their planning and implementation

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec1-Lec2	Inventic, innovation, inventiveness.	4
Lec3-Lec4	Applications inventic methods - areas	4
Lec5-Lec6	The man in the innovation process	4
Lec7-Lec8	Leadership in the process of solving organizational problems	4
Lec9-Lec10	Review of inventic methods	4
Lec11-Lec12	Review of inventic methods	4
Lec13-Lec14	The algorithm of the invention	4
Lec 15	Summary and evaluation (test)	2
	Total hours	30

Classes		**Number of hours**
Cl 1	Rules of evaluation. Introduction	2
Cl 2-3	Free Associations techniques – selected tools	4
Cl 4-5	Forced Associations techniques – selected tools	4
Cl 6-7	Analytical Methods – selected tools	4
Cl 8	Report presentations. Summary of the classes.	1
	Total hours	15

TEACHING TOOLS USED
N1. Problem lecture with the use of a multimedia presentation N2. Case studies N3. Discussion with the participants N4. Student's work (individually and in a group)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Test
F2	PEU_U01 PEU_U02 PEU_K01	A written report on solving selected problems
F3	PEU_U01 PEU_U02 PEU_K01	Presentation of the results
P lecture = F1 P classes = 0.8*F2+0.2*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Cempel Cz., Inżynieria kreatywności w projektowaniu innowacji, WNITE, Radom 2013.
[2] Martyniak Z., Wstęp do inwentyki, Akademia Ekonomiczna w Krakowie, Kraków 1997.
[3] Proctor T., Twórcze rozwiązywanie problemów, GWP, Gdańsk 2002.

SECONDARY LITERATURE:

[1] Branowski B., Metody twórczego rozwiązywania problemów inżynierskich, WKT NOT, Poznań 1999.
[2] De Bono E., Myślenie lateralne, Sudio EMKA, Warszawa 2015.
[3] Stacewicz M., Inżynieria twórczego myślenia, Akia, Gdańsk 1999.

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Zał. nr 1a do ZW 35/2022

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Rachunkowość i finanse dla inżynierów
Name of subject in English: Accounting and finance for engineers
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0018
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**75**	**50**			
Form of crediting	**Examination**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**3**	**2**			
including number of ECTS points for practical classes (P)		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of economics.
2. Knowledge of the organisational and legal bases of enterprise operation.

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SUBJECT OBJECTIVES

C1. To make the student familiar with the principles of accounting and the way and tools of keeping accounting records.

C2. To introduce the student to the information values of basic accounting statements.

C3. To acquaint the student with basic financial mechanisms functioning in an enterprise..

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 - knows the principles and rules of the functioning of accounting in the enterprise
PEU_W02 - knows the basic financial mechanisms and tools in the enterprise

relating to skills:
PEU_U01 - can read and understand financial statements
PEU_U02 - is able to carry out a basic efficiency calculation of the enterprise

relating to social competences:
PEU_K01 - is prepared to participate in production and investment projects, understanding their impact on the company's financial performance

PROGRAMME CONTENT

Lecture		**Number of hours**
Lec 1	Information on the organization of classes. The genesis and types of accounting	2
Lec 2	Basic financial categories	2
Lec 3	Accounting principles and rules	2
Lec 4	The problem of valuation in accounting	2
Lec 5	Basics of accounting records	2
Lec 6	Balance sheet	2
Lec 7	Company financing sources	2
Lec 8	Income and Cash flow statement	3
Lec 9	Initial assessment of the enterprise on the basis of financial statements	2
Lec 10	Cost-volume-profit analysis	2
Lec 11	Financial leverage	2
Lec 12	Operating and total leverage	2
Lec 13	Profitability and its analysis	2
Lec 14	Financial liquidity and methods of its testing	2
Lec 15	Summary of the lecture	1
	Total hours	30

Classes		Number of hours
CL1	Information on the organization of classes. Accounting recording tools	2
CL2	Recording of balance sheet operations	4
CL3	Recording of income operations	4
CL4	Depreciation methods	2
CL5	Transition from accrual-based to cash-based accounting	2
CL6	Written test	1
CL7	Preparation of financial statements	3
CL8	Cost-volume-profit analysis	2
CL9	Operating, financial and total leverage mechanism	5
CL10	Assessment of the basic efficiency of the enterprise	3
CL11	Written test, Summary of classes	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecture with the use of a multimedia presentation and discussion.
N2. Accounting exercises - solving problems with discussion.
N3. Own work - preparation for exercises and exam.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_K01	written test No 1
F1	PEU_W01, PEU_W02, PEU_U1, PEU_U2 , PEU_K01	written test No 2
F3	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_K01	activity
F4	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_K01	written examination
P(lecture) = F4		
P(classes)=0,8*mean(F1,F2)+02*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Dudycz T., Analiza finansowa jako narzędzie zarządzania finansami przedsiębiorstwa, Wydawnictwo Indygo Zahir Media, Wrocław 2011.
[2] Nowak E., Rachunkowość. Kurs podstawowy, PWE, Warszawa 2016.

[3] Gierusz B., Podręcznik samodzielnej nauki księgowania, ODDK, Gdańsk 2018.

SECONDARY LITERATURE:

[1] Rutkowski A., Zarządzanie finansami, PWE, Warszawa 2016.
[2] Gierusz B., Podręcznik samodzielnej nauki księgowania, ODDK, Gdańsk 2018.
[3] Chałupczak J., Zasady rachunkowości - zbiór zadań z rozwiązaniami, Tom 1, ODDK, Gdańsk 2018.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zarządzanie produkcją i logistyką
Name of subject in English: Production and logistics management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0020
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**	**15**		
Number of hours of total student workload (CNPS)	**50**	**25**	**50**		
Form of crediting	**crediting with grade**	**crediting with grade**	**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**	**1**	**2**		
including number of ECTS points for practical classes (P)		**1**	**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**	**0,6**	**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Passing the subjects: Organisation and management theory; Economics.

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SUBJECT OBJECTIVES

C1 To learn about the essence and decision-making problems of the logistic management of the operational activity of the enterprise.
C2 Understanding the essence and principles of market-oriented and efficient operational management systems, including logistical aspects of material flows in the internal supply chain.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01Knows the most important concepts, objectives and strategies of logistic management of operational activities and its links with other functional areas of the company.
PEU_W02 Has basic knowledge of the construction and operation of production systems in enterprises.
PEU_W03 Knows the essence and principles of operation of classic and modern logistic management systems for the operational activity of the enterprise.

relating to skills:

PEU_U01Able to identify and diagnose decision-making problems of companies in the operational area and logistic activity.

PEU_U02Able to analyze and evaluate the functioning of the existing logistics management systems for production and services.

PEU_U03Able to formulate alternative solutions for the logistic management of operational activities

relating to social competences:

PEU_K01 Understands the role and importance of logistics and operational activity in the overall activity of the company

PEU_K02Understeds the role and importance of modern logistics management systems for production and services in increasing market and operational effectiveness of enterprises

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussing the objectives of the course and the conditions of passing The essence, goals of logistic management in an enterprise.	2
Lec 2	Tasks of logistic management in an enterprise.	2
Lec 3	Product. The process. Production structure. Production environment	2
Lec 4	Sales and production planning for SOPs (aggregated)	2
Lec 5 – Lec 6	Short-term planning parameters and procedures	4
Lec 7 – Lec 8	SCS stock control systems	4
Lec 9 – Lec 10	Logistic management in the MRP/MRPII system	4
Lec 11 – Lec 12	Logistic management in the JIT/LP strategy	4
Lec 13 – Lec 14	Logistic management in the OPT/TOC concept	4
Lec 15	Passing test	2
	Total hours	30

Classes		**Number of hours**
Cl 1	Optimisation of the production programme in the absence of bottlenecks	3
Cl 2	Optimisation of the production programme in bottleneck conditions	2
Cl 3	Inventory management - SWZ system (EOQ models + ordering point)	2
Cl 4	Temporary production flow parameter - production cycle	2
Cl 5	Ways of shortening the production cycle (production runs)	2
Cl 6	Material Requirement Planning MRP - planning logic	2
Cl 7	Course completion	2
	Total hours	15

Laboratory	**Number of hours**

Lab 1	GOAL-OPT simulation game - production and sales flow control	3
Lab 2	GOAL-OPT simulation game - sales and production flow planning	2
Lab 3	Aggregate production planning - clean and mixed planning strategies	2
Lab 4	Aggregate production planning - shaping your own planning strategy	2
Lab 5	Inventory management - SWZ system (EOQ model + ordering point)	2
Lab 6	Inventory management - EOQ system (EOQ model variants)	2
Lab 7	Course completion	2
	Total hours	15

TEACHING TOOLS USED
N1. for the lecture: informative lecture, multimedia presentation N2. for exercises: accounting exercises, problematic exercises N3. for the laboratory: computer program in the field of simulation of the production process and aggregated production planning, preparation in report form

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W02, PEU_W03, PEU_U03, PEU_K02	report on laboratory exercises
F2	PEU_W02, PEU_W03, PEU_K02	activity
F3	PEU_W02, PEU_U03, PEU_K02	quiz
F4	PEU_W01, PEU_W02, PEU_W03, PEU_U01, PEU_U02, PEU_U03, PEU_K01, PEU_K02	test
P (lecture) = F4 P (laboratory) = 0,8*F1 + 0,2*F2 P (exercises) = 0,8*F3 + 0,2*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Zbroja T., Zarządzanie produkcją. Podręcznik, WSO WL, Wrocław 2015.
[2] Pająk E., Zarządzanie produkcją. Produkt, technologia, organizacja, PWN, Warszawa 2021.
[3] Krawczyk S., Logistyka. Teoria i praktyka, Tom 2, DIFIN, Warszawa 2011.

SECONDARY LITERATURE:

[1] Bozarth C.C., Handfield R.B., Wprowadzenie do zarządzania operacjami i łańcuchem dostaw: kompletny podręcznik logistyki i zarządzania dostawami, Helion, Gliwice 2007.
[2] Heizer J., Render B., Operations Management, Pearson Education, Inc.,Upper Saddle River, New Jersey 2006.
[3] Zarządzanie produkcją w praktyce, Wydawnictwo „Wiedza i Praktyka", Warszawa 2006.
[4] Nowoczesne zarządzanie produkcją, Ujęcie procesowe, PWN, Warszawa 2014
[5] Kulińska E., Bogusławski A., Zarządzanie procesem produkcji, DIFIN, warszawa 2019

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza ekonomiczna decyzji biznesowych
Name of subject in English: Economic analysis of business decisions
Main field of study: Business Engineering
Specialization:
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0021
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of corporate finance and corporate governance.

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SUBJECT OBJECTIVES

C1 Acquiring the ability to apply general knowledge of economic analysis in practice.
C2 Acquiring the ability to independently conduct an analysis of the financial condition based on standard economic reporting.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEU_W01 has basic knowledge of economic analysis
PEU_W02 knows the basic stages of assessing the financial condition of the enterprise
Relating to skills:
PEU_U01 Is able to perform a critical analysis of the company's financial condition
PEU_U02 Has the ability to analyze the causes and dynamics of phenomena occurring in the enterprise

PEU_U03 Is able to use IT tools in the process of analyzing the company's financial condition.

Relating to social competences:

PEU_K01 Is aware of the complexity of socio-economic systems and a willingness to multilateral overview of the impact of business decisions and management

PEU_K02 Is focused on independent and critical search and selection methods, techniques and tools to support organizational knowledge management

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec1	Discussion of the purpose and structure of the lecture. Defining requirements. Organizational matters. Analytical proceedings in auditing financial statements	2
Lec2	Overview of available databases of financial statements.	2
Lec3	Liquidity analysis in terms of static and dynamic approach.	2
Lec4	Profitability analysis.	2
Lec5	Analysis of turnover and debt ratios.	2
Lec6	Analysis of the company's market position.	2
Lec7, 8	Synthetic analysis (statistical methods).	4
Lec 9,10	Synthetic analysis (methods based on artificial intelligence).	4
Lec11	Verification of models.	2
Lec12	The causes of business failure.	2
Lec13	Selection of indicators.	2
Lec14	Basic IT tools used in economic analysis.	2
Lec15	Test/Term work.	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Overview of the purpose and structure of the laboratory. Defining requirements. Organizational matters. Company Allocation.	1
Lab 2	Choice of reference values. Preliminary analysis.	2
Lab 3	Liquidity analysis in terms of static and dynamic approach.	2
Lab 4	Profitability analysis.	2
Lab 5	Analysis of the situation of assets and capital.	2
Lab 6	Analysis of the company's market position.	2
Lab 7	Synthetic analysis.	2
Lab 8	Presentation of the results.	2
	Total hours	15

TEACHING TOOLS USED
N1. MS Office software N2. Problem lecture N3. Discussion N4. Case study N5. Report

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02, PEU_U03, PEU_K01	Written paper consisting laboratory and project results
F2	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_U03, PEU_K02	Presentation of the selected stage of the economic analysis of the company
F3	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_U03	Test/Term work
F4	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_U03, PEU_K01, PEU_K02	Activity
P(L)= 0,8*F1+0,2*F2 P(W)=0,8*F3+0,2*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Radosiński E., Sprawozdawczość finansowa, Wydawnictwo Naukowe PWN, Warszawa 2020.
2. Bławat, F., Drajska, E., Figura, P., Gawrycka, M., Korol, T., & Prusak, B. Analiza finansowa przedsiębiorstwa. Finansowanie, inwestycje, wartość, syntetyczna ocena kondycji finansowej, CeDeWu, Warszawa 2017.
3. Radosiński E., Wprowadzenie do sprawozdawczości, analizy i informatyki ekonomicznej, Wydawnictwo Naukowe PWN, Warszawa 2010 .

SECONDARY LITERATURE:

4. Kowalak R., Ocena kondycji finansowej przedsiębiorstwa, Wyd. ODDK, Gdańsk 2008.
5. Mączyńska E., Bankructwa przedsiębiorstw. Wymiar teoretyczny, statystyczny i rzeczywisty, "Biuletyn PTE", nr 1, s. 7-35, 2013.
6. Bednarski L., Analiza finansowa w przedsiębiorstwie, PWE Warszawa 2006.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Innowacje i przedsiębiorczość inżynierska
Name of subject in English: Innovations and engineering entrepreneurship
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time studies
Kind of subject: obligatory
Subject code: W08IZZ-SI0023
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**15**			
Number of hours of total student workload (CNPS)	**30**	**25**			
Form of crediting	**Crediting with grade**	**Crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**1**			
including number of ECTS points for practical classes (P)		**1**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of managing organizations
2. General knowledge about the methods of managing the organization

SUBJECT OBJECTIVES

C1 To acquaint students with the basic knowledge about innovation and entrepreneurship
C2. Review of processes, methods, tools for creating and implementing innovations and the basic aspects of entrepreneurship management in an organization

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01
Has a structured, theoretically founded general knowledge of innovation and engineering entrepreneurship
PEU_W02

Has knowledge about forms of entrepreneurship and about the identification of premises for its formation and development. Knows the concept of innovation and distinguishes between their types. Recognizes the features and conditions of innovation in an organization. Describes the innovative process taking place in the organization
In the field of skills:
PEU_U01
Can analyze and evaluate innovations
PEU_K01
Is prepared to identify and analyze social conditions for the implementation of innovations
PEU_K01
Is prepared to initiate innovative changes in the workplace and participate in their planning and implementation. Can think and act in an entrepreneurial manner

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Organizational hour. Introduction to the course. Overview of the rules for completing the course. The concept of innovation and entrepreneurship	2
Lec 2	Schumpeterian innovations, closed and open innovations	2
Lec 3	Radical and gradual innovations, innovations that continue the course of the industry's development, and innovations that interrupt the course of the industry's development	2
Lec 4	Innovations that generate needs and innovations that meet the needs; social innovation	2
Lec 5	Innovation generated by an individual, team, and crowd - differences and similarities	2
Lec 6	Designing innovation. The idea of innovation; dimensions of innovation: technical, market, and social	2
Lec 7	Developing and improving innovations: layers of product innovation, price, distribution, promotion, Innovative environment: customers, competitors, stakeholders, Strategic evaluation of innovation;	2
Lec 8	Implementing innovations: financing, models, strategies, processes;	2
Lec 9	PEST analysis - Political and economic determinants of innovation implementation - part I	2
Lec 10	PEST analysis - Social and technological determinants of innovation implementation - part II	2
Lec 11	An innovation-oriented organization (startups, business incubators, innovation transfer centers, "living" laboratories, digital enterprises, etc.)	2
Lec 12	Engineering and academic entrepreneurship	2
Lec 13	Social and senior entrepreneurship	2
Lec 14	Corporate and SMEs entrepreneurship	2
Lec 15	Discussion of the results and effects of work in the semester	2
	Total hours	30

Classes		**Number of hours**
Cl 1	Discussion of the subject of exercises and the rules of passing	1

Cl 2	Overview of the types of innovations. Part I - presentations prepared by students	2
Cl 3	Overview of the types of innovations, part II - presentations of projects prepared by students	2
Cl 4	Designing and implementing innovations - presentations prepared by students	2
Cl 5	Implementation of innovations - presentations prepared by students	2
Cl 6	An innovation-oriented organization (startup, innovative organization, digital enterprise) - presentations of prepared projects by students	2
Cl 7	Entrepreneurship - presentations prepared by students	2
Cl 8	Assessment of presentations prepared by students	2
	Total hours	15

TEACHING TOOLS USED
N1. presentations N2. reports from consulting companies and social organizations N3. case study N4. quiz N5. survey and interview in an organization N6. group work

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_U01 PEU_U02 PEU_K01 PEU_K02	Semester work (project, article, paper) done by student (independent or in a team)
F2	PEU_W01 PEU_U01 PEU_U02 PEU_K01 PEU_K02	Presentation of the results of the semester work done by the student (independent or in a team)
P lecture = F1 P classes = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Skonieczny, **Twórczość jako fundament strategii organizacji**, Wyd. Politechniki Wrocławskiej, 2019.
[2] A.M. Dereń, **Zarządzanie twórczością organizacyjną. Podejście procesowe**, Difin, 2016Warszawa
[3] J. Skonieczny (red.), **Kształtowane zachowań innowacyjnych, przedsiębiorczych i twórczych w edukacji inżyniera**, Wydawnictwo Indygo Zahir Media, Wrocław, 2011

SECONDARY LITERATURE:

[1] S.G. Walesh, **Introduction to Creativity and Innovation for Engineers**, Pearson, 2017
[2] Trias de Bes, **Innowacyjność. Przepis na sukces. Model od A do F**, Dom Wydawniczy Rebis, 2013.
[3] J. Dyer , H. Gregersen, C.M. Christensen , **DNA innowatora. Jak opanować pięć umiejętności przełomowych innowatorów**, Wyd. ICAN Institut, Warszawa 2012.
[4] K. Allen, **Entrepreneurship for scientists and engineers**, Pearson Education, 2010
[5] T. Kelley, J. Littman, **Sztuka innowacji**, MT Biznes, Warszawa 2009.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Marketing
Name of subject in English: Marketing
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0025
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**50**	**50**			
Form of crediting	**Examination**	**Crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**2**	**2**			
including number of ECTS points for practical classes (P)		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of the basics of management
2. Knowledge of the basics of economics

SUBJECT OBJECTIVES

Passing basic knowledge, taking into account its application aspects, regarding:
C1. marketing as a management concept
C2. strategies, tactics and operational marketing activities, in particular - in the context of marketing planning (including the online / digital environment)
Development of basic skills regarding:
C3. marketing planning and identifying and solving (also with the use of benchmarking) selected marketing problems in business management

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 - understands marketing as a management concept, in particular in the context of management engineering

PEU_W02 - has basic knowledge of strategy, tactics and operational marketing activities, including: creating, delivering and communicating value; customer relationship management, brand management, and online marketing strategy and activities
PEU_W03 - knows and understands, at a basic level, the process of marketing planning, the marketing research process as well as organizing and controlling marketing activities

relating to skills:
PEU_U01 - has, at the basic level, the ability to apply the engineering way of thinking to identify selected, significant marketing problems in company management and to formulate proposals for their solutions
PEU_U02 - has the basic ability to develop a marketing plan, taking into account activities in the Internet environment
PEU_U03 - has, at the basic level, the ability to identify and use - within a given scope - good marketing practices in company management, with particular emphasis on analyzing the causes and dynamics of marketing phenomena

relating to social competences:
PEU_K01 - is aware that the modern work of a management engineer consists in the continuous identification, analysis, prioritization and effective solving of management problems
PEU_K02 - demonstrates readiness to lead and work in a team, to take responsibility in managing a company – both in the substantive and ethical dimension
PEU_K03 - presents initiative, creativity, specificity and model approach in formulating, communicating and defending own solutions and views.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Organizational issues - discussion of the structure, principles and organization of the course. Marketing as a management concept	2
Lec 2	Marketing strategy in the company's strategy. Marketing plan.	2
Lec 3	Fundamentals of customer relationship management (CRM).	2
Lec 4	Customer-oriented marketing strategy.	2
Lec 5	Brand management strategy.	2
Lec 6	Acquisition of marketing information, marketing research.	2
Lec 7	Analysis of the environment for the purposes of the marketing strategy.	2
Lec 8	Consumer markets and enterprise markets.	2
Lec 9	Product strategies. Service management.	2
Lec 10	Pricing strategies.	2
Lec 11	Integrated Marketing Communication.	2
Lec 12	Marketing channels.	2
Lec 13	Marketing activities strategy in the digital environment.	2
Lec 14	Organizing, leading and controlling in marketing activities.	2

Lec 15	Marketing planning process. Summary of lectures in the semester.	2
	Total hours	30

Classes		Number of hours
Cl 1-2	Introduction to classes. Marketing in business management	4
Cl 3	Marketing strategies and plans	2
Cl 4	Fundamentals of CRM	2
Cl 5	Marketing strategy focused on customers	2
Cl 6	Brand strategy	2
Cl 7	Marketing information and marketing research	2
Cl 8	Environment analysis	2
Cl 9	Understanding customers	2
Cl 10	Product strategies	2
Cl 11	Pricing strategies	2
Cl 12	Integrated Marketing Communication	2
Cl 13	Distribution strategies	2
Cl 14	Online Marketing Strategies	2
Cl 15	Organizing, leading and control in marketing. Summary of the classes in the semester.	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture with the use of a multimedia presentation N2. Questions asked to the audience during the lecture N3. Case studies N4. Questions and tasks asked to students during exercises N5. Independent or team analysis and evaluation of the given aspects of the company's marketing activities N6. Own or team work: preparation for classes and preparation for the exam N7. Tutoring (available to students selected by the tutor from among those interested).

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_U02 PEU_U03	Assessment of solutions to given tasks (short tests included)
F2	PEU_U01 PEU_U02 PEU_U03 PEU_K01 PEU_K02 PEU_K03	Activity and engagement during the semester

F3	PEU_W01 PEU_W02 PEU_W03	Assessment of solutions to given examination issues
P [Classes] = 0,3*F2 + 0,7*F1 P [Lecture] = F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Kotler Ph. Keller K.L., Marketing, wyd. 22 (lub wyd. wcześniejsze do wyd. 14 włącznie), Rebis, Poznań 2021 (lub wyd. wcześniejsze do r. 2012 włącznie).
[2] Nowak M.W., Orientacja rynkowa - aspekty i potrzeba rozwoju w środowisku internetowym, Prace Naukowe Wyższej Szkoły Bankowej w Gdańsku, tom 42, 2015, s. 15-24.

SECONDARY LITERATURE:

[1] Amstrong G., Kotler Ph., Marketing. Wprowadzenie, Wydawnictwo Nieoczywiste, Warszawa 2016.
[2] Baruk, A., Hys, K., Dzidowski, A., Marketing dla inżynierów (ZIP Zarządzanie i Inżynieria Produkcji), Warszawa: Polskie Wydawnictwo Ekonomiczne, 2012.
[3] Biernacki M., Nowak M. W., Jak poprawić satysfakcję pacjentów: zrozumieć sukces Cleveland Clinic, Handel Wewnętrzny, nr 5. (370), wrzesień-październik, 2017, s. 53-62.
[4] Dziekoński M., Kozielski R., Jak szybko napisać profesjonalny plan marketingowy, Wydawnictwo Nieoczywiste, wyd. 3, Warszawa 2017.
[5] Mitręga M., Marketing relacji teoria i praktyka, wyd. 3, Warszawa, 2018.
[6] Turner J., Shah R., Jak zarabiać w mediach społecznościowych? Rozwijaj firmę dzięki nowoczesnym narzędziom marketingowym, wyd. II, Helion, OnePress, Gliwice 2015.

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FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Podstawy zarządzania projektem
Name of subject in English: Fundamentals of project management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0026
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**				
Number of hours of total student workload (CNPS)	**50**				
Form of crediting	**crediting with grade**				
For group of courses mark (X) final course					
Number of ECTS points	**2**				
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,84**				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Principles of management.

SUBJECT OBJECTIVES

C1. To ensure fundamental knowledge (including practical knowledge) about project characteristics and project management.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Knowing the project characteristics and project management processes.
PEU_W02 Knowing the basic project management methods and techniques (critical path method, resource balancing, budgeting, risk analysis).
PEU_W03 Knowing the principles of initial project analysis.
PEU_W04 Knowing the role of the human factor in project management.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introduction. Project characteristics	2
Lec 2	Basic concepts of project management	2
Lec 3	Initiating the project (Project Charter)	2
Lec 4	Planning project scope	2
Lec 5	Project scheduling	2
Lec 6	Project cost management	2
Lec 7	Project risk management	2
Lec 8	Project quality management	2
Lec 9	Project resource management	2
Lec 10	Project communication management	2
Lec 11	Project monitoring	2
Lec 12	Project settlement and closing	2
Lec 13	Introduction to adaptive project management	2
Lec 14	Summary	2
Lec 15	Final test	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Case studies N3. Discussion of selected issues N4. Self-study: classes preparation and final assessment preparation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02, PEU_W03, PEU_W04	Assessment of students activity
F2	PEU_W01, PEU_W02, PEU_W03, PEU_W04	Written test
P=0,2*F1+0,8*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Kerzner H., Zarządzanie projektami: studium przypadków, Helion, Gliwice 2005
[2] Spałek S., Zarządzanie projektami w przedsiębiorstwie. Perspektywa czwartej rewolucji przemysłowej, Polskie Wydawnictwo Ekonomiczne, Warszawa 2020
[3] Wysocki R.K., McGary R., Efektywne zarządzanie projektami: poznaj nowoczesne metody zarządzania projektami, Helion, Gliwice 2005

SECONDARY LITERATURE:

[1] Kapusta M., Zarządzanie projektami. Krok po kroku, Wyd. Edgard, Warszawa 2013
[2] PMBOK Guide 6th Edition, Project Management Institute 2017
[3] Polskie Wytyczne Kompetencji IPMA (National Competence Baseline - NCB), wersja 4.0
[4] PRINCE2 - Skuteczne zarządzanie projektami, Axelos 2017
[5] Trocki M. (red.), Zarządzanie projektem europejskim, Polskie Wydawnictwo Ekonomiczne, Warszawa 2015
[6] Żmigrodzki M., Zarządzanie projektami dla początkujących. Jak zmienić wyzwanie w proste zadanie, Wyd. Helion, Warszawa 2018

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Praktyka
Name of subject in English: Internship
Main field of study (if applicable): Business Engineering
Specialization (if applicable):
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0027
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)		150			
Form of crediting		Crediting with grade			
For group of courses mark (X) final course					
Number of ECTS points		5			
including number of ECTS points for practical classes (P)		5			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)		1,5			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Professional training should be carried out in the period starting (at the earliest) from the 4th semester.

SUBJECT OBJECTIVES

C1. Practical use of theoretical knowledge in the realities of the functioning enterprises and other economic organizations.
C2. Acquiring practical skills to develop and supplement the student's knowledge obtained in the studies.
C3. Developing the ability to cooperate and build professional relationships in the real conditions of the organization's functioning.

SUBJECT EDUCATIONAL EFFECTS

Relating to social competences:

PEU_K01 The student is able to perform various roles in the organization / project teams, etc., in accordance with the expectations / preferences of the employer.
PEU_K02 The student is aware of the importance of the relationship between knowledge and managerial, business and engineering activity as well as responsibility for the decisions made.
PEU_K03 The student is aware of the necessity of independent learning and the necessity of continuous improvement of professional qualifications in connection with economic and technological progress.

PROGRAMME CONTENT

The substantive scope of the internship is directly related to the diploma profile, each time agreed with the organization accepting the student for internship and written in the document "Framework program of internships" (Annex No. 2 to the Principles of student internships, WSZJK).

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_K01 PEU_K02 PEU_K03	Assessment based on a prepared professional training plan, approved by the employer.
P = F1		

PRIMARY LITERATURE:

BOOK OF PROCESSES OF THE FACULTY OF EDUCATIONAL QUALITY ASSURANCE SYSTEM
https://wz.pwr.edu.pl/o-wydzial/wydzialowy-system-zapewnienia-jakosci-ksztaloszenia/ksiega-procesow

In particular, the point: 7. Implementation of student internships.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Metodyki zarządzania projektem
Name of subject in English: Methods of project management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0030
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**	**30**	**15**		
Number of hours of total student workload (CNPS)	**50**	**50**	**25**		
Form of crediting	**Examination**	**Crediting with grade**	**Crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**	**2**	**1**		
including number of ECTS points for practical classes (P)		**2**	**1**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,92**	**1,2**	**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Fundamentals of project management.

SUBJECT OBJECTIVES

To provide basic knowledge, including its application aspects, on:
C1. popular methodologies of project management and differences between traditional and adaptive project management.
To ensure fundamental skills in:
C2. applying selected methods and techniques characteristic for the discussed project management methodologies.

SUBJECT LEARNING OUTCOMES

relating to knowledge:
PEU_W01 Student lists and describes most popular methodologies of project management. Student distinguishes traditional and adaptive project management.
PEU_W02 Student is familiar with tools specific to a particular methodology of project management.

PEU_W03 Student knows contemporary trends in developing project management methodologies.
relating to skills:
PEU_U01 Student can use known management tools specific to a particular methodology of project management.
PEU_U02 Student is able to solve project management problems by using various methods and tools of project management.

relating to social competences:
PEU_K01 Student understands conditions of using different project management approaches.
PEU_K02 Is aware of existing priorities, barriers and constraints within the various project management methodologies.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introduction to the lecture. PMI Methodology (part 1)	2
Lec 2	PMI Methodology (part 2)	2
Lec 3	PRINCE 2 Methodology	2
Lec 4	IPMA Methodology (part 1)	2
Lec 5	IPMA Methodology (part 2)	2
Lec 6	SCRUM Methodology (part 1)	2
Lec 7	KANBAN Methodology, SCRUMBAN Methodology	1
Lec 8	Summary	
Total hours		**15**

Classes		**Number of hours**
Cl 1	Introduction: organisational information and exercises in traditional project management	2
Cl 2	Traditional project management – case study + task no. 1.1	2
Cl 3	Traditional project management – case study + task no. 1.2	2
Cl 4	PMI Methodology – task no. 2.1	2
Cl 5	PMI Methodology - task no. 2.2	2
Cl 6	PRINCE 2 Methodology - task no. 3.1	2
Cl 7	PRINCE 2 Methodology – task no. 3.2	2
Cl 8	IPMA Methodology – task no. 4.1	2
Cl 9	IPMA Methodology – task no. 4.2	2
Cl 10	Adaptive project management– case study + task no. 5	2
Cl 11	SCRUM Methodology – task no. 6.1	2
Cl 12	SCRUM Methodology – task no. 6.2	2
Cl 13	KANBAN Methodology – task no. 7.1	2
Cl 14	SCRUMBAN Methodology – task no. 8	2
Cl 15	Final test	2
Total hours		**30**

Laboratory	**Number of hours**

Lab 1	Introduction: organisational information, discussion of the subject of the course	1
Lab 2	Traditional project management - selected IT tools	2
Lab 3	Traditional project management - selected IT tools	2
Lab 4	Traditional project management - selected IT tools	2
Lab 5	Traditional project management - selected IT tools	2
Lab 6	Traditional project management - selected IT tools	2
Lab 7	Adaptive project management - selected IT tools	2
Lab 8	Adaptive project management - selected IT tools	2
Total hours		**15**

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Case studies presented during lecture N3. Discussion of selected issues N4. Analysis and evaluation of real organization's characteristics N5. Self-study: classes preparation and final assessment preparation N6. Task lists

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02, PEU_K01, PEU_K02	Assessment of students activity
F2	PEU_W01, PEU_W02, PEU_W03, PEU_U01, PEU_U02	Assessment of solved tasks
F3	PEU_W01, PEU_W02, PEU_W03, PEU_U01, PEU_U02	Written exam
P (lecture) = F3 P (classes) = 0,2*F1+0,8*F2 P (laboratory) = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Schwaber K., Sutherland J., The Scrum Guide, 2020

[2] Trocki M., Metodyki i standardy zarządzania projektami, Polskie Wydawnictwo Ekonomiczne, Warszawa 2017

SECONDARY LITERATURE:

[1] Hammarberg M., Sunden J., Kanban: zobacz, jak skutecznie zarządzać pracą, Helion, Gliwice 2015

[2] Kaczor K., SCRUM i nie tylko. Teoria i praktyka w metodach Agile, Wyd. PWN, Warszawa 2014

[3] PMBOK Guide 6th Edition, Project Management Institute 2017

[4] Polskie Wytyczne Kompetencji IPMA (National Competence Baseline - NCB), wersja 4.0

[5] PRINCE2 - Skuteczne zarządzanie projektami, Axelos 2017
[6] Stellman A., Agile: przewodnik po zwinnych metodykach programowania, Helion, Gliwice 2015

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Systemy informatyczne zarządzania
Name of subject in English: Management Information Systems
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time studies
Kind of subject: obligatory
Subject code: W08IZZ-SI0033
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**15**		
Number of hours of total student workload (CNPS)	**50**		**25**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark final course with (X)					
Number of ECTS points	**2**		**1**		
including number of ECTS points for practical (P) classes			**1**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge about the organizations' functioning and about project management.
2. Essentials of information requirements analysis and system modeling.

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SUBJECT OBJECTIVES

C1 Familiarizing students with management information systems (MIS) issues.
C2 Familiarizing students with the features of the selected MISs.
C3 Preparation for selecting MIS for a specific organization.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 Basic knowledge about creating and implementing management information systems.
PEU_W02 Familiarization with basic functionality of MIS in various business areas.
PEU_W03 Familiarization with MIS history, current state and development prospects.

relating to skills:

PEU_U01 Student is able to analyze the functionality of specific MIS.
PEU_U02 Student understands the importance of business requirements in information systems design, selection and implementation.
PEU_U03 Student is able to state basic criteria of MIS selection for specific organization.

relating to social competences:
PEU_K01 Ability to search for information and analyze it critically.
PEU_K02 Development of the entrepreneurial thinking.

PROGRAM CONTENT		
Lectures		**Number of hours**
Lec 1	Presentation of subject and rules of crediting.	1
Lec 2	Information system and computer system in organization. Basic terms and definitions concerning MIS.	2
Lec 3	System selection criteria. Identification of business needs. Methods and rules of MIS selection.	2
Lec 4	Different classifications of MIS.	2
Lec 5	The possibilities of the system acquiring – advantages and disadvantages of different attitudes.	2
Lec 6	Integrated systems and their evolution. MIS development prospects.	2
Lec 7	Implementation of IT solutions in the organization. The problems concerning the implementation of the new system in the organization. Test.	2
Lec 8	Global and local market of MIS. Retake.	2
	Total hours	15

Laboratory		**Number of hours**
Lab 1	Introduction, rules of crediting.	1
Lab 2	Choice of the organization and the area of management. Analysis of the features of HRM systems.	2
Lab 3	Functional requirements analysis. Analysis of the features of sales systems.	2
Lab 4	Preparation to the MIS selection: development of the selection algorithm, the choice of the selection criteria. Analysis of the features of CRM systems.	2
Lab 5	Analysis of the MIS detailed features (concerning chosen area of management). Analysis of the features of warehouse systems.	2
Lab 6	Survey of the MIS market concerning chosen area of management. Analysis of the features of accounting systems.	2
Lab 7	Comparison of selected systems according to developed criteria. Optimal MIS choice and its justification.	2
Lab 8	Conclusion, evaluation of the reports.	2
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture with Power Point presentations and videos. N2. Familiarization with selected MIS based on vendor's training materials. N3. Student's unassisted work – preparation for laboratories.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_W01 – W03	Test
F2	PEU_U01 – U03 PEU_K01 – K02	Preparation for each laboratory
F3	PEU_U01 – U03 PEU_K01 – K02	Report
F4	PEU_U01 PEU_K01 – K02	Assessment of the work with the systems
P(lecture) =F1 P(laboratory)= 0,4*F2 + 0,5*F3 +0,1*F4		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Banaszak Zb., Kłos S., Mleczko J.: Zintegrowane systemy zarządzania. PWE, Warszawa 2016. [2] Jurek J.: Wdrożenia informatycznych systemów zarządzania. PWN, Warszawa 2016. [3] Kijewska A.: Systemy informatyczne w zarządzaniu. Wydawnictwo Politechniki Śląskiej, Gliwice 2005. **SECONDARY LITERATURE:** [1] Kisielnicki J.: Systemy informatyczne zarządzania, PLACET, Warszawa 2013. [2] Journals e.g. Computerworld [3] Informations of systems suppliers
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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zarządzanie jakością
Name of subject in English: Quality management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0034
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**50**	**50**			
Form of crediting	crediting with grade	crediting with grade			
For group of courses mark final course with (X)					
Number of ECTS points	**2**	**2**			
including number of ECTS points for practical (P) classes		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge in the field of fundamental organisation management.

SUBJECT OBJECTIVES

Knowledge objectives:
C1 To acquire basic knowledge of non-standardised and standardised quality management systems and knowledge of basic quality management tools.
Skill objectives:
C2 To acquire the ability to apply selected quality management tools in solving organisational problems.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 Student has basic knowledge about total quality management principles and quality management systems in organizations.

PEU_W02 Student knows basic norms and standards of quality management.

PEU_W03 Student recognizes basic tools of quality improvement management.

relating to skills:

PEU_U01 Student has the ability to identify and analyse basic quality management problems in organisations using the appropriate methods and tools.

PEU_U02 Student is able to apply chosen techniques and methods of quality management to analyze, design, and improve an organisation's business processes and the system of quality management..

relating to social competences:

PEU_K01 Student is aware of the importance of ethics in social life and organisation’s management.

PEU_K02 Student is aware of the importance of individual and team activity in initiation changes in the workplace.

PROGRAM CONTENT

Lectures		Number of hours
Lec 1	Introduction to the lecture. The meaning of quality	2
Lec 2	Evolution of approaches to quality in organizations.	2
Lec 3	The concept of Kaizen.	2
Lec 4	Tools of quality improvement in Kaizen.	2
Lec 5	Quality management principles according to quality philosophers (W.E. Deming and Ph.B. Crosby).	2
Lec 6	Quality management principles according to quality philosophers - cont. The concept of cost accounting for quality.	2
Lec 7	TQM definition. TQM principles.	2
Lec 8	TQM principles - cont.	2
Lec 9	Assessing the risk of failures in processes. FMEA method.	2
Lec 10	Standardization of quality management systems. Review of standardised management systems.	2
Lec 11	ISO 9000 series quality management system.	2
Lec 12	ISO 9000 series quality management system – con. Requirements of PN-EN ISO 9001:2015.	2
Lec 13	Audit and certification of the quality management system. Integrated quality management systems.	2
Lec 14	Final test-term1.	2
Lec 15	Final test-term2.	2
	Total hours	30

Classes		Number of hours
Cl 1	Organizational classes. Interpretation of a quality term.	2

Cl 2	Developing and interpretation of a customer satisfaction evaluation questionnaire form- CSI.	2
Cl 3	Classical quality improvement technique: Ishikawa diagram.	2
Cl 4	Classical quality improvement technique: Pareto-Lorenz diagram.	2
Cl 5	Classical quality improvement technique: histogram.	2
Cl 6	Classical quality improvement technique: Shewhard control chart.	2
Cl 7	Determining and evaluating the quality capability of a process (Cp and Cpk indicators).	2
Cl 8	Passing test – part1.	2
Cl 9	Analysis of the quality cost structure.	2
Cl 10	Designing the system of organisation processes (organisation megamap) and process structure (Flow diagram).	2
Cl 11	Preventive actions, corrective actions and correction in processes. Method of analysis of failures, their causes and effects in a process (PFMEA) part 1.	2
Cl 12	PFMEA method, part 2.	2
Cl 13	New quality improvement techniques: Tree diagram and PDPC	2
Cl 14	New quality improvement techniques: matrix diagram	2
Cl 15	Passing test- part 2.	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture - presentation in pdf. N2. Teaching materials published on the ePortal. N3. Self-study - independent literature studies and preparation for passing tests. N4. Practical exercises - Teamwork.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU-W01÷PEU-W02, PEU-K01	Written test on theoretical issues.
F2	PEU-U01÷PEU-U02, PEU-K01÷PEU-K02	Evaluation of tasks carried out by students.
F3	PEU-W02, PEU-U02, PEU-K01	Written test on quality management tools.
Lecture: C=F1 Classes: C=0,7*F2+0,3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Materials posted on the lecturer's website (ePortal).
[2] Bugdol M., *System zarządzania jakością według normy ISO 9001:2015*, Wydawnictwo Onepress, 2018.
[3] Hamrol A., *Zarządzanie jakością z przykładami*, Wydawnictwo Naukowe PWN, Warszawa 2013.
[4] Zymonik Z., Hamrol A., Grudowski P., *Zarządzanie jakością i bezpieczeństwem*, PWE, Warszawa 2012.

SECONDARY LITERATURE:

[1] Brajer-Marczak R., *Doskonalenie zarządzania jakością procesów i produktów w organizacjach,* Wyd. Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2015.
[2] Dahlgaard J.J., Kristensen K., Kanji G.K., *Podstawy zarządzania jakością*, PWN, Warszawa 2001.
[3] Dobrowolska A., *Podejście procesowe w organizacjach zarządzanych przez jakość*, Poltext, Warszawa 2017.
[4] Grudowski P., Leseure- Zajkowska E.: *LSS Plutus - Lean Six Sigma dla małych i średnich przedsiębiorstw*, Wydawnictwo WNT, Warszawa 2013.
[5] Hamrol A., *Strategie i praktyki sprawnego działania: lean, six sigma i inne*, Wydawnictwo Naukowe PWN, Warszawa 2016.
[6] Imai M., *Kaizen: klucz do konkurencyjnego sukcesu Japonii*, Wydawnictwo MT Biznes, Warszawa 2007.
[7] Imai M., *Gemba kaizen : zdroworozsądkowe, niskokosztowe podejście do zarządzania*, Wydawnictwo MT Biznes, Warszawa 2006.
[8] *Norma PN-EN ISO 9000:2015 Systemy zarządzania jakością. Podstawy i terminologia*. Polski Komitet Normalizacyjny, Warszawa 2015
[9] *Norma PN-EN ISO 9001:2015 Systemy zarządzania jakością. Wymagania*. Polski Komitet Normalizacyjny, Warszawa 2015
[10] Strona internetowa ISO (International Organization for Standardization): www: ISO.org
[11] Strona internetowa PKN (Polskiego Komisji Normalizacyjnej): www. pkn.pl.
[12] Szczepańska K., *Zarządzanie jakością: koncepcje, metody, techniki, narzędzia*, Wydawnictwo Politechniki Warszawskiej, Warszawa 2015.
[13] Szczepańska K., Podstawy zarzadzania jakością, Wydawnictwo Politechniki Warszawskiej, Warszawa 2017.
[14] Zymonik Z., *Koszty jakości w zarządzaniu przedsiębiorstwem*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2003.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Projektowanie analizatorów biznesowych
Name of subject in English: Design of business analysis tools
Main field of study: Business Engineering
Specialization: Applications of IT in Business
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0038
Group of courses: NO

	Lecture	Classes	**Laboratory**	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**30**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of data analysis
2. Ability to use MS Office

SUBJECT OBJECTIVES

C1 Course aim is to familiarize the student with the basics of information technology, enabling the construction of computer tools to automate analytical and decision-making procedures on the basis of business data and information of varying degrees of abstraction
C2 Acquisition of practical, analytical and programming skills useful in the development of computer tools that automate the acquisition, analysis of data and information and the generation of reports (results) on selected business processes

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Student knows the main approaches to automating analysis and decision-making in business, can characterize tools and match them to the task

relating to skills:

PEU_U01 Student is able to automate selected activities in the field of economic analysis (acquisition, processing of data and information on the basis of sources of various nature in order to structure them)

PEU_U02 Student can use IT tools for structuring information to make decisions based on complex information in natural and domain-specific language

PROGRAMME CONTENT

	Lecture	**Number of hours**
Lec 1	Discussion of the goals and structure of the lecture. Credit requirements. Organizational issues	1
Lec 2	Basics of using sheet formulas (MS Excel) for the processing of text and numerical data. Interface to databases (e.g. MS SQL Server Import/Export)	2
Lec 3	Selected methods and tools for automatic information processing. The role of PivotTables in spreadsheets	2
Lec 4	VBA elements in MS Excel and Word in the context of accessing external data. Techniques for generating text documentation	2
Lec 5	Elements of selected environments in task automation in office applications (e.g. LibreOffice Basic, Google sheets)	2
Lec 6	Overview of specialized development environments for obtaining and analyzing text documents (e.g. PowerQuery, WEKA)	2
Lec 7	Business Analytical Models – An Overview of Approaches	2
Lec 8	Lecture summary	1
Lec 9	Colloquium	1
	Total hours	15

	Laboratory	**Number of hours**
Lab 1	Overview of the aim and structure of the laboratory. Identification of requirements and areas of research. Organizational issues. Selecting data sets for analyzing. OHS regulations	2
Lab 2	Overview of techniques for creating data templates (files) with a high level of structuralisation (computer simulator or open databases)	2
Lab 3	The use of MS Excel VBA procedures in designing an analyzer of variants of economic decisions (e.g. financial and investment) based on data prepared during previous classes	4
Lab 4	Overview of techniques for creating medium-structured data templates (files) (sources include reports of listed companies, relevant open databases or own databases)	2
Lab 5	Discussion of techniques for accessing text files containing complex data (e.g. about listed companies) using the advanced capabilities of the MS	2

	Office platform (e.g. Excel VBA, MS SQL Server Import/Export, Power Query)	
Lab 6	Development of a set of procedures (VBA for Excel) obtaining numerical data needed in the analysis of the examined object or economic process	4
Lab 7	Integration of developed procedures and techniques, e.g. in financial analysis - creating applications, e.g. an analyzer of financial reports concerning a specific company	2
Lab 8	Overview of techniques to automate access to complex text files using VBA for MS Excel or MS Word (containing numbers, texts, table, graphics)	2
Lab 9	Development of a set of procedures (e.g. using VBA for MS Excel or MS Word) obtaining information (text and graphic) available in the documentation of the selected project, process or database	3
Lab 10	Development of a tool to increase the structuralisation level of the acquired information	3
Lab 11	Development of an information generator based on stochastic assumptions and testing of previously made analyzers	2
Lab 12	Presentations of works, grading	2
	Total hours	30

TEACHING TOOLS USED
N1. MS Office 2019 or later, Ekanwin, LibreOffice and various basic dialects N2. Problem lecture N3. Case and scientific paper analysis N4. Teaching materials published on ePortal N5. Task list (problems to solve, application requirements, analyzed companies, elements of simulation game) N6. Exercises on software tools N7. Work in groups with presentations of the current state of the developed applications N8. Preparation of written reports

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
P1	PEU_W01	Colloquium
F1	PEU_U01	Sub-tasks (computer applications and lab task reports – tool aspects)
F2	PEU_U02	Sub-tasks (computer applications and lab task reports – analytical aspects)
F3	PEU_U02	Summary presentations on selected works
F4	PEU_U01	Participation in discussions (discussing the progress of work on a selected topic) during laboratories
P1 – lecture grading P2 – laboratory grading P2 = 0.4*F1+0.4*F2+0.1*F3+0,1*F4		

PRIMARY AND SECONDARY LITERATURE

LITERATURA PODSTAWOWA:

1. Franczewski S., Excel. Tworzenie zaawansowanych aplikacji, Helion 2012
2. Mansfield R., VBA dla Microsoft Office 365 i Office 2019, Helion 2020
3. Winston W. L., Microsoft Excel 2019, Analiza i modelowanie danych biznesowych, APN Promise 2019

LITERATURA UZUPEŁNIAJĄCA:

1. Ferreira J., Google Apps Script. Web Application Development Essentials, O'Reilly Media Inc. 2014
2. Gładysz A., Problemy i wyzwania automatycznego przetwarzania informacji zapisanej w języku naturalnym, Logistyka 3/2014
3. Jelen B., Syrstad T., Microsoft Excel 2019 VBA and Macros, 2018
4. Osterwalder A., Pigneur Y.,Tworzenie modeli biznesowych. Podręcznik wizjonera. Helion, 2021
5. Piskorski J., Yangarber R. Information Extraction: Past, Present and Future. w: Poibeau T., Saggion H., Piskorski J., Yangarber R. (red.) Multi-source, Multilingual Information Extraction and Summarization. Theory and Applications of Natural Language Processing. Springer, Berlin, Heidelberg (2013)
6. Potiopa P., Metody i narzędzia automatycznego przetwarzania informacji tekstowej i ich wykorzystanie w procesie zarządzania wiedzą, Automatyka T. 15/2, s. 409-419, 2011
7. Roman S., Word. Makrodefinicje. Helion 2000
8. Sierotowicz T., Koncepcje modeli biznesowych organizacji działających w wirtualnej przestrzeni życia gospodarczego, Zarządzanie i Finanse, 1 cz. 4, 2013
9. Wierzbiński M., Modelowanie finansowe w projektowaniu modelu biznesowego przedsiębiorstwa, Zarządzanie i Finanse Journal of Management and Finance Vol. 15, No. 2/2/2017

Internet:

Apache OpenOffice Basic, https://wiki.openoffice.org/wiki/Documentation/DevGuide/Basic/OpenOffice.org_Basic, 2021

Ferati D., Text mining in financial industry: implementing text mining techniques on bank policies (Master's thesis), Utrecht University, https://studenttheses.uu.nl/handle/20.500.12932/26236, 2017

Google, Automate tasks with Apps Script https://developers.google.com/apps-script/overview

Microsoft, Word VBA reference, https://docs.microsoft.com/en-us/office/vba/api/overview/word. 2021

Nifenecker J.F., Reference cards for quick access to LibreOffice BASIC programming, https://documentation.libreoffice.org/en/english-documentation/macro/ 2018

Pitonyak A., Pitonyak A., OpenOffice.org Macros Explained, OOME Fourth Edition, https://www.pitonyak.org/OOME_4_0.odt, 2018

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Seminarium dyplomowe
Name of subject in English: Diploma seminar
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0039
Group of courses NO

	Lecture	Classes	Laboratory	Project	**Seminar**
Number of hours of organized classes in University (ZZU)					**15**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					**2**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**0,6**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Intersectional knowledge of issues in the course of study

SUBJECT OBJECTIVES

C1 To prepare students to complete an engineering thesis in accordance with the departmental requirements - to help formulate a managerial problem, the aim of the thesis and to plan its structure.
C2 To acquire the skills of writing a thesis (engineering project) presenting one's own achievements - starting from problem identification, planning tasks to be performed, using appropriate sources, up to the implementation of the work and interpretation of the results, taking into account editorial recommendations.
C3 To improve the ability to present ideas, concepts and planned solutions to an audience in a communicative manner.
C4 To reinforce skills of creative discussion in which one can justify and defend one's position, to draw attention to particularly important elements or faulty and omitted aspects of the planned work.
C5 To prepare students for the final diploma examination.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEU_U01 Is able to identify a managerial problem and plan its solution using engineering methods, techniques and tools.

PEU_U02 Is prepared to develop a professional project in the form of engineering design.

PEU_U03 Is able to prepare a presentation containing analysis results and problem solution concepts.

PEU_U04 Is able to justify his/her ideas and solutions in a discussion and critically evaluate planned actions and solutions of others.

PROGRAMME CONTENT

	Seminar	Number of hours
Semin 1	Organizational classes: introduction to the course, plan and organization of the classes, credit rules.	1
Semin 2	Discussion of university and departmental requirements for engineering theses. Process and schedule of graduation. Discussion of the principles of identifying and formulating a managerial problem whose solution requires the use of engineering methods and tools, and the formulation of the topic and purpose of the thesis. Examples of good and bad engineering thesis topics/objectives. Recommendation of consultations with potential promoters - to be refereed in the next class Refereeing and discussion of progress in choosing a topic and promoter (1).	2
Semin 3	Discussion of the thesis statement template. Topic, aim, scope, structure. Discussion of thesis construction - order of contents, introduction and conclusion. Common errors in the thesis. Referencing and discussion of progress in choosing a topic and supervisor (2).	2
Semin 4	Discussion of requirements for editing the paper and editorial recommendations. Discuss/refer how to access, use, analyze and cite literature sources. Consultation of the first version of the thesis statement. Discussion. Consultation and planning of the scope of work to be completed in the current semester (for course credit).	2
Semin 5	Discussion of the criteria for final evaluation of the work (review form). The concept of plagiarism, anti-plagiarism system. Presentation of recommendations for developing a part of the work for course credit. Approval of the final version of the thesis statement. Referring, consulting and discussing problems and progress in the work. Presenting recommendations on how to present the progress of the thesis in the next classes.	2
Semin 6	Discussion of the course of the diploma exam. Examination issues and questions. Referencing, consultation and discussion of problems and progress of the thesis. Individual presentations of progress and further plans to complete the thesis (1). Discussion.	22
Semin 7	Individual presentations of progress and further plans for completion of work (2). Discussion	2
Semin 8	Individual presentations of progress and further plans for completion of work (3). Discussion	2
	Total hours	15

TEACHING TOOLS USED

N1. Presentations of selected issues related to the thesis topic.

N2. Multimedia presentations - own and foreign (positive and negative examples).
N3. Problem discussion, recognizing advantages and criticizing disadvantages of solutions.
N4. Individual consultations of students' problems connected with planning and realisation of the work

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01	Timely submission and evaluation of a working statement of work completion (topic, purpose, problem, concept, initial structure)
F2	PEU_U03	Evaluation of the preparation and presentation of the progress of the thesis and follow-up plans.
F3	PEU_U04	Attendance, participation in discussion.
F4	PEU_U02	Initial portion of work (e.g., characterization of the object, problem, and methods and techniques for solving the problem)
P = 0,1*F1 + 0,2*F2 + 0,3*F3 + 0,4*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Literature related to the issues of the thesis - selected independently and recommended by the thesis supervisor.

SECONDARY LITERATURE:

[1] Zenderowski R., Przewodnik po metodologii pisania i obrony pracy dyplomowej, CeDeWu 2020.
[2] Kwaśniewska K., Jak pisać prace dyplomowe. Wskazówki praktyczne, KPWS 2017.
[3] Grzybowski P., Sawicki K., Pisanie prac i sztuka ich prezentacji, Impuls 2010.
[4] Blein B., Sztuka prezentacji i wystąpień publicznych. RM 2010.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Systemy analityczne
Name of subject in English: Analytical systems
Main field of study (if applicable): Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0041
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**30**		
Number of hours of total student workload (CNPS)	**25**		**75**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**1**		**3**		
including number of ECTS points for practical classes (P)			**3**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of business data exploration, analysis, and visualization
2. Basic experience in spreadsheet modelling with Excel

SUBJECT OBJECTIVES

C1 to get acquaintance with selected specialized applications of advanced statistical (model-driven) and computational (data-driven) methods based on machine learning for developing predictive models, analysing imperfect data and text-mining
C2 to develop practical experience and skills with selected top predictive analytics software packages

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 has basic knowledge of methods of business intelligence and advanced analytics, in the domain of descriptive and predictive analytics, as well as machine learning, imperfect data analysis, and text analytics

relating to skills:

PEU_U01 is skilful at selecting and preparing data for a particular business problem, using appropriate tools of advanced analytics and machine learning
PEU_U02 is able to apply selected information technologies of business analytics, implemented in available analytical packages, for making descriptions, diagnoses, critical analysis of decision alternatives, and predictions concerning specific decision problems, as well as explaining and interpreting findings to business decision-makers

relating to social competences:
PEU_K01 can interact and work in a team to solve a specific task with a clear distinction of the role of and input by individual members of the project team

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussing the conditions of obtaining credit. Analytic Systems - Introduction to data science	1
Lec 2	Introduction to Machine Learning. Learning process and predictors selection in Tableau and WEKA	2
Lec 3	Predictive analytics in RapidMiner. Analytic project in predictive analytics – premises	2
Lec 4	Processing imperfect data: data cleansing, missing data, imbalanced data	2
Lec 5	Unstructured data analytics – text mining	2
Lec 6	Explainability and interpretability of predictive analytics results	2
Lec 7	ModelOps: Advanced analytic systems	2
Lec 8	Summing up. Written test.	2
	Total hours	**15**

Laboratory		**Number of hours**
Lab 1	Discussing the conditions of obtaining credit and lab safety rules. Discussion of tasks, data and software; sample predictive analytics projects	2
Lab 2	Elements of predictive analytics in Tableau with R	2
Lab 3	Predictive analytics in WEKA Explorer	2
Lab 4	Analytic process development in WEKA Knowledge Flow	2
Lab 5	Predictive analytics in RapiMiner. Direct Marketing	2
Lab 6	Designing processes and analysing predictive accuracy in RapidMiner.	2
Lab 7	Price Risk Clustering – cluster analysis in RapidMiner	2
Lab 8	Optimization of model parameters. Credit Risk Modelling	2
Lab 9	Preprocessing. Imperfect data analytics	2
Lab 10	Unstructured data analytics in RapidMiner. Text mining	2
Lab 11	Sentiment Analysis in in RapidMiner	2
Lab 12	Explanation/interpretation of predictive analytics results for decision makers in Tableau and rapidMiner	2
Lab 13	Predictive analytics in Tableau&R, WEKA, RapidMiner – summing up	2

Lab 14	Discussing group project work	2
Lab 15	Presentation and assessment of group project results	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Teaching materials published on the WUST e-portal N2. Tableau Desktop with R packages in R-Studio; optional: TabPy N3. WEKA: Explorer, Experimenter, Knowledge Flow N4. RapidMiner Studio; optional: MeaningCloud N5. Multimedia presentations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02, PEU_K01	Task 1 (Tableau with R; 10 pts)
F2	PEU_U01, PEU_U02, PEU_K01	Task 2 (WEKA; 10 pts)
F3	PEU_U01, PEU_U02, PEU_K01	Task 3 (RapidMiner: main processes; 10 pts)
F4	PEU_U01, PEU_U02, PEU_K01	Task 4 (RapidMiner: advanced functions; 10 pts)
F5	PEU_U01, PEU_U02, PEU_K01	Task 5 (RapidMiner: text analytics; 10 pts)
F6	PEU_U02, PEU_K01	Task 6 (Interpretability of predictive analytics results; 10 pts)
F7	PEU_U02, PEU_K01	Task 7 (Comparing analytic tools; 10 pts)
F8	PEU_U01, PEU_U02, PEU_K01	Task 8 (Analytic project; 40 pts)
F9	PEU_W01	Written test.
F10		Activity [up to 10 pts]
P (Lecture) = F9		
P (Laboratory) = Sum (F1,F2,F3,F4,F5,F6,F7,F8) + F10; Grade: 3.0 from 40, 3.5 from 50, 4.0 from 60, 4.5 from 70, 5.0 from 80		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Foreman J.W. (2017) Mistrz analizy danych. Od danych do wiedzy, Helion (Data Smart: Using Data Science to Transform Information into Insight, Wiley, 2014)
[2] Szeliga M. (2019) Praktyczne uczenie maszynowe, WN PWN

SECONDARY LITERATURE:

[1] Ameisen E. (2021) Uczenie maszynowe w aplikacjach: projektowanie, budowa i wdrażanie, Helion (Building Machine Learning Powered Applications: Going from Idea to Product, O'Reilly, 2020)
[2] De Mauro A., Marzoni F., Walter A.J. (2021) Data Analytics Made Easy, Packt Publishing
[3] Delen D. (2020) Predictive Analytics: Data Mining, Machine Learning and Data Science for Practitioners, 2nd Edition, Pearson
[4] Eremenko K. (2021) Kluczowe kompetencje specjalisty danych: jak pracować z danymi i zrobić karierę, PWN (Confident Data Skills, 2020, Kogan)
[5] Grus J. (2019) Data Science od podstaw, Helion (Data Science from Scratch: First Principles with Python, O'Reilly, 2015)
[6] Hofmann M., Klinkenberg R. (2016), RapidMiner. Data Mining use cases and business analytics applications, Chapman and Hall/CRC
[7] Hudgeon D., Nichol R. (2020) Machine Learning for Business, Manning Publications
[8] Larose D.T. (2006) Odkrywanie wiedzy z danych: wprowadzenie do eksploracji danych, WN PWN (Discovering Knowledge in Data, Wiley, 2014)
[9] Larose D.T. (2008) Metody i modele eksploracji danych, WN PWN (Data Mining Methods and Models, Wiley, 2006)
[10] Molnar C. (2021) Interpretable Machine Learning. A Guide for Making Black Box Models Explainable. [https://christophm.github.io/interpretable-ml-book/]
[11] Provost F., Fawcett T. (2015) Analiza danych w biznesie. Sztuka podejmowania skutecznych decyzji, Helion (Data Science for Business, O'Reilly 2013)
[12] Schutt R., O'Neil C. (2015) Badanie danych. Raport z pierwszej linii działań. Unikalne wprowadzenie do nauki o danych, Helion (Doing Data Science: Straight Talk from the Frontline, O'Reilly, 2014)
[13] Sharda R., Delen D., Turban E. (2020) Analytics, Data Science, and Artificial Intelligence: Systems for Decision Support, Pearson
[14] Stephenson D. (2019) Big Data. Nauka o danych i AI bez tajemnic. Helion (Big Data Demystified: How to use big data, data science and AI to make better business decisions and gain competitive advantage, Pearson, 2018)
[15] Surma J. (2009) Business Intelligence. Systemy wspomagania decyzji biznesowych, WN PWN
[16] Szeliga M. (2019) Praktyczne uczenie maszynowe, WN PWN
[17] Treveil M. et al. (2020) Introducing MLOps, O'Reilly Media
[18] Vaughan D. (2021) Umiejętności analityczne w pracy z danymi i sztuczną inteligencją: wykorzystywanie najnowszych technologii w rozwijaniu przedsiębiorstwa, Helion (Analytical Skills for AI and Data Science: Building Skills for an AI-Driven Enterprise, O'Reilly, 2020)
[19] Witten I.H., Frank E., Hall M.A., Pal. C. (2016) Data Mining: Practical Machine Learning Tools and Techniques, 4thd Edition, Morgan Kaufman
[20] Wodecki A. (2021) Sztuczna inteligencja we współczesnych organizacjach: jak autonomiczne systemy mogą wpływać na firmy, modele biznesowe i rynki, PWN

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zarządzanie zasobami ludzkimi
Name of subject in English: Human Resource Management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0042
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**75**	**50**			
Form of crediting	**exam**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**3**	**2**			
including number of ECTS points for practical (P) classes		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
Basic knowledge in the scope of basis of management and organizational behaviour.

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SUBJECT OBJECTIVES
C1*: Providing students with information on objectives, instruments, principles and elements occurring in the human resource management in the organisation and internal and external factors of the process.*
C2: *Allowing students to directly learn principles and instruments that are actually used in particular areas of human resource management in given organisations (case studies).*
C3: *Enable students to learn innovative ways to improve the human resource management process and acquire the skills to apply them.*

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEU_W01*: Has a basic knowledge about the human resource in organization (HRM). Knows the objectives and determinants of HRM process. Knows basic principles and instruments using in recruitment, development, evaluation and rewarding of employees. Understand the factors of the effective using these instruments.*

PEU_W02: *Explains the essence, meaning and forms of team action, and in particular carried out in a project form. He knows and interprets the principles of team building and knows the terms and conditions of their functioning. He knows the roles of leader and team members.*
PEU_W03: *Has a basic knowledge and about the methods of diagnosis and improvement of HRM process and. Knows the basic standards and innovative methods of improvement personnel function in specific areas of personnel management.*

Relating to skills:

PEU_U01: *Student is able to analyze and evaluate basic elements and typical managerial and content-related problems of the task structure of the personnel function in a specific organization, interpreting basic concepts and issues related to the personnel function on the basis of literature and evaluating the existing state together with the indication of ways to solve existing problems or to improve the realization of the personnel function.*
PEU_U02: *Student is able to choose sources of information and use techniques of obtaining them (interview, survey, documentation), is able to integrate the information obtained, to make their interpretation.*
PEU_U03: *Student is able to prepare expertise in the form of a written report and present and defend the results of diagnostic research*

Relating to social competences:

PEU_K01: *Student is aware and prepared to identify, analyse and settle employee problems occurring in the work place in relation with the performance of the personnel function.*

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Presentation of the purpose of the class, its course and assessment criteria (regulations, rules for passing) The concept and essence of the HR function, HR management goals, conditions, extent and evolution of the HR function. The tasks structure and content of the process of personnel management. Philosophy, strategy and personnel policy, Human Resources Management (HRM) and Personnel Management (PM).	1 1
Lec 2	Personnel selection: requirement bench, principles and instruments of recruitment, selection and its tools. Introduction of the employee. Evaluation of the effectiveness of selection.	2
Lec 3	Objectives and types of assessment staff. Periodic employee appraisal system (PEAS). The criteria, methods and principles for the assessment of employees. The effectiveness of PEAS.	2
Lec 4	The remuneration policy. Objectives and principles of differentiation of remuneration. The tariff system in basic salary: valuation of work.	2
Lec 5	The rules of renumeration. Tables of wage rates. Forms of basic wages. Bonuses, awards and other components of remuneration.	2
Lec 6	Workforce potential. Shaping of employee development. Career path. Training - objectives, types, evaluation of effectiveness.	2
Lec 7	Methodological approaches in the study of personnel problems. The procedures, methods and techniques. Principles of construction of selected research methods (observation, interview, analysis of sources of documentation, survey, paraeksperyment).	2
Lec 8,9	Innovative ways to improve the HR function - competence management.	4
Lec 10	Innovative ways to improve the HR function. This flexible employment structure - personnel audit and restructuring of employment. Techniques to support employment flexibility.	2

Lec 11	Innovative ways to improve the HR function - control of personnel management function (including controlling personal).	2
Lec 12	Innovative ways to improve the HR function – personnel marketing, internal communication system of the organization. Features an efficient communication process.	2
Lec 13	Team work organization - the essence, objectives, importance. Forms of team activities. Task (project) - building rules. The roles of leader and team members. The specificity of directing the project team, the effectiveness and efficiency of the project team.	2
Lec 14	The functioning of the project team: the organization of work, motivating and evaluating team members, communication and sharing of knowledge in the team, decision making and conflict resolution in the project team.	2
Lec 15	Summary of lecture content.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl1	Organizational hour: Presentation of the classes, their progress and criteria for evaluation of the students learning effects. The division into teams and establish a schedule of the tasks.	2
Cl2	Consult the choice thematic area of diagnostic tests. Test of knowledge - characteristics of HRM and PM. **Task 1:** Identifying similarities and differences in the structure of task of personnel function; philosophy HR Human Resources Management (HRM) and Personnel Management (PM).	2
Cl3	Consultation of the method of conducting in the scope of personnel selection. Test of knowledge - personnel selection. **Task 2:** Development of requirements indicated workplace and propose a method of evaluation of its fulfillment by the candidates. Materials: Characteristics of the workplace.	2
Cl4	Consultation of the method of conducting in the scope of periodic evaluation of employees. Test of knowledge - periodic evaluation of employees. **Task 3:** The periodic evaluation of employees - a case study to determine the advantages and disadvantages and compliance with the standard literature. Materials: Internal regulations of periodic evaluation of employees, performance characteristics at selected workplaces.	2
Cl5	Consultation of the method of conducting in the scope of wage formation. Test of knowledge - wage formation. **Task 4:** Job evaluation of selected positions; the design of salary scales (method UMEWAP). Materials: Characteristics of the company, the job description for selected positions, remuneration regulations.	2
Cl6	Consultation of the method of conducting in the scope of development of employees. Test of knowledge - development of employees. **Task 5:** Career Development - a case study, determination the advantages and disadvantages and compliance with the standards in basic literature. Materials: The procedure for planning a career in a particular company.	2
Cl7-Cl8	Introductory presentations (exactly 10 minutes) - student speeches presenting: - **Theoretical background** for the selected area of personnel management - the result of own, original literature studies - recommended in the literature innovative methods,	

	instruments and rules used in the selected area of personnel management and their advantages and disadvantages (about 5 minutes) **- Object of research** (Name, organizational and legal form, subject of activity, organizational structure (about 1 minute); **- Formal documents** (name and general characteristics) which establish the principles and instruments of personnel management implementing in the whole organization, regarding the topic area selected by the team (about 4 minutes). Discussion and presentation by the teacher of the achieved learning outcomes and indication of issues - problems that require a detailed diagnosis and orientation of students on innovative instruments applicable in the organization under study. (10 minutes)	
Cl9	"Rehearsal" - presentations of one or two teams will be detail reviewed by lecturer and students - will be discussed the advantages and disadvantages of the presentation. The teams that will take part in the rehearsal will be their "normal" presentations within the deadlines set in the schedule presentation.	2
Ćw10-13	Presentation of the results of researches - case studies - discussion and evaluation of the presentation.	8
Cl14-15	Discussion of the conclusions of the presentation of the results of diagnostic research. Develop a written report - an indication of advantages and disadvantages. Summary schedule - to present the achievements of individual learning effects for each student.	4
	Total hours	30

TEACHING TOOLS USED
N1. Lecture. N2. Lecture materials available in electronic form on the website. N3. Studies in chosen organization – interviews, documentary analysis, surveys. N4. Simulation exercises in teams. N5. Work in diagnostic groups - consultations with the lecturer. N6. Written report, edited according to a strictly defined template N7. Students' presentation of the final reports - audiovisual media (slides, computer projector) N8. Discussion. N9. Student's own work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	**Way of evaluating learning outcomes achievement**
F1 – Lec 7	*PEU_W01, PEU_W02; PEU_W03*	Exam
Min 60% required		

Classes assessment: ***P= F2+F3+F4+F5*** **only if:**

1. Number of attendance is > 8
2. For each task (F2-F5) student earned at least 50% number of points.
No condition 1 or 2 means the assessment Failed

	F2	F3	F4	F5		
Activity	Activity during class	presentation No 1	presentation No 2	report	total	Required points
points	**15**	15	30	40	100	50%
passing all learning outcomes with at least 50% is mandatory						

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Armstrong M., Taylor S., Zarządzanie zasobami ludzkimi, Wolters Kluwer Polska 2016.
2. Król H., Ludwiczyński A., Zarządzanie zasobami ludzkimi, Wydawnictwo Naukowe PWN, 2021.
3. Oleksyn T., Zarządzanie kompetencjami. Teoria i praktyka, Wolters Kluwer Polska 2017.
4. Szczepanik R. Budowanie zespołu. Poradnik dla menadżera personalnego. Wydawnictwo Helion , Gliwice 2005.

SECONDARY LITERATURE:

1. Oleksyn T., Zarządzanie zasobami ludzkimi w organizacji, Wolters Kluwer Polska 2016
2. Sidor-Rządkowska M., Kompetencyjne systemy ocen pracowników. Przygotowanie, wdrażanie i integrowanie z innymi systemami ZZL, Wolters Kluwer Polska 2020

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Controlling projektu
Name of subject in English: Project controlling
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0043
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**	**15**			
Number of hours of total student workload (CNPS)	**50**	**25**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**1**			
including number of ECTS points for practical classes (P)		**1**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge about the fundamentals of organization and management, the fundamentals of project management and the fundamentals of accountancy.

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SUBJECT OBJECTIVES

C1 To provide the students with the fundamental knowledge about the essence of project controlling and its role in the process of project management.
C2 To provide the students with the knowledge about the functional, organizational and instrumental solutions of project controlling.
C3 Shaping and developing the ability of implementation of basic tools of project controlling.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Has a knowledge about the essence of project controlling. Understands the importance of restructuring processes related to the implementation of project controlling in the organization. Knows the factors influencing the realization of project controlling.

PEU_W02 Knows the organizational solutions of project controlling, including the solutions relating to the controllers and responsibility centers
PEU_W03 Has knowledge about the tools of project controlling.

relating to skills:
PEU_U01 Can apply basic instruments projects controlling.

relating to social competences:
PEU_K01 Is prepared to identify and interpret the economic aspects and impacts of engineering activities in organizations

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introduction, overview of the lecture program and the rules of passing. Controlling and the project controlling. The essence of project controlling. The role of project controlling and its place in the process of project management. Project controlling, project controlling portfolio and controlling enterprise managed by the project.	3
Lec 2	Types of project controlling. Conditions of the implementation of project controlling. Factors influencing the shape project controlling solutions. Organizational solutions of project controlling: Responsibility centers in project controlling (measures of assessment of project results and metrics assessment of responsibility centers).	3
Lec 3	Organizational solutions of project controlling: The role and tasks of project controller (system competence and responsibility in the company, expectations related to controllers). Instrumental solutions of project controlling: Cost accounts used in project costs planning (full costing, variable costing, activity-based costing, target costing).	3
Lec 4	Instrumental solutions of project controlling: Budgeting in project controlling. Controlling profit and loss account as well as deviation analysis.. Earned Value as a method of controlling and steering the result of the project. Reporting on project implementation (project evaluation measures), rewarding the project team.	3
Lec 5	Implementation solutions of project controlling. Summary. Colloquium.	3
	Total hours	15

Classes		**Number of hours**
Cl 1	Organizational classes - overview of the program and the rules of passing. Project initiation: identifying project goals and stakeholder expectations, planning tasks, resources and project resource costs, defining project success criteria - case study.	3
Cl 2	Scheduling and economic efficiency of the project: planning costs and determining the demand for project financing - case study.	3
Cl 3	Operational and financial budgeting of the project (impact of the project implementation on the financial statements) - case study.	3
Cl 4	Deviation analysis of project results using the Earned Value method - case study.	3

Cl5	Project and project portfolio profitability evaluation, selection of project evaluation measures - comparative assessment and risk analysis, construction of a reporting system - case study.	3
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Case study – team work Multimedia ended with a presentation prepared by students N3. Self-study – final assessment preparation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02 PEU_W03	Colloquium
F2	PEU_U01, PEU_K01	Active participation in the case study - team work completed with the presentation of the results
F3	PEU_U01, PEU_K01	Activity during the class.
P(lecture)=F1 P(classes)=0,6*F2+0,4*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1.] Niedbała B., Controlling w przedsiębiorstwie zarządzanym przez projekty, Wolters Kluwer, Kraków 2008.

[2.] Łada M., Kozarkiewicz A., Zarządzanie wartością projektów. Instrumenty rachunkowości zarządczej i controllingu, Wydawnictwo C.H. Beck, Warszawa 2010.

[3.] Klinowski M., Rachunkowość zarządcza zorientowana na projekty, wyd. III, CeDeWu, Warszawa 2021.

SECONDARY LITERATURE:

[1.] Bukłaha E., Menedżerski controlling projektów. Koncepcje I wyniki badan, Oficyna Wydawnicza SGH, Warszawa 2019.

[2.] Goliszewski J., Controlling. Koncepcja, zastosowania, wdrożenie, Oficyna Wolters Kluwer business, Warszawa 2015.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: E-gospodarka
Name of subject in English: E-economy
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time studies
Kind of subject: obligatory
Subject code: W08IZZ-SI0044
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**15**
Number of hours of total student workload (CNPS)	**25**				**25**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark final course with (X)					
Number of ECTS points	**1**				**1**
including number of ECTS points for practical (P) classes					**1**
including number of ECTS points for direct teacher-student contact (BU) classes	**0,6**				**0,6**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

SUBJECT OBJECTIVES

C1 To prepare students to use digital economy solutions in enterprises and managers' work.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 – has structured knowledge concerning applications of IT in business (foundations of technical, legal and economic infrastructure in the electronic economy).

PEU_W02 – knows the opportunities of IT implementation in business, potential benefits, threats and possibilities of their minimization.

relating to skills:

PEU_U01 – can suggest the solution of the selected problems in the organization using IT tools.

PEU_U02 – can identify features, advantages and disadvantages of the technologies applied and minimize possible problems and threats.

relating to social competences:

PEU_K01 – Student can think and act in the entrepreneurial way.

PROGRAM CONTENT

	Lectures	**Number of hours**
Lec 1	Introduction, rules of crediting.	1
Lec 2	Development of the Internet. Users. Basic terms.	2
Lec 3	History of the e-business. e-business models.	2
Lec 4	e-commerce on B2B, B2C and C2C markets.	3
Lec 5	Technologies applied. Prospects of development.	2
Lec 6	e-government.	1
Lec 7	Image of the company in the Internet. Written test.	2
Lec 8	Opportunities and threats of the digital economy (for the business and the society). Retake.	2
	Total hours	15

	Seminar	**Number of hours**
Sem 1	Presentation of the subject, requirements and rules of receiving a credit.	1
Sem 2	Legal aspects connected with electronic commerce (in Poland and abroad).	2
Sem 3	Online store (elements, technologies and its prices, promotion).	2
Sem 4	Logistic and payments in the digital business.	2
Sem 5	Services supporting e-commerce. Digital product.	2
Sem 6	Computing cloud. Security aspects in e-economy.	2
Sem 7	e-signature, e-documents, blockchain.	2

Sem 8	e-medicine, Industry 4.0. Summary and crediting.	2
	Total hours	15

TEACHING TOOLS USED
N1. Lecture with multimedia presentation N2. Group discussion during lecture and seminar N3. Student's unassisted work – preparation of the presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	U01, U02	activity
F2	U01, U02	presentation
F3	W01, W02	test
P(seminar)= 0,2*F1+0,8*F2 P(lecture)=F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Biblia e-biznesu 3.0, Dutko M. (red.), Onepress, Gliwice 2021.
[2] Chaffey D.: Digital Business and e-Commerce Management: Strategy, Implementation and Practice. PWN, Warszawa 2022.
[3] Raporty (Społeczeństwo informacyjne, e-commerce w Polsce itp.)

SECONDARY LITERATURE:

[1] Skorupska J.: E-commerce. Strategia, Zarządzanie, Finanse. Wydawnictwo Naukowe PWN, Warszawa 2017.
[2] Strony internetowe np. WorldStats, We are Social.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Praca inżynierska
Name of subject in English: Diploma project
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0045
Group of courses NO

	Lecture	Classes	Laboratory	**Project**	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**350**	
Form of crediting				**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**14**	
including number of ECTS points for practical classes (P)				**14**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				**8**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Cross-curricular knowledge of issues in the course of study

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SUBJECT OBJECTIVES

C1 Synthesis of knowledge and practical from the entire first degree studies, especially in the field of the selected specialisation.
C2 To consolidate skills of acquiring and using scientific and technical information.
C3 To achieve proficiency in engineering design of solutions to managerial problems.
C4 To prepare a work in a compact form (thesis) on the basis of knowledge gained during studies, literature information, analytical and design work or results of research work.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEU_U01 Be able to make an in-depth analysis of a running or designed process in an organization and indicate dysfunctions and/or needs for improvement.
PEU_U02 Be able to collect and analyze information from various sources on management and engineering methods, techniques and tools.
PEU_U03 Can correctly identify, select and apply basic engineering methods, techniques and tools to solve a managerial problem.

PEU_U04 Be able to correctly identify a managerial problem and solve it using appropriate engineering methods, techniques and tools.
PEU_U05 Be able to prepare a professional work - a comprehensive text presenting in a rigorous way the results of design work.PEU_U02

PROGRAMME CONTENT		
Project		**Number of hours**
Proj 1	Analysis of the organization being addressed. Identification, problem analysis and design assumptions	4
Proj 2	In-depth literature analysis of the issues addressed in the thesis, including engineering methods, techniques and tools used to solve problems of a particular class.	4
Proj 3	Implementation of the project.	12
Proj 4	Analysis of the feasibility and desirability of implementing the proposed solutions, schedule, expected effects and economics.	2
Proj 5	Determination of directions of future work on the issue included in the scope of the thesis.	2
Proj 6	Editing of the thesis	6
	Total hours	30

TEACHING TOOLS USED	
N1.	Literature study.
N2.	Interviews with employees of the organization that is the subject of the study.
N3.	Own analytical and creative work.
N4.	Individual consultations.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01-PEU-U05	Ongoing evaluation of systematic work and partial results.
F2	PEU_U01-PEU-U05	Final evaluation of the finished work (thesis).
P = 0,5*F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Literature related to the problems of the thesis - independently selected and recommended by the thesis supervisor.

SECONDARY LITERATURE:

[1] Zenderowski R., Przewodnik po metodologii pisania i obrony pracy dyplomowej, CeDeWu 2020.
[2] Kwaśniewska K., Jak pisać prace dyplomowe. Wskazówki praktyczne, KPWS 2017.
[3] Grzybowski P., Sawicki K., Pisanie prac i sztuka ich prezentacji, Impuls 2010.
[4] Blein B., Sztuka prezentacji i wystąpień publicznych. RM 2010.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Studium wykonalności projektów infrastrukturalnych
Name of subject in English: Feasibility study of infrastructural projects
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0047
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**			**15**	
Number of hours of total student workload (CNPS)	**25**			**50**	
Form of crediting	crediting with grade			crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	**1**			**2**	
including number of ECTS points for practical classes (P)				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**			**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Students should have skills of effects connected with courses of :

1. economics (related to the knowledge of macro- and microeconomic environment as well as special aspects of source markets);
2. financial (the knowledge of the kinds and the structure of financial statements, the methods of financial analysis and skills for calculating financial key profitability ratios;
3. project management (the knowledge of the life cycle of project).

SUBJECT OBJECTIVES

C1: The presentation of: reasons for feasibility study, structure of feasibility study, kind of analyzes, its scope and its methods as well as the tools (including IT tools) which support this analysis.

C2: The creation of skills to define the project scope as well as its clear describing for experts of social science and for technical one.

C3: The creation of skills to conduct the needed analysis for creating the feasibility study. The creation of skills to make needed assumptions – which came from law, economic situation and the project specifics – to carry out the analysis of social-economic-ecological efficiency of project. Student carries out social Cost and Benefit Analysis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01: know social, technical, economic and ecological conditions for infrastructural projects.

PEU_W02: Know the specifics of infrastructure projects as well selected methods and tools supporting complex analysis to create the feasibility study (e.g. methods of social-economic-ecological efficiency analysis).

relating to skills:

PEU_U01: possess skills to make elements of feasibility study, present clearly results of his/her works for experts of social science and for technological experts, using appropriate analytical tools.

PEU_U02: possess skills to identify and to define the scope of engineering project (infrastructural investment), to dee3fine its elements, norms and standards as well as to define conditions as: cultural, social, economic, technical environmental. Use appropriate analytical methods (e.g. risk matrix, logical matrix) and IT tools. Possess skills to define assumptions for analysis and , on this base he or she carry out this analysis

PEU_U03: possess skills to carry out social-economic- ecological analysis of efficiency in hazard environment.

relating to social competences:

PEU_K01: possess skills to participate in the preparation of infrastructural projects taking to consideration legal, economic, political and ecological issues as well as to clearly inform about them the social.

PROGRAMME CONTENT

	Lecture	**Number of hours**
Lec 1	Organizational lecture. Kinds and specification of infrastructural projects and the feasibility study according to selected standards (UNIDO, European grants).	2
Lec 2	Feasibility analysis and its stages.	1
Lec 3	Research methods of feasibility study (TELOS method) and project definition PCM method).	2
Lec 4	Logic intervention Logical matrix.	1
Lec 5	Kind of analysis and used methods. The analysis of project, technical analysis, stakeholder analysis. The institutional and legal analysis.	2

Lec 6	Economic Cost and Benefit Analysis for feasibility study. Methods to estimate the economic-social-ecological cost and benefits.	2
Lec 7	Evaluation methods of social-economic-ecological efficiency dedicated to infrastructural projects (e.g.: ENPV, EIRR, EV).	2
Lec 8	Estimate methods of risk of infrastructural projects as well as methods of risk management. Evaluation risk matrix.	2
Lec 9	Final test.	1
	Total hours	15

Project		**Number of hours**
Proj 1	Organizational class	1
Proj 2	The characteristic of infrastructure projects (energy, water-sewer, telecommunication, road). Declaration of assumptions for CBA. Stages of project	2
Proj 3	Methods of market environmental analysis and stakeholder one – the describing the project assumptions (CBA).	2
Proj 4	Logical matrix - practise	2
Proj 5	The estimation of the social-economic-ecological cost and benefits – project of tools	4
Proj 6	The estimation methods of risk for selected projects - practise	2
Proj 7	Presentation results of students' work	2
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentation. N2. IT tools (Excel, Word, PowerPoint.(for presentation and calculation) N3. Templates prepared by the lecturer (e.g. logical matrix) and published them on e-portal N4. Paper or digital report (feasibility study). N5. Public institution's Databases (e.g. PNB, Statistics Poland) N6. Official hours. N7 Teamwork completed with the result presentation. N8 Shared disks N9 The case studies of feasibility study of infrastructural projects.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Writing test
F2	PEU_W01 PEU_W02	Activity on the lectures

F3	PEU_U01, PEU_U02, PEU_K01	Activity on the projects (student's work, its preparation before project), Systematically work during classes Result presentation
F4	PEU_U02	Creating or improving analytical tools (Systematically work during classes)
F5	PEU_U01, PEU_U02, PEU_U03 PEU_K01	Separated elements of feasibility study (writing form)
F6	PEU_U01, PEU_U02, PEU_U03 PEU_K01	Verbal presentation final version of separated elements of feasibility study.
$P(lecture) = 0{,}8 \cdot F1 + 0{,}2 \cdot F2$ $P(project) = 0{,}2 \cdot F3 + 0{,}3 \cdot F4 + 0{,}3 \cdot F5 + 0{,}2 \cdot F6$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Behrens W., Hawranek P. M., *Poradnik Przygotowania przemysłowych studiów feasibility*, UNIDO, Warszawa, 1993.

[2] Bogucki B., *Studium wykonalności. Poradnik*, Presscom Sp. z o.o., Wrocław 2016.

[3] Czaja St., Becla A., Zielińska A., *Analiza kosztów i korzyści w wycenie środowiska przyrodniczego*, Difin, Warszawa 2012.

SECONDARY LITERATURE:

[1] Kawala J., Modras M., Kalinowska E., *Studium wykonalności dla inwestycji komunalnych*, LAMTECH Konsulting, Kraków 2003.

[2] Komisja Europejska, *Przewodnik po analizie kosztów i korzyści projektów inwestycyjnych. Narzędzia analizy ekonomicznej polityki spójności 2014-202, grudzień 2014.*

[3] Overton R., *Feasibility studies made simple*, Martin Books, Austria [opublikowane w 2007 w formie eBOOK].

[4] SENTRO, *Handbook for performing feasibility studies of alternative Energy systems*, Report No. SENTRO/D4/2008/WP4, November 2008

[5] Solińska M., Soliński I., *Efektywność ekonomiczna proekologicznych inwestycji rozwojowych w energetyce odnawialnej*, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Kraków 2003.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Trening kierowniczy
Name of subject in English: Management training
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0048
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			**30**		
Number of hours of total student workload (CNPS)			**75**		
Form of crediting			**Crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points			**3**		
including number of ECTS points for practical (P) classes			**3**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)			**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to use a computer spreadsheet (MS Excel)

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SUBJECT OBJECTIVES

C1: To provide opportunities to purposeful apply knowledge from various areas of management and its integration in the process of making business decisions in information deficit and time pressure conditions.

C2: Enhancing students' abilities to critical systemic analysis of business organization's outcomes and their abilities to present and discuss conclusions from this analysis.

C3: Enhancing students' abilities to develop a 'what-if' decision support system with the use of generally available tools (computer spreadsheets).

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01 Understands the importance of intra- and inter-organizational relations. Knows and understands the influence of the organizational environment on the organization's functioning.

Relating to skills:

PEU_U01: Using information related to processes taking place in a business organizations and knowledge about the key financial and performance indicators, he/she is able to develop a

simple computer system supporting quantitative decisions regarding various functional areas of this organization.
PEU_U02: Can apply the previously prepared decision support system to make predictions of the business organization's outcomes and to effectively use these predictions in enterprise management.
PEU_U03: Is able to make a critical comparative analysis of the competing companies' strategies and outcomes, identifying errors, dilemmas and cause-effect relationships, and to present the results of this analysis.
Relating to social competences:
PEU_K01 Is prepared to take responsibility for the tasks entrusted to him/her. Is able to properly define priorities in his/her own work and in cooperation with others in connection with fulfilling various organizational roles.
PEU_K02 Acknowledges socio-economic systems' complexity and the necessity of lifelong learning.
PEU_K03 Is prepared to identify and to analyze professional and social problems. Is ready to flexibly look for ways to solve them.

PROGRAMME CONTENT		
Laboratory		**Number of hours**
Lab1	Information on the course completion criteria and the course content. An introduction to the management game, including the description of the economic system represented in the model. Start of work on the decision support system: the *Materials* subsystem.	2
Lab2	Development of the decision support system (continuation) - subsystems: *Necessary Production Personnel and Necessary Production Machines*, *External Warehouses, Natural Environment*.	2
Lab3	Development of the decision support system (continuation) - subsystems: *Work in Process*; *Finished Products*, *Selling Price*.	2
Lab4	Development of the decision support system (continuation) - subsystems: *Selling Price, Credits; Cash Flow*. Information on the Test Game. Students' knowledge assessment (a test).	2
Lab5	The Test Game. Decision support systems' verification and correction. Students' knowledge assessment (a resit).	2
Lab6	Decision support systems' verification and correction (continuation). Preparation for the business game run (game parameters, demand forecast, procedural rules, teams formation).	2
Lab7	Run of the management game.	2
Lab8	Run of the management game (continuation).	2
Lab9	Run of the management game (continuation).	2
Lab10	Run of the management game (continuation).	2
Lab11	Run of the management game (continuation).	2
Lab12	Run of the management game (continuation).	2
Lab13	Game debriefing or run of the management game - continuation (in the case of a small group)	2
Lab14	Game debriefing (continuation).	2
Lab15	Game debriefing (continuation) and the course summary.	2

	Total hours	30

TEACHING TOOLS USED
N1. lecture N2. multimedia presentation N3. MS Excel N4. simulation game N5. discussion N6. own and group work N7. written report N8. written instructions (handouts)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U03 PEU_W01 PEU_K02 PEU_K03	The game debriefing
F2	PEU_K02 PEU_K01	The game outcome
F3	PEU_K03 PEU_K02 PEU_K03	Tests, oral answers, student activity
P = 0,4 F1 + 0,3 F2 + 0,3 F3		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Rzońca W., *Gra kierownicza SPÓŁKA - podręcznik uczestnika* + appendixes (hand-outs and electronic documents accessible for students). **SECONDARY LITERATURE:** [1] Nowak, E., Analiza i kontrola kosztów przedsiębiorstwa, CeDeWu, Warszawa 2019. [2] Sierpińska M., Jachna T., Ocena przedsiębiorstwa według standardów światowych, PWN, Warszawa 2011.
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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zarządzanie procesami informatyzacji
Name of subject in English: Information process management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0049
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**30**
Number of hours of total student workload (CNPS)	**25**				**25**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark final course with (X)					
Number of ECTS points	**1**				**1**
including number of ECTS points for practical (P) classes					**1**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**				**0,6**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of business processes analysis and modeling methods
2. Ability to specification software requirements
3. Knowledge of the basics of project management

SUBJECT OBJECTIVES

C1 To acquire knowledge about software lifecycle models.
C2 To acquire knowledge about software size and effort estimation methods
C3 To acquire knowledge about strategic IT – business alignment models and standards

SUBJECT LEARNING OUTCOMES

relating to knowledge:
PEU_W01 Knows software lifecycle models
PEU_W02 Knows the methods of software size and effort estimation

PEU_W03 Knows the methods of formulation the business justification for IT project
PEU_W04 Knows the IT – business alignment models and standards

relating to skills:
PEU_U01 Is able to choose a software lifecycle model
PEU_U02 Is able to calculate a software size and effort estimate
PEU_U03 Is able to formulate the business justification for IT project

relating to social competences:

PROGRAM CONTENT		
Lectures		**Number of hours**
Lec 1	**One hour:** Organizational information, terms and conditions for passing. Introduction: Organization's information processes. **Two hours:** Selected problems of MIS implementation management (scope, cost-effectiveness, IT-Business alignment, effort estimation, choice of project IT management method). Sequential and evolutionary software lifecycle development models.	3
Lec 2	Software size and complexity estimation methods - examples of applications. Software project effort estimation methods.	3
Lec 3	Methods used to the business justification for IT project. Software requirements management.	3
Lec 4	Organization maturity level models (CMMI). Areas and models of strategic IT-business alignment	2
Lec 5	Strategic IT – business alignment standards (ITIL, COBIT) Selected aspects of the classic and modern project management approach.	3
	Test	1
	Total hours	15

Seminar		**Number of hours**
Sem 1	Setting up student teams. Topic selection – IT project management problem. Accepting of business selection and methods to solve the management problem. Presentation plan.	3
Sem 2	Choosing an IT project lifecycle model. Calculation of software size. Presentation and discussion.	3
Sem 3	Estimating IT project effort Presentation and discussion.	3
Sem 4	Formulation of the business justification for IT project. Selected aspects of software requirements management Presentation and discussion.	3
Sem 5	The applicability of the model/standard alignment IT – business: description and analysis. Presentation and discussion.	3

	Final assesment	
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Lecture and seminar materials available in electronic form on the ePortal N3. Possibility to ask questions during the lecture N4. Team analysis of a sophisticated case of using a method from a selected thematic category N5. Work in diagnostic groups – consultations with the lecturer during seminar and consultation hours N6. Students' presentation of the final report - audiovisual media (slides, computer projector) N7. Problem discussion during the seminar N8. Test with the open questions

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02, PEU_U03	Presentation of a team-developed problem from a selected thematic category in the form of a documented study in the field of IT applications on the example of a real object
F2	PEU_U01, PEU_U02, PEU_U03	Participation in a problem-based discussion
F3	PEU_W01, PEU_W02, PEU_W03, PEU_W04	Test
P (Lec) = F3 P (Sem) = 0,7F1 +0,3F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Applegate L, Austin R. McFarlan M., Corporate Information Strategy and Management: Text and Cases, 8th Edition 2020
[2] Cadle J, Yestes D., Zarządzanie procesem tworzenia systemów informacyjnych, WNT 2004
[3] McConnel S., Szacowanie oprogramowania. Kulisy czarnej magii, APN PROMISE 2006

SECONDARY LITERATURE:

[4] BABOK V.3, A Guide to the Business Analysis Body of Knowledge, IIBA 2015
[5] COBIT 5, www.ctpartners.pl/wp-content/uploads/2015/10/COBIT5_whitepaper.pdf
[6] Garmus D., Herron D., Function Point Analysis, Addison-Wesley 2001
[7] ITIL, www.ctpartners.pl/wp-content/uploads/2015/10/ITIL-whitepaper_PL-1.pdf
[8] A Guide to the Project Management Body of Knowledge, Project Management Institute; Edycja 6th ed. 2017
[9] Mohapatra S., Singh R., Information Strategy Design and Practices, 2012
[10] Pressman R.S., Praktyczne podejście do inżynierii oprogramowania, WNT 2004
[11] PMI, Requirements Management: A Practice Guide, 2016
[12] Stabryła A., Zarządzanie strategiczne w teorii i praktyce firmy, PWN 2016

[13] Żebrowski A., *Ebook ISO20000 — Zarządzanie usługami IT zgodnie z zasadami sztuki*, Wydawnictwo Wiedza i Praktyka, 2015

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Metody radzenia sobie ze stresem
Name of subject in English: Stress coping strategies
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code W08IZZ-SI0063
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**30**
Number of hours of total student workload (CNPS)	**25**				**50**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points	**1**				**2**
including number of ECTS points for practical classes (P)					**2**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**				**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS, AND OTHER COMPETENCES
No requirements

SUBJECT OBJECTIVES
C1 to know and understand biological and psychological determinants and consequences of stress and methods of coping with stressful situations
C2 to acquire skills of diagnosing stressful situations in life and at work
C3 to acquire competence in identifying sources of stress in life and at work, and to match methods of coping with stress

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEU_W01 has knowledge of the sources and psychological mechanisms of stress at work
PEU_W02 recognizes available coping strategies with stressful situations
relating to skills:

PEU_U01 is able to identify stress factors in the organization
PEU_U02 is able to reduce and prevent the consequences of stress in groups and organization.
relating to social competences:
PEU_K01 demonstrates readiness to identify stressful situations at work and to use methods to counteract and cope with stress at work

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Overview of the course schedule. The concept of stress in human life.	1
Lec 2	Models of psychological stress	2
Lec 3	Biological and psychological bases of stress	2
Lec 4	Typology of stress reactions	2
Lec 5	Individual and social effects of experiencing stress	2
Lec 6	Occupational stress and its consequences	2
Lec 7	How individuals manage stress	2
Lec 8	Managing stress in the organization/test	2
	Total hours	15

Seminar		**Number of hours**
Semin 1	Overview of the seminars' schedule. Introduction to the subject of stress and methods of coping with stress.	2
Semin 2	Diagnosis of stressful conditions of life and work	2
Semin 3	Stress connected with work. Workaholism and burnout.	2
Semin 4	Stress in the management profession.	2
Semin 5	Job loss stress: sources and consequences.	2
Semin 6	Two perspectives on the cost of stress: individual and organizational.	2
Semin 7	Self-regulation and depletion of limited resources: The role of self-control in work settings.	2
Semin 8	Relationships between job demands, fatigue, and job quality control.	2
Semin 9	Positive emotions, expanding attention, span and supporting positive thoughts and actions.	2
Semin 10	Positive social relationships and their impact on mental and physical health (social support as a stress moderator).	2
Semin 11	Gratitude skills and meditation techniques as methods of stress reduction.	2
Semin 12	Optimism, curiosity, and willingness to share as pathways to well-being.	2
Semin 13	Workplace design in the context of reducing stress and enhancing employee well-being.	2
Semin 14	Developing anti-stress training.	2
Semin 15	Developing individual strategy for coping with stress.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Lecture N2. Discussion N3. Multimedia presentation N4. Individual training and practice N5. Group training and practice

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02	Multiple choice test
F2	PEU_U01, PEU_U02	Task 1 – development of anti-stress training
F3	PEU_U01, PEU_U02	Task 2 – development of the individual strategy of stress coping
F4	PEU_K01	Evaluation class activity and group work
Lecture: P = F1 Seminar: P = 0.4*F2+ 0.4*F3+0.2*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Sapolsky, R. (2019). *Dlaczego zebry nie mają wrzodów.* Warszawa: PWN

[2] Heszen, I. (2019/2013). *Psychologia stresu*. *Korzystne i niekorzystne skutki stresu życiowego.* Wydawnictwo PWN.

[3] Cieślak, R., Sęk H. (Red.) (2018). *Wsparcie społeczne, stres i zdrowie.* Warszawa: PWN

SECONDARY LITERATURE:

[1] Baka, Ł., Łuczak, A., Najmiec, A. (2019). *Kopenhaski kwestionariusz psychospołeczny jako narzędzie do oceny psychospołecznych warunków pracy, wyniki badań i zalecenia do programów profilaktyki stresu w pracy w grupie pracowników wykonujących pracę o szczególnym charakterze.* Warszawa: Centralny Instytut Ochrony Pracy.

[2] Ogińska-Bulik, N. (2014). Rola strategii radzenia sobie ze stresem w rozwoju po traumie u ratowników medycznych. *Medycyna Pracy*, 65(2): 209-217.

[3] Waszkowska, M., Andycz, A., Merecz, D. (2014). *Dopasowanie pracownika do organizacji jako mediator relacji między oceną środowiska pracy a odczuwanym stresem wśród pracowników socjalnych. Medycyna Pracy*, 65(2).

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Doskonalenie systemów informacyjnych organizacji
Name of subject in English: Improvement of organizational information systems
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0066
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**50**	
Form of crediting				**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**2**	
including number of ECTS points for practical classes (P)				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				**1,2**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Capable to analyze the business model of the organization and its environment
2. Capable to implement a simple relational database system and acquire ad hoc information by defining from a relational data base search processes using a query language.
3. Knows a methodology of management information systems identification and analysis and capable to apply it.

SUBJECT OBJECTIVES

C1 An application of the student's general knowledge from the area of the data processing technology and management information systems analysis in practice, confrontation of theoretical foundations with practice.

C2 Verification of the student's skills of the management information system current state identification and assessment and of the determining directions of the management information system improvements by means of computer systems.

C3 To acquire social competences specific for the activity of the management information systems improvement.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 knowledge of information systems definition and basic functions

relating to skills:

PEU_U01 Capable to apply in practice theoretical and methodological solutions in management information systems diagnostics.

PEU_U02 Capable to apply in practice theoretical and methodological solutions in the management information systems computerization.

relating to social competences:

PEU_K01 Capable unaided to develop her/his knowledge and skills, to collaborate and to work in groups, ready to identify, analyze and solve problems in the area of management information systems diagnostics and improvement.

PEU_K02. Capable professionally to find and chose problem solving methods, to take the responsibility for them, pass over, convince and defend own views connecting with information systems diagnostics and improvement.

PROGRAMME CONTENT

Project		**Number of hours**
Proj 1	Determining of the project goals and requirements to the project documentation. Project tasks review.	2
Proj 2	Consultations on the extend and the way of the organization information system diagnostics investigation in the organizational function hierarchy perspective.	2
Proj 3	Consultations on the extend and the way of the organization information system diagnostics investigation in the organizational entity relationship perspective.	2
Proj 4	Consultations on the extend and the way of the organization information system diagnostics investigation in the data flow model perspective and the assessment of the existing information system implementation.	2
Proj 5	Consultations on the extend and the way of the organization information system diagnostics investigation in the analysis of the information requirements fulfilling by the existing information system.	2
Proj 6	Plenary session. Presentation, analysis and assessment of the project problems proposed by project teams.	4
Proj 7	Consultations on the theoretical and methodological problems connected with the database application design solution elaboration (determining the information and functional requirements, determining the non-functional requirements to the data base application).	2
Proj 8	Consultations on the theoretical and methodological problems connected with the database application design solution elaboration (data base application architecture design).	2

Proj 9	Consultations on the theoretical and methodological problems connected with the database application design solution elaboration (data base design).	2
Proj 10	Consultations on the theoretical and methodological problems connected with the database application design solution elaboration (forms and reports design, menu design).	2
Proj 11	Plenary session. Presentation, analysis and assessment of the project solutions proposed by the project teams.	6
Proj 12	Summary and credit.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Consultations N2. Solving a practical problem based on case study N3. Software needed to prepare the project and application implementation N4. Presentations during plenary sessions, discussions, justification of the own solutions N5. Written report

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01	Scoring of the „Project problem application" (max. 5 pts.) and its presentation during the first plenary session (max. 10 pts.)
F2	PEU_U02	Scoring of the „Written report" (max. 50 pts.), quality of the design defense (max. 15 pts.)
F3	PEU_U01, PEU_U02, PEU_K01, PEU_K02	Scoring an author's independence, her/his maturity in the area under considertion, attendence, participation in discussions (max. 15 pts.)
P(project)=0,15*F1+0,65*F2+0,15*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Allen S., "*Modelowanie danych*", Helion, 2006

[2] Laudon J., Laudon K. "*Management Information Systems"*, Prentice Hall; 16th edition, 2020

[3] Stasiak A., Dąbrowski W., Wolski M., "*Modelowanie systemów informatycznych w języku UML 2.1*", PWN, 2020

[4] Ullmann J. Widom J. „*Podstawowy wykład z systemów baz danych"*, WNT 2000.

SECONDARY LITERATURE:
[1] Flanczewski S., „*Access w biurze i nie tylko*”, Helion 2007
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Anna Lamek, anna.lamek@pwr.edu.pl

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Metody matematyczne - optymalizacja decyzji
Name of subject in English: Mathematical methods – decision optimization
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0067
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**50**	
Form of crediting				**Crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**2**	
including number of ECTS points for practical (P) classes				**2**	
including number of ECTS points for direct teacher-student contact (BU) classes				**1,2**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Operations research
2. Basis of optimization
3. Basis of probability calculus

SUBJECT OBJECTIVES

C1. Acquiring skills in formulating mathematical models for practical decision problems
C2. Acquiring the ability to use IT tools to solve practical decision problems.

SUBJECT LEARNING OUTCOMES

relating to skills:
PEU_U01 - Can build a mathematical model for practical decision-making problems of an engineering nature
PEU_U02 - Can carry out computational experiments, interpret the obtained solution and draw conclusions.
PEU_U03 - Can use appropriate IT tools to solve decision problems.

relating to social competences:
PEU_K01 - Can clearly present a solution to a practical decision problem and present the advantages of its implementation.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Pro1	Presentation of sample, practical decision problems (e.g., in the field of logistics, production planning, supply chain management, scheduling) and IT tools for solving them.	6
Proj2	Students' choice of practical problems to be solved.	6
Proj3	Presentation of the concept of solving a selected decision problem.	6
Proj4	Solving the problem using the selected IT tool. Carrying out computational experiments.	6
Proj5	Presentation of the obtained solution of the selected decision problem.	6
	Sum	**30**

TEACHING TOOLS USED
N1. Presentation N2. Computer software N3. Written project.

EVALUATION OF SUBJECT LEARNING EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_U01	Presentation of the concept of solving a selected decision problem.
F2	PEU_U02 PEU_U03 PEU_K01	Presentation of a solution to a selected decision problem
F3	PEU_U01 PEU_U02 PEU_U03	Preparation of the written project
P(project) = 0.2F1 + 0.2F2 + 0.6F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE

1. Y. Pochet, L. A. Wolsey. Production planning by mixed integer programming. Springer-Verlag, 2006.
2. S. Voss, D. Woodruff. Introduction to computational optimization models for production planning in a supply chain. Springer, 2006.
3. M. Pinedo. Scheduling. Theory, algorithms, and systems. Springer 2008.

SECONDARY LITERATURE

1. R. A. Sarker, C. S. Newton. Optimization modelling. A practical approach. CRC Press, 2008
2. J. K. Sharma. Operations research. Theory and applications. Trinity Press 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Kasperski, email: adam.kasperski@pwr.edu.pl

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Proces generowania i wdrażania innowacji
Name of subject in English: Process of generating and implementing innovations
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0068
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**50**	
Form of crediting				**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**2**	
including number of ECTS points for practical (P) classes				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				**1,2**	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
There are no prerequisites.

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SUBJECT OBJECTIVES

The aim of the course is to familiarize participants with the process of implementing innovation in the enterprise. The participant will gain knowledge of methods and tools supporting the process of implementing innovation at various stages of its implementation. They will learn the methods of generating ideas and will be able to develop an innovative project plan.
C1: Getting to know the methods of implementing innovations
C2. Improving creative problem solving skills
C3. Acquisition of innovation management skills in an enterprise

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 has a structured, theoretically founded general knowledge of the management and operation of enterprises, innovation and engineering entrepreneurship

relating to skills:

PEU_U01 is able to obtain information and carry out measurements necessary for the implementation of innovative projects in the enterprise, as well as draw conclusions based on them and formulate and justify opinions

PEU_U02 is able to identify and select methods of tools supporting the process of implementing innovation at various stages of its implementation.

PROGRAM CONTENT

Pr1-2	Presentation of the aim of the classes, their course and the criteria for assessing students. Discussion of individual tasks to be performed by the student. Project stages: description of the innovation, strategy of the innovative idea, action plan in the process of testing the innovative idea, dissemination strategy, risk analysis	*4*
Pr3-4	Presentations (about 10 min) on methods of generating ideas (classic methods, brainstorming, nominal group technique, one text procedure,. Discussion.	*4*
Pr5-6	Discussion and consultation of the selection of topics (ideas) that are the subject of the project work in the field of introducing innovation in the enterprise. Identification and selection of methods for project development. Detailed description of the innovation. Selection and characteristics of the target group to which the innovation is directed.	*4*
Pr7-8	Consulting content-related problems, assessing the advancement of students' work. Consulting on how to prepare the project analysis and evaluation of the idea, development of a product usability map for the client, Discussion and consultation of the selection of topics (ideas) that are the subject of the project work in the field of introducing innovation in the enterprise. Identification and selection of methods for project development. Detailed description of the innovation. Selection and characteristics of the target group to which the innovation is directed.	*4*
Pr9-10	Consulting content: characteristics of competitors (if any), description of the industry, target market, development of a SWOT analysis of an innovative idea (e.g. product)and selecting a competitive advantage / strategy, developing a risk analysis of an innovative idea	*4*
Pr11-Pr12	Presentation by students of the results of their project work (approx. 20 minutes) and a discussion on the assessment of the success of marketing the idea, opportunities and threats (barriers) in its potential implementation	*4*

Pr13-14	Presentation by students of the results of their project work (approx. 20 minutes) and a discussion on the assessment of the success of marketing the idea, opportunities and threats (barriers) in its potential implementation	*4*
Pr15	Summary of classes: discussion of the conclusions of the evaluation of written reports and student presentations. Choosing the best ideas.	*2*
	summary	*30*

TEACHING TOOLS USED
N1. Group consultations with lecturer N2. Case studies N3. Discussion with participants N4. Presentation of the project results N5. Students' own work

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_W01	Project (Completeness of the project, substantive values),
F2	PEU_U01 PEU_U02	Presentation of the results of projects
P=0,8F1+0,2F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Antoszkiewicz J., Innowacje w firmie. Praktyczne metody wprowadzania zmian. Poltext, Warszawa 2008

[2] Jelonek D., Moczała A., Metody i techniki projektowania innowacji, PWE, Warszawa 2021

[3] Kraśnicka T., Gładysz B., Kucińska-Landwójtowicz A., Doskonalenie organizacji i procesów innowacyjnych, PWE, Warszawa 2020

SECONDARY LITERATURE:

1. Projekty innowacyjne, Poradnik dla projektodawców. Warszawa 2011, dokument elektroniczny, źródło: http://efs.lubuskie.pl/system/obj/2141_Projekty%20innowacyjne%20-%20poradnik%20dla%20projektodawc%C3%B3w%20PO%20KL.pdf
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Teoria i praktyka twórczości inżynierskiej
Name of subject in English: Theory and practice of engineering creativity
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0069
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**50**	
Form of crediting				**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**2**	
including number of ECTS points for practical (P) classes				**2**	
including number of ECTS points for direct teacher-student contact (BK) classes				**1,2**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
No prerequisites.

SUBJECT OBJECTIVES
The aim of the course is to acquaint the participants with the organizational methods. The participant will acquire skills in the field of methods and techniques helpful in solving problems in the enterprise.
C1: Acquiring the ability to use engineering methods of problem solving.
C2. Improving the ability to initiate changes in the organization and participate in their planning and implementation.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:
PEU_U01 is able to analyze, evaluate and solve organizational problems
PEU_U02 is able to use organizational methods
relating to social competences:
PEU_K01 is prepared to initiate changes in the organization and participate in their planning and implementation and take responsibility for them
PEU_K02 is able to work in group and team forms of work organization

PROGRAMME CONTENT

Project		Number of hours
Pr1	Presentation of the aim of the classes, and the criteria for assessing students. Discussion of individual tasks to be performed by students	2
Pr2-Pr3	Characteristics of the problem-solving identification process.	4
Pr4-Pr5	Problem identification techniques	4
Pr6-Pr7	Information gathering techniques	4
Pr8-Pr9	Techniques of investigating the causes of problems	4
Pr10	Consulting content-related problems, assessing the advancement of students' work. Consulting on how to prepare a project, analysis and evaluation of the idea, development of a usability map	2
Pr11-12	Students present results of their project work (approx. 20 minutes) and discussion	4
Pr13-14	Students present results of their project work (approx. 20 minutes) and discussion	4
Pr15	Summary of classes: debate on conclusions from the evaluation of reports and student presentations. Choosing the best ideas.	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Consultations
N2. Case study
N3. Discussion with participants
N4. Student's own work

EVALUATION OF SUBJECT LEARNING EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_U02 PEU_K01 PEU_K02	Presentation the results of project

P=F1

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Dobrowolski K.: Problem Solving jest dla ludzi. Skuteczne rozwiązywanie problemów w każdym biznesie, Wydawnictwo Onepress, Warszawa 2021
[2] Skalik Jan (red.) - Metody i techniki organizatorskie, Wydawnictwo Akademii Ekonomicznej we Wrocławiu 2001
[3] Bieniok B.: Metody sprawnego zarządzania, Placet, Warszawa 1997
SECONDARY LITERATURE:
[1] Martniak Z.: Organizacja i zarządzanie, Antykwa, Kluczbork 1996
[2] Mikołajczyk Z.: Techniki organizatorskie w rozwiązywaniu problemów zarządzania, PWN, Warszawa 1999
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Technologie informacyjne
Name of subject in English: Information technology
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0070
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**15**		
Number of hours of total student workload (CNPS)	**30**		**30**		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course			X		
Number of ECTS points			**2**		
including number of ECTS points for practical classes (P)			1		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)			**1**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

SUBJECT OBJECTIVES

C1 To acquire knowledge of the selected tools and methods used to support gathering, processing, analyzing, presenting data and their applications in organizations.
C2 To acquire the skills to use selected IT tools at an advanced level, for management support.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has basic knowledge of information technologies used to acquire, collect, process and present data, and in particular, knows tools and methods of text processing, data calculations, analysis, visualization and presentation of results and their applications in organizations, nowadays and future trends.

PEU_W02 Understands importance of security and protection of data and intellectual property. Knows cyberattack techniques and preventive measures.

relating to skills:

PEU_U01 Can use appropriate features of selected software and Internet services to address challenges in word processing, calculations and economic analysis, and to visualize, collect and integrate results.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introduction to the lecture. Discussing the conditions of obtaining credit. Digital technology fundamentals.	1
Lec 2	Tools and methods used to support data calculating, analysis and visualization.	2
Lec 3	Advanced functions and methods of data analysis and simulations in a spreadsheet	2
Lec 4	Tools, methods and advanced features of text processing	2
Lec 5	Exchanging data objects between applications – the OLE technique. Tools and techniques of preparing and conducting a business presentation.	2
Lec 6	Security and protection of data and intellectual property in organization.	2
Lec 7	Cybersecurity. Common threats and prevention.	2
Lec 8	Future trends in business IT applications. Crediting.	2
	Total hours	15

Laboratory		**Number of hours**
Lab 1	Introduction to the lab classes. Discussing the conditions of obtaining credit. The computer lab environment and safety rules.	1
Lab 2	Basic spreadsheet features and functions.	2
Lab 3	Advanced functions and methods of data gathering, analysis and visualization in a spreadsheet.	4
Lab 4	Tools and methods of text processing.	4
Lab 5	Elective task.	2
Lab 6	Failed assignments retake and final remarks.	2
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture with overhead slides. N2. Assignments to carry out individually in the computer lab and at home. N3. Discussion of the achievements (causes of failures if applicable) during each presentation of students' results.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement

F1	PEU_U01	Assessment of the lab task results and understanding of the solutions
F2	PEU_W01, PEU_W02, PEU_U01	Bonus credit points.
F3	PEU_W01, PEU_W02	Class attendance and activity.
P(lecture) = F3 P(laboratory) = 0,7*F1 + 0,2*F3 +0,1*F2 P(GK) = 0,2*P(lecture) + 0,8*P(laboratory)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Wrotek W., Office 2019, Helion 2019.
[2] Masłowski K., Excel 2019. Ćwiczenia zaawansowane, Helion 2020.
[3] Ciekanowski Z., Wojciechowska-Filipek S., Bezpieczeństwo funkcjonowania w cyberprzestrzeni: jednostki - organizacji - państwa, CeDeWu 2020.

SECONDARY LITERATURE:

[1] Winston W., Microsoft Excel 2019 Analiza i modelowanie danych biznesowych, Promise 2020.
[2] Cichocki M., Przetwarzanie danych w Excelu. Laboratorium Power Query, Helion 2020.
[3] Miernik R., Molendowska M., Bezpieczeństwo w cyberprzestrzeni. Wybrane zagadnienia, Marszałek 2021.

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Zał. nr 6 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Organizacja i zarządzanie
Name of subject in English: Organization and management
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0071
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**50**	**50**			
Form of crediting	**exam**	**credit with a grade**			
For group of courses mark (X) final course					
Number of ECTS points	**2**	**2**			
including number of ECTS points for practical (P) classes		**2**			
including number of ECTS points for direct teacher-student contact (BK) classes	**1,44**	**1,2**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
-

SUBJECT OBJECTIVES

To ensure fundamental knowledge and skills (including application aspects) about:
O1. characteristics, elements and types of organizations, and the impact of the environment organizational operations, management processes, functions, principles and tools,
O2. development trends in the field of management sciences
O3. analysis and evaluation of selected internal elements of the organization and relations between them, as well as typical management problems

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01 - has a basic knowledge about the characteristics, elements and types of organizations as well as about the interaction of the organization with the environment

PEU_W02 – has a basic knowledge about the development trends of science of management

PEU_W03 – identifies the basic management issues

Relating to skills:

PEU_U01 - analyzes and evaluates (at a basic level) internal and inter-organizational relationships as well as the interactions of the organization with the environment

PEU_U02 - identifies and analyzes basic management issues

Relating to social competences:

PEU_K01 - is aware of the need to develop knowledge and skills in the science of organization and management and that manager's job is to continuously identify, analyze and resolve issues in organizations

PEU_K02 - is prepared to express and defend his/her views, and to persuade others to his/her views as well as to initiate changes in the workplace and participate in their planning and implementation

PROGRAMME CONTENT		
Lecture		**Number of hours**
L 1-2	Organizational information The concept of organization, organization typology	3
L 2-3	International aspects of management	2
L 3-4	The concept of management, management functions	3
L 5-6	Organizational effect.	3
L 6-8	Development of management thought	4
L 8-9	Planning as a management function	2
L 9-10	Organizing as a management function	2
L 10-11	Leading as a management function	2
L 11-12	Control as a management function	2
L 12-13	The essence of decision making	3
L 14	Efficiency (effectiveness) of the organization	1
L 14-15	Contemporary management methods	3
	Total hours	**30**

PROGRAMME CONTENT		
Classes		**Number of hours**
Cl 1	Organizational information Introduction to organization and management science	2
Cl 2	The organizations and its models	2
Cl 3	People. Variety of personalities and interests groups	2
Cl 4	Organizational culture	2
Cl 5	Organizational goals. Multitude of goals and conflicts them	2

Cl 6	Technology. Kinds of technology, technology and social structure	2
Cl 7	Organizational structure dimensions	2
Cl 8	Basic types of organizational structure	2
Cl 9	Organizational environment	2
Cl 10	Organization life cycle	2
Cl 11	Typologies of organizations	2
Cl 12	Techniques for identifying information gathering problems	2
Cl 13	Techniques for investigating the causes of problems and activating creative thinking	2
Cl 14	Using a decision tree to solve problems	2
Cl 15	Summary	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Questions to students during lecture N3. Case studies presented during lecture N4. Discussion of selected issues N5. Analysis and evaluation of real organization's assigned characteristics N6. Presentations prepared by students

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01-03 PEU_U01-02	Quizzes (during classes)
F2	PEU_W01-03, PEU_U01-02, PEU _K01-02	Involvement (during classes)
F3	PEU_W01-03	Exam
P1 (classes) = 0,5*F1+0,5*F2		
P2 (lecture) = F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koźmiński A.K., Piotrowski W. [red.]: Zarządzanie. Teoria i praktyka, PWN, Warszawa 2021.
[2] Robbins S.P., DeCenzo D.A.: Podstawy zarządzania, PWE, Warszawa 2019
[3] Steinmann H., Schreyögg G.: Zarządzanie. Podstawy kierowania przedsiębiorstwem, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001.

SECONDARY LITERATURE:

[5] Bielski M.: Podstawy teorii organizacji i zarządzania, C. H. Beck, Warszawa 2004.
[6] Bielski M.: Organizacje: istota, struktury, procesy, Wyd. Uniwersytetu Łódzkiego, Łódź 1992.
[7] Bieniok H. [red.]: Metody sprawnego zarządzania: planowanie, organizowanie, motywowanie, kontrola, PLACET, Warszawa 2011.
[8] Czarniawska B.: Trochę inna teoria organizacji: organizowanie jako konstrukcja sieci działań, Poltext, Warszawa 2010.
[9] Griffin R.W.: Podstawy zarządzania organizacjami, PWN, Warszawa 2020.

[10] Hopej M.: Struktury organizacyjne: podstawowe, współczesne i przyszłe rozwiązania strukturalne, Ossolineum, Wrocław 2004.
[11] Hopej M., Kamiński R.: Struktury organizacyjne współczesnych organizacji, Oficyna Wyd. PWr., Wrocław 2010.
[12] Hatch M.J.: Teoria organizacji, PWN, Warszawa 2002.
[13] Korzeniowski L., Podstawy zarządzania organizacjami, Difin 2019.
[14] Mikuła B., Pietruszka-Ortyl A., Potocki A. [red.]: Podstawy zarządzania przedsiębiorstwami w gospodarce opartej na wiedzy, Difin, Warszawa 2007.
[15] Mintzberg H., Zarządzanie, Nieoczywiste 2020.
[16] Schermerhorn J.R.: Zarządzanie, kluczowe koncepcje, PWE, 2008.

Magazines and Journals:
[1] Ekonomika i Organizacja Przedsiębiorstwa
[2] Harvard Business Review
[3] Przegląd Organizacji

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Fizyka środowiska pracy
Name of subject in English: Physics of work environment
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code W08IZZ-SI0072
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**	**15**	
Number of hours of total student workload (CNPS)	**30**		**50**	**50**	
Form of crediting	**crediting with grade**		**crediting with grade**	**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points	**1**		**2**	**2**	
including number of ECTS points for practical (P) classes			**2**	**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1**		**0,6**	**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

No requirements.

SUBJECT OBJECTIVES

To ensure fundamental knowledge (including application aspects) about:
C1 work environment factors
C2 measurement of work environment factors
C3 influence of work environment on man

To ensure fundamental skills to:C4 assess the physical parameters of workload factors
C5 use of selected methods of reducing physical parameters of workload factors

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01: knowledge about the impact of the selected physical factors of the work environment on the human body

Relating to skills:

PEU_U01: can determine the workload by physical environmental factors in the workplace and apply basic ergonomic methods

Relating to social competences:

PEU_K01: able to acquire and develop the ability of team cooperation to the optimum solution of problem

PROGRAMME CONTENT		
Lectures		**Number of hours**
Lec 1	Introduction. Work environment and work environment physics - definition. Ergonomics - the history, aims and objectives, methods of ergonomic	4
Lec 2	Human being in the work environment. Human-machine-work environment system. Fundamentals of ergonomic design. Variability of human anthropometric measurements.	3
Lec 3	Working at the computer workstation. The recommended posture. Workspace organization. Requirements and recommendations for computer workstation.	3
Lec 4	Work environment factors and their impact on human productivity. Microclimate - basic concepts, the impact on the human body. Physical parameters of microclimate. Measurement of microclimate parameters	4
Lec 5	Lighting. Eyesight and eye anatomy. Basic lighting and illumination parameters affecting the employee. Measurement of basic lighting parameters. The impact of lighting on worker productivity.	4
Lec 6	Sound - the basic physical parameters. Noise. Structure and function of the organ of hearing. Measurement of noise parameters. The impact of noise on humans. Prevention of noise.	4
Lec 7	Workspace of man. Recommendations for ergonomic work space design. Layout of workstation elements. Posture at work. Factors determining the awkward postures. The consequences of awkward posture.	2
Lec 8	Workload measurement. Basics of measurement and reduction of mental workload. Biomechanical workload – different kinds, measurement, reduction methods	4
Lec9	Final test	2
	Total hours	**30**

Laboratory		**Number of hours**
Lab 1	Organizational issues	1

Lab 2	Designing a computer workstation - computer analysis of the geometric parameters of the workstation computer.	2
Lab 3	Microclimate - computer simulation of thermal effects on the human environment	2
Lab 4	Lighting - Lighting Design Simulation in the workplace.	4
Lab 5	The design of layout of work elements.	2
Lab 6	Laboratory methods for studying the man-machine system	4
	Total hours	15

Project		**Number of hours**
Pr1	Introduction. Rules of assessment, scope of the project, rules of group work, division of project topics in groups	1
Pr2	Consultation classes - discussion of individual stages of the project: computer workstation - geometry	2
Pr3	Consultation classes - discussion of individual stages of the project: selected environmental factors - measurement and assessment of compliance with regulations/standards/recommendations - microclimate, noise, lighting)	2
Pr4	Consultation classes - discussion of individual stages of the project: selected environmental factors - measurement and assessment of compliance with regulations/standards/recommendations - lighting	4
Pr5	Consultation classes - discussion of individual stages of the project: selected environmental factors - measurement and assessment of compliance with regulations/standards/recommendations - noise	4
Pr6	Presentation of projects and reports	2
	Total hours	15

TEACHING TOOLS USED

N1. The lecture with multimedia presentation and activity tools (i.e. padlet, mentimeter)
N2. Laboratory - computer software (Amicro, Alinks, Dialux, ErgoEaser or equivalent);, specialized educational stations available in the Laboratory of Ergonomics
N3. Working in groups during classes
N4. Presentation of the projects

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating educational effect achievement
F1	PEU_W01	Activity during classes

	PEU_U01 PEU_K01	
F2	PEU_W01 PEU_U01	Reports
F3	PEU_W01	Short tests
F4	PEU_W01 PEU_U01 PEU_K01	Project presentation
F5	PEU_W01	Written test for crediting with grade
P (lecture) = F5		
P (lab) = F1(20%)+F2(50%)+F3(30%)		
P (project) = F1(20%)+F2(50%)+F4(30%)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Materials available at www of course (eportal)

[2] Kuliński M., Jach K., Koszela-Kulińska J., Metodyka doradztwa w zakresie ergonomii stanowisk pracy, Podręcznik ergonomiczny. Wielowymiarowy model wsparcia i identyfikacji kompetencji zawodowych. Zeszyt 4, Wojewódzki Urząd Pracy w Gdańsku, Gdańsk 2014 (available in electronic version)

SECONDARY LITERATURE:

[3] Gajdzik B., Wyciślik A., Jakość, środowisko i bezpieczeństwo pracy w zarządzaniu przedsiębiorstwem, Wyd. Politechniki Śląskiej, Gliwice, 2010

[4] Górska E., Ergonomia : projektowanie, diagnoza, eksperymenty, Warszawa : Oficyna Wydawnicza Politechniki Warszawskiej, 2015.

[5] Nowak E., Atlas antropometryczny populacji polskiej - dane do projektowania. The Anthropometric Atlas of Polish Population - Data for Design, IWP Warszawa, 2001

[6] Wykowska M., Ergonomia: jako nauka stosowana, Kraków: AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, 2009. 2014 (available in electronic version)

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Podstawy programowania
Name of subject in English: Essentials of software development
Main field of study: Business Engineering
Specialization
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0073
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**75**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**3**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
None

SUBJECT OBJECTIVES
C1 Acquisition of knowledge of the procedural and object programming
C2 Acquire the ability to automate tasks and creating and development of computer programs in MS Office (VBA for MS Excel)
C3 Gaining skills necessary for creating computer programs in nowadays used programming language (Python)

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Knows how to automate tasks in the application programs
PEU_W02 Knows the fundamentals of using programming languages
relating to skills:
PEU_U01 Can use the elements of programming to extend the functionality of computer utility packages
PEU_U02 Implement a subprogram in Python
relating to social competences:
PEU_K01 Knows how to present own knowledge and skills in PC programming

PROGRAMME CONTENT

Lecture		**Number of hours**
Lec 1	Organizational issues, the concept of programming, basic approaches, division and application	2
Lec 2	Create and use macros (MS Excel). Automate tasks. Use spreadsheet formulas in VBA procedures	2
Lec 3	Procedures and functions - declaration and using. Concepts of types, variables and constants. Standard types. Algebraic expressions: Construction, types, valuation of expressions. Simple instructions	2
Lec 4	Structural instuctions	2
Lec 5	user Interface Elements (e.g. Formants, ActiveX controls)	2
Lec 6	Structural types: Tables, Strings	3
Lec 7	Create and use subprograms in a spreadsheet	3
Lec 8	The basics of the Python development environment	2
Lec 9	Scripting in Python, conditional statements and loops	4
Lec 10	Elements of an object-oriented approach in Python	4
Lec 11	File operation basics	2
Lec 12	Colloquium	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Organizational matters, introduction to the VBA environment.	1
Lab 2	Automate tasks using macros. Define subprograms	2
Lab 3	Using structural commands	3
Lab 4	Apply subprograms to a spreadsheet	3
Lab 5	Creating procedures and functions for spreadsheet	3
Lab 6	Create and apply a user interface to a spreadsheet	2

Lab 7	Practical test at the computer (F1)	2
Lab 8	The basics of the selected Python language environment	1
Lab 9	Basic I/O operation, using of variables	1
Lab 10	Using structural commands.	3
Lab 11	Use control commands and loops for task automation	2
Lab 12	Create and use functions and classes in Python	2
Lab 13	Text files handling	1
Lab 14	Practical test at the computer (F2)	2
Lab 15	Summaries. Evaluation	2
	Total hours	30

TEACHING TOOLS USED
N1. The problem lecture N2. Multimedia presentation N3. Lab materials N4 Web browser N5. Software MS Office (with VBA) N6. Python development environment N7. A practical test at the computer N8. A written final test

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02 PEU_U01	A practical test at the computer
F2	PEU_W02 PEU_U02	A practical test at the computer
F3	PEU_W01 PEU_W02 PEU_U01 PEU_U02 PEU_K01	Prepare solutions for homework
F4	PEU_W01 PEU_W02 PEU_K01	Written final test
Final grade (Lab) P:= F1*0,4+F2*0,4+F3*0,2 P(Lecture)=F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Jelen B., Syrstad T., Microsoft Excel VBA i Makra, Promise
[2] Jurkiewicz A., Python 3. Projekty dla początkujących i pasjonatów, Helion
[3] Lutz M., Python. Wprowadzenie. Wydanie V, Helion

SECONDARY LITERATURE:

[1] Dijkstra E. W., Umiejętność programowania, WNT
[2] Jagaciak K. Python. Kurs programowania na prostych przykładach, RASP
[3] Walkenbach J., Programowanie w VBA. Vademecum, Helion
[4] Wirth N., Algorytmy + struktury danych = programy, WNT

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Wymagania Systemów Informacyjnych Zarządzania
Name of subject in English: MIS Requirements
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0075
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**	**15**			
Number of hours of total student workload (CNPS)	**25**	**50**			
Form of crediting	**crediting with grade**	**crediting with grade**			
For group of courses mark (X) final course					
Number of ECTS points	**1**	**2**			
including number of ECTS points for practical (P) classes		**2**			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**	**0,6**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. General knowledge about management essentials, business regulations and organizational behaviour.

SUBJECT OBJECTIVES

C1 To acquire knowledge about software requirements methods and techniques
C2 To gain skills of the software requirements analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Knows selected methods and techniques for identification and analysis of the software requirements.
PEU_W02 Knows selected standards of the quality software requirements.

relating to skills:

PEU_U01 Is able to choose and use professional methods for identification and analysis of the software requirements.
PEU_U02 Is able to choose and use the selected standards of the quality software requirements.
relating to social competences:

PROGRAMME CONTENT		
Lectures		**Number of hours**
Lec1	Organizational information, terms and conditions for passing. Introduction: Fundamentals of information and information processing: Information system. Methods and techniques of the information requirements elicitation.	2
Lec 2	Functional areas in organization. Function Hierarchy Diagram. Domain dictionary.	2
Lec 3	Information sources. Data flow inside business organization analysis and modeling.	2
Lec 4	Business and product use cases and scenarios in information requirements analysis. Information requirements others templates: user story, BDD.	2
Lec 5	Information requirements: Analysis, classification and documentation. Data modeling.	2
Lec 6	Standard data operations and processing specification.	2
Lec 7	Quality standards of software requirements	2
Lec 8	Test	1
	Total hours:	15

Classes		**Number of hours**
Cl 1	Domain subsystems - information usefulness and usability circumstances - Interviewing domain specialists.	1
Cl 2	Information system scope. Determination of functional areas of the system. Function hierarchy diagram. Domain dictionary.	2
Cl 3	Business organization environment – information flow context. Information source and destination. Rules and notations for building a data flow diagram	2
Cl 4	Workshops – functional and non-functional requirements elicitation. Identification of use cases. Draw a use case diagram. Writing scenarios.	2
Cl 5	Analysis of documents collected in the organization. Rules and notations for building data modeling. The need to update the data dictionary.	2
Cl 6	Standard operations and data processing specification.	2
Cl 7	Quality software requirements verification	2
Cl 8	Summary of completed tasks. Final grades	2
	Total hours:	15

TEACHING TOOLS USED
N1. Lecture N2. Multimedia presentation. N3. Practical class-tasks. N4. Discussion N5. Teamwork.

N6. Theoretical test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Test
F2	PEU_U01 PEU_U02	Evaluation of the team reports
F3	PEU_U01 PEU_U02	Evaluation of individual and team class-tasks
F4	PEU_U01 PEU_U02	Evaluation of class activity (discussions)
P(lecture) = F1 P (classes) = 05*F2+03*F3+02*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Barker R., *CASE*Method: Modelowanie związków encji*, WNT, W-wa, 1996
[2] Barker R., Longman C. *CASE*Method: Modelowanie funkcji i procesów*, WNT, W-wa, 1996
[3] Nowicki A., Sitarska M., Procesy informacyjne w zarządzaniu, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2010

SECONDARY LITERATURE:

[4] BABOK V.3, A Guide to the Business Analysis Body of Knowladge, IIBA 2015
[5] Cadle, J., Paul, D. and Turner, P., Business Analysis Techniques. BCS, Swindon 2010
[6] Informatyka ekonomiczna, red. Wrycza S., Państwowe Wydawnictwo Ekonomiczne, Warszawa 2010
[7] Robertson S., Robertson J., Mastering Requirements Process, 3 rd ed., Pearson Education Inc, Boston 2014
[8] Schneider G., Winters J., Stosowanie przypadków użycia, WNT 2006
[9] Komputerowe wspomaganie biznesu, red. Nowicki A., Placet, Warszawa 2006
[10] Zmitrowicz K., Roman A., Inżynieria wymagań, PWN 2020

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Notacje procesów biznesowych
Name of subject in English: Business process notations
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0077
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**30**		
Number of hours of total student workload (CNPS)	**25**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**1**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge about economic organizations
2. Knowledge of theory of systems
3. Knowledge of information gathering rules and methodologies

SUBJECT OBJECTIVES

C1 Presentation of approaches to business process modeling
C2 Presentation of business process modeling rules and best practices
C3 Ability to modeling business processes

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 – knowledge of business process modeling notations and approaches
relating to skills:
PEU_U01 – ability to model business processes
relating to social competences:
PEU_K01 – ability to work in the group
PEU_K02 – developing ability to think independently and creatively

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Introduction to the lecture	2
Lec 2	Preview of methodologies and approaches	2
Lec 3	ARIS – organization view	2
Lec 4	ARIS – data view & functional view	2
Lec 5	ARIS – process view	2
Lec 6	BPMN – basic models	2
Lec 7	BPMN – advanced models	2
Lec 8	Test	1
	Total hours	15

Laboratory		Number of hours
Lab 1	Introduction	2
Lab 2-3	Modeling of the organization (ARIS)	4
Lab 4-5	Modeling of the data (ARIS)	4
Lab 6-7	Modeling of the functions (ARIS)	4
Lab 8-9	Modeling of the process (ARIS)	4
Lab 10-11	Modeling of the process (BPMN)	4
Lab 12-14	Advanced modeling of the process (BPMN)	6
Lab 15	Conclusion	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture
N2. Business process modeling tools (e.g. ARIS, ARIS Express, BizAgi)
N3. Self-learning – for labs

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P –	Learning outcomes code	Way of evaluating learning outcomes achievement

concluding (at semester end)		
F1	PEU_W01	Test
F2	PEU_W01 PEU_U01 PEU_K01 PEU_K02	Evaluation of the report from lab work

P(lecture) = F1
P(laboratory) = F2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Renata Gabryelczak, ARIS w modelowaniu procesów biznesu, Difin 2006
[2] Jarosław Żeliński, Analiza biznesowa. Praktyczne modelowanie organizacji, Helion 2016
[3] Szymon Drejewicz, Zrozumieć BPMN. Modelowanie procesów biznesowych

SECONDARY LITERATURE:

[1] User manual of selected software applications (e.g. ARIS, ARIS Express, BizAgi)
[2] Business Analysis Body of Knowledge® (BABOK Guide®), IIBA

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Symulacja systemów
Name of subject in English: Systems simulation
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level studies, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0078
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**125**				
Form of crediting	Crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	**5**				
including number of ECTS points for practical classes (P)	2				
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,8**				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

knowledge of basic probability calculus and mathematical statistics

SUBJECT OBJECTIVES

C1 - Introduction to the principles of building simulation models using selected stochastic methods
C2 - To gain skills of forecasting through simulation with the use of selected simulation methods
C3 - Developing skills of using simulation models to describe the current state and to forecast the future state of an organization

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Has knowledge of computer simulation and forecasting in business.
PEU_W02 Knows selected methods, techniques and computer tools used in simulation modeling and forecasting in business.
relating to skills:
PEU_U01 Be able to use simulation methods and models to describe, predict and optimize business processes to solve engineering tasks.

PEU_U02 Be able to plan and conduct simulation experiments

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Presentation of class requirements and regulations. General introduction to modeling. Basic concepts related to simulation in business.	2
Lec 2	Randomness and uncertainty in decision-making processes. Course of simulation modeling. Classification of simulation approaches. Basic blocks of a discrete simulation model (using the selected package). Part 1	2
Lec 3	Basics of discrete simulation: process, request, queue Example models (using the package of your choice). Part 2	2
Lec 4	Discrete simulation basics: event, event calendar, discrete event handling Example models (using the package of your choice). Part 3	2
Lec 5	Example of manual simulation Example models (using selected package). Part 4	2
Lec 6	Discrete simulation results: how to measure Example models (using selected package). Part 5	2
Lec 7	Elements of probability calculus and statistics. Review of basic distributions of a random variable Example models (using the package of your choice). Part 6	2
Lec 8	Random number generators. Generating random variables. Example models (using the package of your choice). Part 7	2
Lec 9	Collection and analysis of input data. Selecting and fitting random distributions. Hypothesis testing. Sample models (using the selected package). Part 8	2
Lec10-11	Design of experiments and analysis of simulation results.	4
Lec.12	Variance reduction methods. Generation of submission streams	2
Lec 13	Verification and validation of simulation models: principles, approaches and concepts	2
Lec 14	Discrete simulation tools. Test.	2
Lec 15	Trends. Directions of development. Make-up test	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Introduction to the lab classes. Discussing the conditions of obtaining credit. The computer lab environment and safety rules.	1
Lab 2	Building a simple discrete simulation model: an introduction. Part 1: Create-Process-Dispose	2
Lab 3	Building a discrete simulation model Part 2: Resources	2
Lab 4	Building a discrete simulation model. Part 3: Batch and Separate	2
Lab 5	Building the Discrete Simulation Model. Part 4: Variables	2

Lab 6	Consultation on the project task	2
Lab 7	Defense and and project's grading	2
	Total hours	15

TEACHING TOOLS USED
N1. Overhead slides. N2. Quizes N3. Simulation platforms (Arena, ExtendSim, AnyLogic)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1		Attendance
F2	PEU_U01 PEU_U02	Performance grade for mini tests, models made at home and in class
F3	PEU_U01 PEU_U02	Evaluation for the project task
F4	PEU_W01 PEU_W02	Knowledge test
P (Lab) = 0,33*F1+0,23*F2+0,44*F3 P (Lec) = F4 P = 0,5F(Lab)+0,5F(Lec)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] **Mielczarek B.,** *Modelowanie symulacyjne w zarządzaniu. Symulacja dyskre*tna. Oficyna Wydawnicza PWr Wrocław 2009
[2] Kelton W.D., Sadowski R.P., Zupick N., *Simulation with Arena*, McGraw Hill Higher Education, 2016

SECONDARY LITERATURE:

[1] Winston L.W., Microsoft Excel 2019. Analiza i modelowanie danych biznesowych, APN Promise, Warszawa 2020
[2] Gajda J.B., Prognozowanie i symulacja a decyzje gospodarcze, Wyd. C.H.Beck, Warszawa 2001
[3] Tutorials. Arena (available with software)
[4] Tutorials from Winter Simulation, https://informs-sim.org/
[5] Andrei Borshchev, Ilya Grigoryev, *The Big Book of Simulation Modeling*, https://www.anylogic.com/resources/books/big-book-of-simulation-modeling/

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Implementacja procesów biznesowych
Name of subject in English: Business process implementation
Main field of study: Business engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: W08IZZ-SI0079
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**30**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**exam**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,84**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge about economic organizations
2. Knowledge of different approaches to business process modeling
3. Knowledge of information gathering rules and methodologies

SUBJECT OBJECTIVES

C1 Presentation of business process lifecycle
C2 Presentation of BPMS
C3 Ability to develop application in BPMS environment

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 – knowledge of business process lifecycle
PEU_W02 – knowledge business process implementation rules
relating to skills:
PEU_U01 – ability to implement an application on the base of business process
relating to social competences:
PEU_K01 – ability to work in the group
PEU_K02 – developing ability to think independently and creatively

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to the lecture – definitions related to business process lifecycle.	2
Lec 2	Business process information gathering and documentation	2
Lec 3	Implementation of business processes - BPMS systems	2
Lec 4	Implementation of business processes - Process flows and decision rules	2
Lec 5	Implementation of business processes - User forms and UI	2
Lec 6	Implementation of business processes - Integration with external systems	2
Lec 7	Business process monitoring	2
Lec 8	Conclusion	1
	Total hours	15

Form of classes - laboratory		Number of hours
Lab 1	Introduction. Discussion of the course credit conditions and health and safety requirements.	2
Lab 2-3	Modeling of selected business process in the BPMS system	4
Lab 4-5	Implementing of decision rules	4
Lab 6-7	Implementing of user forms	4
Lab 8-9	Testing and verification of the first application	4
Lab 10-11	Implementation of the integration with external services	4
Lab 12	Monitoring of the implemented process	2
Lab 13-14	Optimization of the implemented process	4
Lab 15	Conclusion	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture
N2. Using BPMS tool (e.g. IBM BPM, BizAgi)
N3. Self-learning – for labs

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEU_W01	exam
F2	PEU_W01 PEU_U01 PEU_K01 PEU_K02	Evaluation of the report from the lab work prepared for the14th lab and discussed during 15th lab.
P (lecture)= F1 P (laboratory) = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Jarosław Żeliński, Analiza biznesowa. Praktyczne modelowanie organizacji, Helion 2016

[2] Szymon Drejewicz, Zrozumieć BPMN. Modelowanie procesów biznesowych

SECONDARY LITERATURE:

[1] Raports (e.g. Gartner Group, Forester Research) about BPMS software applications

[2] User manuals for selected BMPS (e.g. IBM BPM, BizAgi)

[3] Business Analysis Body of Knowledge® (BABOK Guide®), IIBA

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject of in Polish: Efektywna praca w zespole
Name of subject in English: Effective teamwork
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0080
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					**30**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					**2**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

SUBJECT OBJECTIVES

C1 Knowing proper teamwork rules
C2 Acquiring teamwork skills
C3 Acquisition of competence to take responsibility for teamwork result

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 Student knows the basic principles and processes during teamwork in the organization
relating to skills:
PEU_U01 Student is able to identify, explain and deal with the problems in an effective groups work in the organization.
PEU_U02 student is able to realize his part of teamwork
relating to social competences:

PEU_K01 He demonstrates a willingness to cooperate and undertake team tasks. PEU_K02 He is able to take responsibility for carrying out tasks.

PROGRAMME CONTENT		
Seminar		**Number of hours**
Sem 1	Discussion of organizational issues and conditions for passing. Common and scientific approach to the group - analysis of the definitional aspects of the group and team concepts.	2
Sem 2	Building relationships between group members - integration exercises	2
Sem 3	Practical building and analysis of group identity and identification of members with the team	2
Sem 4	Identification of the main motives of social behavior in the team: competition, cooperation and altruism	2
Sem 5	Interpersonal behavior in a group - identification and analysis - opportunities and threats for the functioning of the individual in the team	2
Sem 6	Task behaviors in a team - identification and analysis - group thinking syndrome, social facilitation, social laziness and other phenomena	2
Sem 7	The communication in the group – the correctness and limitation of the process	2
Sem 8	Group methods of the creative thinking	2
Sem 9	Searching for one's place in the group - diagnosis of the predisposition and limitations of the subject to effective teamwork	2
Sem 10	Role-playing in a group; advantages and disadvantages of group roles	2
Sem 11	Difficult situations in the group. Conflicts and Us - Them - group antagonisms	2
Sem 12	Team project performance – work planning	2
Sem 13	Team project performance – the problem solving	2
Sem 14	Team project performance – teamwork analysis	2
Sem 15	Team project presentation and evaluation - the process of evaluation and giving feedback about teamwork	2
	Total hours	30

TEACHING TOOLS USED	
N1. multimedia presentation	N4. Discussion
N2. individual tasks	N5 Case study
N3. group tasks	N6. Observation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement

F1	PEU_W01, PEU_U01-U02; PEU_K01-K02	Active participation in the task performance
F2	PEU_W01, PEU_U01-U02; PEU_K01-K02	Project/task performance
P=0,4*F1+0,6*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1Haman, W. (2017). *Fenomen małej grupy. Jak radzić sobie z trudnymi zachowaniami zespołu, a zwłaszcza z narzekaniem i marudzeniem. Psychologia szefa*. Tom 3. Warszawa: Onepress.

[2] Mastrogiacomo, S., Osterwalder, A. (2022). *Skuteczne zarządzanie zespołem. Jak uzyskać harmonię, zaufanie i widoczne efekty pracy w zespole.* Warszawa: Onepress

[3] Kozak, A. (2014) *Proces grupowy. Poradnik dla trenerów, nauczycieli*. Warszawa: Helion

SECONDARY LITERATURE:

[1] Duhigg Ch. (2016). *Mądrzej, szybciej, lepiej,* PWN, Warszawa.

[2] Bielińska, I., Jakubczyńska, Z. (2016). *Efektywny zespół.* Warszawa: Edgard.

[3] Lencioni P. (2016). *Pięć dysfunkcji pracy zespołowej,* GWP, Gdańsk

[4] Belbin, M. (2008). *Twoja rola w zespole*. Gdańsk: GWP.

[5] Brown, R. (2006). *Procesy grupowe. Dynamika wewnątrzgrupowa i międzygrupowa*. Gdańsk: GWP.

[6] Robson, M. (2005). *Grupowe rozwiązywanie problemów.* Warszawa: PWE

[7] Chybicka, A. (2006). *Psychologia twórczości grupowej. Jak moderować zespoły twórcze i zadaniowe?* Warszawa: Oficyna Wydawnicza IMPULS.

[8] Stephen, W.G., Stephen, C.W.(2007). *Wywieranie wpływu na grupy. Psychologia relacji*. Gdańsk: GWP..

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Zał. nr 5 do ZW 16/2020

FACULTY ON MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Komunikacja interpersonalna
Name of subject in English: Interpersonal communication
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0081
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					**30**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**Crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					**2**
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
None

SUBJECT OBJECTIVES
C1. Student has basic knowledge about the communication process, its psychological, social and organizational foundations.
C2. To acquaint students with techniques of effective communication, establishing contact and maintaining various types of relationships.
C3. Achieving improved communication behavior and acquiring the ability to consciously define and implement strategies in this area.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has knowledge of the psychological mechanisms and processes that determine the communication process in various areas

relating to skills:

PEU_U01 Student can identify, interpret and evaluate people's communication behaviors and can independently analyze the content of the message.

relating to social competences:

PEU_K01 Thanks to interpersonal communication techniques, he is able to cooperate and work in group and team forms of work organization. He can organize the work of small teams and manage them

PEU_K02 Is prepared to identify, analyze and resolve professional and social problems in the workplace, especially related to communication. Can flexibly look for ways to solve them.

PROGRAMME CONTENT

Seminar		Number of hours
Semin 1	Organizational classes. Communication theory.	2
Semin 2	Fundamentals of psycholinguistics and the evolutionary origin of human language.	2
Semin 3	Listening and contact training.	2
Semin 4	Verbal and nonverbal communication.	2
Semin 5	Self-presentation - communication and image management.	2
Semin 6	Public statements: social anxiety and techniques for controlling it.	2
Semin 7	Public statements: plan, structure, implementation.	2
Semin 8	The art and principles of multimedia presentation and data presentation.	2
Semin 9	Cheating and lying.	2
Semin 10	Contemporary media - specificity, strength and limitations.	2
Semin 11	Creativity in communication.	2
Semin 12	Content analysis- presentations of analyzes of groups I-III	2
Semin 13	Content analysis- presentations of analyzes of groups IV-VI	2
Semin 14	Content analysis- presentations of analyzes of groups VII-IX	2
Semin 15	Final test - a summary of classes.	2
	Total hours	30

TEACHING TOOLS USED

N1. Discussion
N2. Group exercises
N3. Case studies
N4. Content analysis

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1 Activity during classes	PEU_W01; PEU_U01; PEU_K01-K02	Assessment of the student's activity
F2 Works prepared in groups	PEU_W01; PEU_U01; PEU_K01-K02	Final test and the evaluation of an independent analytical project
P = 0,3*F1 + 0,7*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. McKay, M., Davies, M., Fanning, P. (2021) *Sztuka skutecznego porozumiewania się*, wydanie IV. Gdańsk GWP
2. Morreale, S.P., Spitzberg B., H., Barge J. K. (2022) *Komunikacja między ludźmi.* Warszawa PWN

SECONDARY LITERATURE:

1. Sadowski, M. (2014) *Rewolucja social media.* Warszawa OnePress
2. Ekman, P., (2010) *Kłamstwo i jego wykrywanie w biznesie, polityce i małżeństwie.* Warszawa PWN

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Techniki prezentacji
Name of subject in English: Presentation techniques
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0082
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					**30**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

SUBJECT OBJECTIVES

C1 Acquainting students with the basic issues related to interpersonal communication and its applications in science and business.
C2. Increasing students' competences in creating and delivering various types of speeches and presentations in business practice.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 The student knows the basic psychological concepts and mechanisms related to interpersonal communication and self-presentation.
PEU_W02 The student knows the techniques and tools for presenting their own and team solutions and scientific, technical and business achievements.

relating to skills:

PEU_U01 Is able to prepare various types of speeches and presentations of own solutions and achievements.
PEU_U02 Is able to critically analyze the speeches and presentations of other people, organizations and institutions.
relating to social competences:
PEU_K01 Is able to define priorities in own work and in cooperation with others.
PEU_K02 Demonstrates assertiveness and courage in communicating and defending one's own achievements and views

PROGRAMME CONTENT		
Seminar		**Number of hours**
Semin 1	Organizational classes. Basics of making a good impression on the recipient.	2
Semin 2	Basics of interpersonal communication: principles of creating an effective message, credibility of the sender.	2
Semin 3	Verbal communication.	2
Semin 4	The role of non-verbal communication (voice and its characteristics, facial expressions and gestures, distance).	2
Semin 5	Behavior in specific social situations.	2
Semin 6	The specificity of communication in various areas of social communication - matching messages to the audience.	2
Semin 7	Mechanisms of self-presentation in interpersonal communication.	2
Semin 8	Principles of developing an effective multimedia presentation.	2
Semin 9	Principles of effective data presentation.	2
Semin 10	Data presentation workshop (tables and charts).	2
Semin 11	Elevator pitch - development of a short presentation.	2
Semin 12	Public speaking stress and how to deal with it.	2
Semin 13	Analysis of students' own speeches and presentations	2
Semin 14	Analysis of students' own speeches and presentations, part 2.	2
Semin 15	Analysis of students' own speeches and presentations, part 3. Summary of the classes. Passing	2
	Total hours	30

TEACHING TOOLS USED
N1. Group exercises N2. Case studies N3. Discussion N4. Multimedial presentation N5. Group work ended with the presentation of the results

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 - 02	Activity during classes

	PEU_U01 - 02 PEU_K01- 02	
F2	PEU_W01 - 02 PEU_U01 - 02 PEU_K01- 02	Task prepared in group
F3	PEU_W01 - 02 PEU_U01 - 02 PEU_K01- 02	Individual task
P = F1*0,2+F2*0,4+F3*0,4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Buksak, L. (2018). Szkoła Mówców. Myśl i prezentuj inaczej niż wszyscy. Onepress.
[2] Duarte, N. (2011). Slajd:ologia : nauka i sztuka tworzenia genialnych prezentacji. Gliwice: Wydawnictwo Helion - Onepress.
[3] Lenar, P. (2008). Profesjonalna prezentacja multimedialna. Jak uniknąć 27 najczęściej popełnianych błędów. Onepress.

SECONDARY LITERATURE:

[1] Jonathan Schwabish (2016) Better Presentations. A Guide for Scholars, Researchers, and Wonks.
[2] Maurizio La Cava (2015) Lean PresentationDesign. How to create presentations that everybody loves.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Rozwijanie kompetencji społecznych
Name of subject in English: Developing social skills
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0083
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					**30**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS, AND OTHER COMPETENCES
None

SUBJECT OBJECTIVES
C1 Learning about the principles of proper social functioning in a team and in an organization
C2 Acquiring basic social skills.
C3 Achieving improvement in social and team behavior and developing conscious planning and implementation of strategies in this area

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEU_W01 Has a basic knowledge of the regularities of organizational behavior and their determinants. Knows the rules of building and functioning teams and the factors influencing their efficiency.
PEU_W02 Describes the concept of organizational culture and its importance in management. Knows the basic means and systems of communication in organizations and the features of an efficient communication process.
relating to skills:

PEU_U01 Is able to identify and interpret psychological and social problems in the functioning of groups and teams.

relating to social competences:

PEU_K01 Is able to interact and work in group and team forms of work organization (assuming different roles). Can organize the work of small teams and manage them.

PEU_K02 Is prepared to identify, analyze, and resolve professional and social problems in the workplace. Can flexibly look for ways to solve them.

Seminar		**Number of hours**
Semin 1	Overview of seminar's schedule. Psychological foundations of social behavior.	2
Semin 2	The nature and development of social competences?	2
Semin 3	Establishing and maintaining relationships, breaking interpersonal barriers.	2
Semin 4	Dealing with difficult and violent relationships.	2
Semin 5	The basics of effective communication.	2
Semin 6	Styles of communication and creating relationships (assertiveness, submission, aggression).	2
Semin 7	Positive feedback, criticism and dealing with it.	2
Semin 8	Critical thinking.	2
Semin 9	Arguing and defending your arguments.	2
Semin 10	Coping with difficult social situations.	2
Semin 11	Coping with stress.	2
Semin 12	Creative solving of social problems.	2
Semin 13	Diagnosis and taking on social and team roles 1.	2
Semin 14	Diagnosis and taking on social and team roles 2.	2
Semin 15	Summary of classes - credit	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Multimedia presentation
N2. Individual training
N3. Group training/simulations
N4. Case studies

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01-02 PEU_U01 PEU_K01-02	Presentation and discussion of the topic and group tasks
F2	PEU_W01-02 PEU_U01	Class participation, completion of tasks and exercises

	PEU_K01-02	
P = F1 (70%) + F2 (30%)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Wojciszke, B. (2001) *Człowiek wśród ludzi*

[2] Brown, R. (2006). *Procesy grupowe. Dynamika wewnątrzgrupowa i międzygrupowa*. Gdańsk: GWP

[3] McKay, M., Davies, M., Fanning, P. (2001), *Sztuka skutecznego porozumiewania się*,

SECONDARY LITERATURE:

[4] Robson, M. (2005). *Grupowe rozwiązywanie problemów.* Warszawa: PWE

[5] Cialdini, R. (2006). *Wywieranie wpływu na ludzi. Teoria i praktyka*. Gdańsk: GWP.

[6] Stephen, W.G., Stephen, C.W. (2000). *Wywieranie wpływu na grupy. Psychologia relacji*. Gdańsk: GWP.

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Zał. nr 1a do ZW 43/2021

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Storytelling
Name of subject in English: Storytelling
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0084
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					**30**
Number of hours of total student workload (CNPS)					**50**
Form of crediting					**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points					**2**
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Basic knowledge of communication

SUBJECT OBJECTIVES

C1 Acquainting with storytelling and the possibilities of its use in external and internal communication of the organization, as well as in building organizational culture.
C2 Developing competences to analyze and solve professional and social problems in the workplace through the use of the storytelling method.
C3 Developing the competence to cooperate in a team and organize a small team's work.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 has basic knowledge of the conditions and methods of communication in organizations necessary to build organizational culture and to function in teams

relating to social competences:

PEU_K01 is ready to identify and solve problems in the area communication at work

PEU_K02 is able to work in a team, as well as to initiate activities for a small team and organize its work

PROGRAMME CONTENT

Seminar		Number of hours
Semin 1	Principles of organization and realization of classes - overview. Storytelling - introductory issues.	2
Semin 2	Narrative - concept, structure, key elements, application.	2
Semin 3	Storytelling - objectives, functions, recipient's involvement. Features of a good story.	2
Semin 4	Narrative scheme in storytelling. Methods of creating the structure and content of the story taking into account its purpose, audience and situation.	2
Semin 5-6	Creativity in storytelling. Elements of creativity training.	4
Semin 7	Principles of communication stimulating creativity.	2
Semin 8	Storytelling - arousing and maintaining the interest of the recipient.	2
Semin 9	Storytelling in internal and external communication of the organization.	2
Semin 10	Storytelling in presenting yourself in professional situations: a story about yourself.	2
Semin 11	Storytelling in team work: a story about team successes and failures.	2
Semin 12	History of the organization and a story about it.	2
Semin 13	Digital storytelling.	2
Semin 14-15	Students' final presentations. Summary of the classes.	4
	Total hours	30

TEACHING TOOLS USED

N1. Storytelling
N2. Student's own work
N3. Work in groups
N4. Case study
N5. Didactic game
N6. Discussion
N7. Multimedia presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_K01 PEU_K02	Activity (including completed homework)
F2	PEU_W01 PEU_K01 PEU_K02	Task in a small team
F3	PEU_K02	Presentation
P = 0,4*F1+0,3*F2+0,3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Filarski K., Storytelling inspiracyjny, Storyhill 2016.

[2] Fog K., Budtz Ch., Munch Ph., Blanchette S., Storytelling. Narracja w reklamie i biznesie, Wyd. Saatchi & Saatchi, Warszawa 2013.

[3] Storr W., Science of Storytelling: Why Stories Make Us Human, and How to Tell Them Better, Gardners 2021.

SECONDARY LITERATURE:

[1] Górska M., Visual storytelling. Jak opowiadać językiem video, PWN, Warszawa 2019.

[2] Mistewicz E., Marketing narracyjny. Jak budować historie, które się sprzedają, Wyd. One Press, Gliwice 2011.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Antropologia stosowana
Name of subject in English: Applied anthropology
Field of study: Business Engineering
Specialty:
Profile: academic
Level and form of study: 1st level, full-time studies
Kind of subject: optional
Subject code: W08IZZ-SI0085
Course group NO

	Lecture	Exercise	Laboratory	Project	Seminar
Number of hours of classes organized at the University (ZZU)					**30**
Number of Hours of Total Student Effort (CNPS)					**50**
Form of credit					**crediting with grade**
For a group of courses, mark the final course (X)					
Number of ECTS credits					**2**
including the number of points corresponding to the classes of a practical nature (P)					
including the number of ECTS credits corresponding to classes requiring the direct participation of teachers or other lecturers (BU)					**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
No prerequisites.

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SUBJECT OBJECTIVES

C1: Acquisition about the anthropological determinants of organizational behavior and anthropological aspects: communication in organizations and organizational culture.
C2: Acquisition of the ability to self-determine the role in the team.
C3: Acquisition of competence to identify cultural diversity in the organization in social responsibility and resolve ethical dilemmas generated by the axiological heterogeneity of the organization's members.

SUBJECT EDUCATIONAL EFFECTS

In the field of knowledge:

PEU_W01 has basic knowledge of the regularities of organizational behavior and its conditions. Describes the concept of organizational culture and its importance in management.

In the field of skills:

PEU_U01 is able to interact and work in group and team forms of work organization (taking on different roles in them). Can organize and lead the work of small teams. Can self-define their role in the team

In the field of social competences:

PEU_K01 is prepared to identify and analyze and resolve professional and social problems in the workplace. Can flexibly look for ways to solve them.

PEU_K02 is prepared to identify cultural diversity in an organization and to resolve ethical dilemmas

PROGRAMME CONTENT		
Seminar		**Number of hours**
Semin 1	Anthropology applied in the context of philosophical sciences. Organizational issues (1h)	2
Semin 2	Reductionist visions of man	2
Semin 3	The problem of adequate anthropology	2
Semin 4	Anthropological determinants of organizational behavior: external and internal determinants	2
Semin 5	Building teams and groups	2
Semin 6	Leading a small team	2
Se7	Determinants of team effectiveness (motivation, management, communication, conflict)	2
Semin 8	Intrinsic and extrinsic motivation	2
Semin 9	Motivational techniques	2
Semin 10	Communication in the organization: conditions, types and functions, communication barriers, active listening, feedback	2
Semin 11	IT in business and the problem of human algorithmization	2
Semin 12	Intercultural communication.	2
Semin 13	Civilizational determinants of organizational culture	2
Semin 14	Cultural pluralism in organization and the problem of tolerance	2
Semin 15	Corporate Social Responsibility	2

	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentation N2. Interactive lecture N3. Panel discussion N4. Working in groups N5. Brainstorming

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Grades (F – formative (during the semester), P – summarizing (at the end of the semester)	Learning outcome number	How to assess the achievement of a learning outcome
F1	PEU_W01 PEU_K01 PEU_K02	a written version of the paper
F2	PEU_U01	activity in the class, participation in the discussion.
P = (F1 + F2)/2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koźmiński, A. K., Piotrowski W. [red. nauk.], *Zarządzanie: teoria i praktyka*, Wydawnictwo Naukowe PWN, Warszawa 2010.

[2] Stewart J., [red.], *Mosty zamiast murów. Podręcznik komunikacji interpersonalnej*, Wydawnictwo Naukowe PWN, Warszawa 2022.

[3] Ząbek M., [red.], *Antropologia stosowana*, Warszawa 2013.

SECONDARY LITERATURE:

[1] Nowicka E., *Świat człowieka – świat kultury*, Warszawa 2006.

[2] Sikora M., *W kierunku praktycznego wymiaru antropologii*, „Studia Etnologiczne i Antropologiczne" 2016, nr 16, s. 85-100.

[3] Szaban J., *Zachowania organizacyjne. Aspekt międzykulturowy*, Wydawnictwo Adam i Marszałek, Toruń, 2012.

SUBJECT SUPERVISOR (NAME, SURNAME, E-MAIL ADDRESS)

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FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Zarządzanie różnorodnością i inkluzja
Name of subject in English: Diversity management and inclusion
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0086
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**15**
Number of hours of total student workload (CNPS)	**30**				
Form of crediting	**crediting with grade**				
For group of courses mark (X) final course	**X**				
Number of ECTS points	**1**				
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1**				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Basic knowledge of management, organizational behavior, human resource management

SUBJECT OBJECTIVES

C1 To teach students about the differences between people and the impact of differences on the functioning of people in society, organisations and teams.
C2 To show the students, using selected examples, how to build an inclusive workplace, inclusive teams, organisational culture open to diversity and how to use diversity to achieve the organisation's business goals taking into account the conditions of the organisation.
C3: To demonstrate competence in identifying and counteracting negative stereotypes, prejudices, designing an inclusive workplace and organisational culture, identifying cultural differences, and identifying potential problems and conflicts in relation to these differences and seeking solutions to such problems.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01 Has basic knowledge of the regularities of organizational behavior and their determinants in the context of social, legal and cultural diversity.

PEU_W02 Knows the potential dimensions of diversity in the workplace (in an organization), diversity management tools and principles of building and functioning of teams in the context of diversity, including those based on inclusive leadership.

PEU_W03 Is familiar with the notion of organizational culture and its functions in an inclusive workplace

PEU_W04 Knows the basic means and systems of communication in organizations and the features of effective communication process in organizations taking into account the known dimensions of diversity

Relating to social competence:

PEU_K01 Is able to organize and manage the work of small teams and take on different roles in them.

PEU_K02 Is prepared to identify, analyze and solve professional and social problems in the workplace. Can flexibly seek ways of solving them.

PROGRAMME CONTENT

Lecture		**Number of hours**
Le1	Introduction to lecture. Discussion of credit requirements. Introduction to diversity and inclusion management. Basic concepts.	1
Le2	Determinants of diversity management in organizations. Socio-demographic, legal conditions etc.	2
Le3	Different theoretical and conceptual approaches to diversity - why diversity can lead to positive and negative consequences	2
Le4	Dimensions of diversity - demographic and functional (primary and secondary). The importance of these dimensions from an organizational point of view	2
Le5	Managing a team made up of diverse employees. Inclusive leadership	2
Le6	Diversity management tools. Diversity Audit	2
Le7	Inclusive Workplace. An organizational culture that supports diversity. Inclusive organizational climate. Good practices in this area.	2
Le8	Course Summary. Final test.	2
	Total hours	15

Seminar		**Number of hours**
Se 1	Introduction to seminar. Discussion of credit requirements. Introduction to diversity and inclusion management	1
Se 2	Stereotypes and prejudices as a source of discrimination. Identifying, analysing and solving problems in this area - using a selected example.	2
Se 3	Going beyond one's comfort zone - awareness of differences between people. Identifying, analyzing and solving problems in this area - using selected example.	2
Se 4	Basic dimensions of diversity - gender, gender identity, LGBTQ. Good practices of diversity management in these dimensions. Identifying, analysing and solving problems in this area - using a selected example.	2

Se 5	Basic dimensions of diversity – age, disability, neurodiversity. Age management versus intergenerational management. Good practices of diversity management in these dimensions. Identifying, analysing and solving problems in this area - using a selected example.	2
Se 6	Basic dimensions of diversity – race, ethnic origin. Managing a culturally diverse organization. Good practices of diversity management in these dimensions. Identifying, analysing and solving problems in this area - using selected example.	2
Se 7	Secondary dimensions of diversity - creed, religion, language, social class, physical appearance. Good practices of diversity management in these dimensions. Identifying, analysing and solving problems in this area - using a selected example.	2
Se 8	Functional diversity - importance of differences in education, work experience profile. Identifying, analysing and solving problems in this area - using a selected example.	2
	Total hours	15

TEACHING TOOLS USED
N1. Lecture (stimulating Q&A) N2. Presentations prepared by students – group work N3. Exercises prepared by students – group work N4. Questions for students during the seminar N5. Case studies N6. Self-study: preparation for the seminar

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02 PEU_W03 PEU_W04	Final test
F2	PEU_W01, PEU_K01 PEU_K02	Assessment of the presentation prepared by the students
F3	PEU_K01 PEU_K02	Assessment of the exercises prepared by the students
F4	PEU_K01 PEU_K02	Assessment of engagement during classes.
F5	PEU_K01 PEU_K02	Assessment of the peer to peer feedback.
F(W) =F1 F(S) = F2* 0,2+F3*0,3+F4*0,3+ F5*0,2 P = (F(W)+F(S))/2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Przytuła S. (red.), Zarządzanie różnorodnością pracowników. Perspektywa globalnej mobilności i migracji, PWN, Warszawa 2019
[2] Warwas I. (red.) Oblicza zarządzania różnorodnością w Polsce, Wyd. Nieoczywiste, 2019.

SECONDARY LITERATURE:

[1] Gross-Gołacka E., Zarządzanie różnorodnością. W kierunku zróżnicowanych zasobów ludzkich w organizacji, Difin, Warszawa 2018.
[2] Jeruszka U., Wolan-Nowakowska M., Zarządzanie różnorodnością w organizacji. Aspekty psychopedagogiczne. Difin, Warszawa 2020.
[3] Leoński W., Pluta A., Wieczorek-Szymańska A., Zarządzanie różnorodnością w organizacji. Wyd. CeDeWu, Warszawa 2020.
[4] Wziątek-Staśko, A. Diversity Management. Narzędzie skutecznego motywowania pracowników. Difin, Warszawa 2012.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Rozwijanie kompetencji poznawczych i decyzyjnych
Name of subject in English: Developing cognitive and decision-making competencies
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0087
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**30**
Number of hours of total student workload (CNPS)	**25**				**50**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points	**1**				**2**
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**				**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None

SUBJECT OBJECTIVES

C1 Acquiring knowledge about human cognitive functioning, especially in the context of his professional and managerial activities
C2. Acquiring the ability to avoid cognitive errors and to carry out cognitive activities correctly (analytical, decision-making, risk-related, etc.).
C3. Improving cognitive skills, especially in situations of assessment, decision and risk assessment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has a basic knowledge of the regularities of organizational behavior and decision-making processes and their cognitive determinants.

relating to skills:

PEU_U01 Is able to correctly carry out the decision-making process, risk assessment, problem situation analysis.
PEU_U02 is able to identify the cognitive limitations of the subject and their role in the process of problem solving and decision making.

relating to social competences:

PEU_K01 Is prepared to identify, analyze and resolve problems in the workplace. He can use the intellectual potential in search of ways to solve them.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introductory lecture. The regularities and limitations of the functioning of the human mind	1
Lec 2	Basic cognitive processes (perception, attention, memory)	2
Lec 3	Cognitive processes (thinking, reasoning, problem solving)	2
Lec 4	Psychological decision-making mechanisms - normative vs descriptive concepts	2
Lec 5	Model of bounded rationality in decision making. Sources of decision errors	2
Lec 6	Psychological determinants of perception, risk assessment and decision making	2
Lec 7	The role of emotions and individual differences in taking risks	2
Lec 8	Coping with making difficult decisions. Summary of the lecture - credit	2
	Total hours	15

Seminar		**Number of hours**
Semin 1	Organizational classes. Psychological cognitive mechanisms and possibilities of their development.	2
Semin 2	Possibilities and limitations of perceptual processes (perception, attention, memory). Optimizing the use of cognitive processes.	2
Semin 3	The potential and limitations of perceptual processes (thinking, problem solving). Optimizing the use of cognitive processes.	2
Semin 4	Decision making process. The role of rational and automatic mechanisms in making decisions.	2
Semin 5	Mental processes in the decision-making process.	2
Semin 6	Estimating the subjective probability in making decisions.	2
Semin 7	Information processing cycles in the decision-making process. Psychological decision rules.	2
Semin 8	Decision heuristics (sources of decision errors).	2
Semin 9	Model and competences of mental accounting.	2
Semin 10	Consequences of perspective theory - errors in risk assessment - predisposition effect and sunk cost effect.	2

Semin 11	Instability of preferences and controllability in decision making and risk. Present tense preference and problems of self-control.	2
Semin 12	Quantitative and qualitative dimensions of perceived risk in decision making.	2
Semin 13	Consequences of emotions in decision making and risk assessment.	2
Semin 14	Individual differences in decision making and risk.	2
Semin 15	Group decision making mechanisms. Summary of the classes. Passing.	2
	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentation N2. Group exercises N3. Individual exercises N4. Case study N5. Group discussion

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1 Cl	PEU_W01, PEU_K01-02	Development of the topic and exercises for the group
F2 Cl	PEU_W01, PEU_K01-02	Activity during classes, implementation of exercises and case studies
P Cl = 0,7*F1+0,3*F2		
F1 Lec	PEU_W01	Written credit for the lecture
F2 Lec	PEU_K02	Activity during the lecture
P Lec = 0,8*F1+ 0,2*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Nęcka, E., Orzechowski, J., Szymura, B. (2006) *Psychologia poznawcza* Warszawa: ACADEMICA Wydawnictwo SWPS & Wydawnictwo Naukowe PWN

[2] Tyszka, T. (2016). *Decyzje. Perspektywa psychologiczna i ekonomiczna.* Warszawa: Wydawnictwo Scholar.

[3] Zaleśkiewicz, T. (2005). *Przyjemność czy konieczność. Psychologia spostrzegania i podejmowania ryzyka.* Gdańsk: GWP.

SECONDARY LITERATURE:

[1] Zaleśkiewicz, T. (2003). *Psychologia inwestora giełdowego. Wprowadzenie do behawioralnych finansów.* Gdańsk: GWP.

[2] Tyszka, T. (2003). Psychologiczne pułapki oceniania i podejmowania decyzji. Gdańsk: GWP.

[3] Tyszka, T. (red.). (2004). *Psychologia ekonomiczna.* Gdańsk: GWP.

[4] Zaleskiewicz, T. (2003). Psychologia inwestora giełdowego. Gdańsk: GWP.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Rozwijanie kompetencji menedżerskich
Name of subject in English: Developing managerial skills
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0088
Group of courses : NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**30**
Number of hours of total student workload (CNPS)	**25**				**50**
Form of crediting	**crediting with grade**				**crediting with grade**
For group of courses mark (X) final course					
Number of ECTS points	**1**				**2**
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**				**1,2**

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS, AND OTHER COMPETENCES
None

SUBJECT OBJECTIVES
C1 Expanding knowledge in the field of team management, using power and social influence in leading people.
C2 Developing managerial competences in the field of communicating with employees and the team, motivating, time management, inspiring, enhancing employee potential, etc.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEU_W01 Has basic knowledge of the regularities of organizational behavior and their determinants. Has knowledge about the role of different managerial competences for effective management of people and organizations. Knows rules of using managerial competences to increase efficiency of teams. Has knowledge about importance of

effective communication in different forms of management e.g. individual, group, virtual.

Relating to skills:

PEU_U01 Is able to recognize and develop own key competences supporting the realization of managerial functions. Is able to use managerial competences depending on the situation.

Relating to social competences:

PEU_K01 Is able to organize work in teams, cooperate with team members and manage them.

PEU_K02 Can motivate team members, identify, and solve interpersonal problems and prevent conflicts

PROGRAMME CONTENT

	Lecture	**Number of hours**
Lec 1	Course overview. The role of managerial competencies and skills.	1
Lec 2	Typology of competencies and their role in the work of a manager.	2
Lec 3	Cognitive and emotional competencies in the work of a manager.	2
Lec 4	Developing skills of recognizing and responding to changes in the internal and external environment.	2
Lec 5	Stimulating and supporting creativity in the process of problem solving and decision making.	2
Lec 6	Competencies in solving conflicts between employees in the organization (in diads, teams, and between groups).	2
Lec 7	Strengthening and developing the potential of employees' competencies.	2
Lec 8	Competencies in ethical and fair evaluation of employees. Summary of classes. Test.	2
	Total hours	**15**

	Seminar	**Number of hours**
Semin 1	Overview of the seminar. Managerial and leadership competencies - is there an ideal leader profile?	2
Semin 2	Developing cognitive and emotional competencies in effective managerial work (including self-awareness, emotional intelligence, locus of control, tolerance of uncertainty).	2
Semin 3	Coping with stress competencies and developing mental toughness.	2
Semin 4	Developing competencies in problem solving and organizing the work of a manager.	2
Semin 5	Developing competencies in decision-making and risk assessment in the work of a manager.	2
Semin 6	Diagnosis of own skills in evaluating others, conducting meetings, conducting difficult conversations, using counseling methods.	2
Semin 7	Team management competencies: cooperation and competition - different strategies to motivate, support, and develop creativity.	2
Semin 8	Competencies in motivating to work. Methods of increasing intrinsic motivation and employee performance.	2

Semin 9	Identifying team members leadership potential required to complete projects.	2
Semin 10	Developing tools to observe and measure managerial competencies.	2
Semin 11	Project realization based on own and team members' competences.	2
Semin 12	Presentation and analysis of team members' competencies used in project implementation - presentation of results.	2
Semin 13	Presentation and analysis of team members' competences used in project implementation - presentation of results.	2
Semin 14	Presentation and analysis of team members' competences used in the project - presentation of results.	2
Semin 15	Summary of classes. Credit.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Lecture in a form of multimedia presentation and discussion N2. Individual exercises N3. Group exercises N4. Analysis case studies N5. Report writing N6. Discussion

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01	Test
F2	PEU_K01-K02 PEU_U01	Active participation in individual and group discussions
F3	PEU_K01 PEU_K02	Completion of a task and a report
P1 (lecture) =F1 P2(seminar) =0,5*F2+0,5*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Filipowicz, G. (2019). *Zarządzanie kompetencjami. Perspektywa firmowa i osobista.* Warszawa: Wolters Kluwer

[2] Drucker, P. F. (2017). *Menedżer skuteczny*. Warszawa: MT Biznes

SECONDARY LITERATURE:

[1] Rożnowski, B., Fortuna, P. (2020). *Psychologia biznesu*. Warszawa: Wydawnictwo Naukowe PWN

[2] Schulz, D., Schulz, S.E. (2015). *Psychologia a wyzwania dzisiejszej pracy*. Warszawa: Wydawnictwo Naukowe PWN

[3] Zawadzka, A. M. (red.) (2019). *Psychologia zarządzania w organizacji.* Warszawa: Wydawnictwo Naukowe PWN

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Mediacje i elementy negocjacji
Name of subject in English: Mediations and elements of negotiations
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0089
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**				**15**
Number of hours of total student workload (CNPS)	**30**				
Form of crediting	**crediting with grade**				
For group of courses mark (X) final course	**X**				
Number of ECTS points	**1**				
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1**				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
None.

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SUBJECT OBJECTIVES
C1 To acquaint students with the key knowledge of the theory of negotiation and mediation as well as the psychological foundations of these processes.
C2 Improving students' skills in managing crisis and conflict situations.
C3 Developing students' ability to communicate independently, conduct mediation and negotiate in economic and social structures.

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEU_W01 has a basic knowledge of the regularities of social behavior, especially those relating to the processes of mediation and negotiation, and their determinants.
PEU_W02 knows the rules of building and functioning of task groups and teams as well as factors influencing their efficiency, especially knows the rules of crisis communication.

PEU_W03 knows the basic means and systems of communication in various social structures and the features of an efficient communication process.

relating to skills:

PEU_U01 has skills to manage crisis and conflict situations.

relating to social competences:

PEU_K01 is able to interact and work in group and team forms of work organization (assuming the role of negotiator and mediator). The student is able to organize the work of small teams and manage them.

PEU_K02 is prepared to identify, analyze and resolve professional and social problems in the workplace. Can flexibly look for ways to solve them.

Lecture		**Number of hours**
Lec1	Introduction (basis of interactions). Passing rules.	1
Lec2	Social influence (imitation, conformism, influence of authority).	2
Lec3	Influence mechanisms (commitment, equity, liking, reciprocity, inaccessibility).	2
Lec4	Manipulation techniques (analysis of various techniques, classical and emerging in the digital world).	2
Lec5	Psychology of conflicts (subject and object of conflict, conflict detectors, conflict phases). Solving the conflict.	2
Lec6	Social groups. Task groups. The dynamics of a group process.	2
Lec7	Phenomena that make group work difficult (social inhibition, social idleness syndrome, group thinking).	2
Lec8	Stress and elements of non-verbal communication. Summary and conclusions for professional and non-professional practice. Final test.	2
	Total hours	15

PROGRAMME CONTENT

Seminar		**Number of hours**
Semin 1	Introduction to the classes (presentation of the aim and effects of the course, getting to know students' expectations, key competences vs. negotiations and mediation, rules of work on the course and its completion).	2
Semin 2	Attitude and interests as a condition for success (preparation for negotiations - building and using tools to define goals, interests, priorities, estimating one's own position and the position of a partner, identifying partners' needs, analyzing problems).	2
Semin 3	Conflict as an opportunity to get additional profits. Crisis communication (experience of conflicts, conflict management, testing methods and ways of conflict resolution - role playing / didactic game).	2
Semin 4	Mediation as a form of alternative dispute resolution. The concept, types and mediation areas. The course of mediation and the rules of mediation. Discussion scenarios that may be the basis for mediation.	2
Semin5	Emotions and non-verbal tactics in negotiations and mediations (recognizing your own emotions, dealing with your own and your partner's difficult emotions, exercises to deal with criticism and objections, simulations - what my body tells you how to sit at the table to achieve your goals).	2

Semin6	Communication in the negotiation and mediation process. Effective questioning and feedback as the basis for success in negotiations and mediation. The role of the mediator. Exercises, application in real situations.	2
Semin7-8	Negotiation tactics. Common features and differences in use during negotiations and mediation (experience and practice of negotiation situations - selection of techniques and strategies for the negotiation phase. Summary and student presentations, conclusions for professional work.	4
	Total hours	15

TEACHING TOOLS USED

N1. Conversational lecture supported by audiovisual materials
N2. Work in groups
N3. De Bono Hats
N4. Brainstorm
N5. Panel discussion
N6. Case study
N7. Presentation
N8. Role play
N9. Didactic games
N10. Individual work of students
N11. Existential tasks

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02 PEU_W03	Presentation or colloquium (student's choice depends on activity)
F2	PEU_W03 PEU_K02	Activity in the classroom
F3	PEU_W03 PEU_K01 PEU_K02	Presentation (in pairs or in a group)
F4	PEU_W03 PEU_U01 PEU_K01 PEU_K02	Activity in the classroom
P = (P lecture + P seminar)/2 P lecture = 0,8*F1+0,2*F2 P seminar = 0,5*F3 +0,5*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Wojciszke, „Psychologia społeczna", Wydawnictwo Naukowe Scholar, Warszawa 2019
2. (red.) Binsztok A. „Sztuka skutecznego prowadzenia mediacji i negocjacji", Wydawnictwo Marina 2013
3. Anthonissen P.F. (red) „ Komunikacja Kryzysowa", 2010, Oficyna Wolters Kluwer, Warszawa

SECONDARY LITERATURE:

1. Fisher, Ury „Dochodząc do TAK, Negocjowanie bez poddawania się", 2016 Polskie Wydawnictwo Ekonomiczne, Warszawa
2. (red.) Gmurzyńska E., Morek R. „Mediacje. Teoria i Praktyka", Wydawnictwo Wolters Kluwer Polska, Wydanie 3, 2018
3. Shapiro „Negocjuj nienegocjowalne", 2016 ICAN Warszawa
4. Dawson „Sekrety negocjacji dla biznesmenów", 2018, MT Biznes, Warszawa
5. Filaber J. „Mediacje. Podstawy prawne i praktyka stosowania", Wydawnictwo CeDeWu sp. Z o.o. 2021,
6. (red.) J. Stewart, „Mosty zamiast murów. Podręcznik komunikacji interpersonalnej", PWN, Warszawa 2007
7. Thomas J. „Negocjuj, aby zwyciężać", 2017, MT biznes
8. Cialdini „Perswazja. Jak w pełni wykorzystać techniki wpływu społecznego" 2016, GWP Gdańskie Wydawnictwo Psychologiczne
9. Wojciszke, „Człowiek wśród ludzi", GWP, Gdańsk 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Diagnostyka ergonomiczna i projektowanie stanowisk pracy
Name of subject in English: Ergonomic diagnosis and design of workstations
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Subject code: W08IZZ-SI0090
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				30	
Number of hours of total student workload (CNPS)				50	
Form of crediting				crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical classes (P)				2	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				1,2	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of descriptive statistics.
2. Knowledge regarding the work environment physics.

SUBJECT OBJECTIVES

C1: To acquire skills of using tools for analysis and support of human workstation design
C2: To gain and consolidate social competences consisting in cooperation skills. Developing habits of cooperation with employers and work organizers.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:
PEU_U01: Is able to apply basic methods of ergonomic research
PEU_U02: is able to determine normative conditions of ergonomic quality assessment
PEU_U03: is able to use basic tools to assess the usability in the paradigm of standard ISO 9241

PEU_U04: is able to diagnose and correct basic factors determining the level of ergonomic quality of a work station
PEU_U05: is able to apply selected methods to design an ergonomic workstation which is used for performing specific tasks and processes.

relating to social competences:
PEU_K01: Acquisition and development of team collaboration skills in order to optimally solve assigned problems
PEU_K02: Acquisition and development of systematic thinking about ergonomic ergonomic properties of human workstations
PEU_K03: Development of self-assessment and self-control skills during work

Project		**Number of hours**
Proj 1	Overview of the organizational issues. Presentation of the project goals and requirements. Discussion of the differences in conceptual and corrective ergonomics with examples of applications.	2
Proj 2	Presenting and discussing possible scenarios for performing ergonomic diagnosis.	4
Proj 3	Consultation with individual project teams on the choice of thematic area	2
Proj 4	Individual selection of diagnostic methods for teams.	4
Proj 5	Presentation of results of preliminary ergonomic evaluation.	4
Proj 6	Consultations with project teams: selection and application of supplementary ergonomic diagnostic methods on the basis of preliminary results	4
Proj 7	Consultations in design teams: discussion of proposals to introduce potential changes resulting from the analyses.	4
Proj 8	Consultations in design teams: verification and validation of the final version of the project.	2
Proj 9	Defence session of individual projects. Demonstration of the results obtained by individual teams in the form of presentation and written report.	4
	Total hours	30

TEACHING TOOLS USED
N1. Shared teaching materials published on websites N2. Group work completed with the presentation of the results

N3. Consultations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01 – PEU_U05	Project realization and report preparation
F2	PEU_U01 – PEU_U05	Presentation and defence of the project
P=0.8*F1 + 0.2*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koradecka D. [red.], Bezpieczeństwo pracy i ergonomia, Centralny Instytut Ochrony Pracy, Warszawa, 1999.

[2] Kuliński M., Jach K., Koszela-Kulińska J., Metodyka doradztwa w zakresie ergonomii stanowisk pracy, Podręcznik ergonomiczny. Wielowymiarowy model wsparcia i identyfikacji kompetencji zawodowych. Zeszyt 4, Wojewódzki Urząd Pracy w Gdańsku, Gdańsk 2014

[3] Tytyk E., Projektowanie ergonomiczne, Wydawnictwo Naukowe PWN, Warszawa, 2001.

SECONDARY LITERATURE:

[1] Artykuły z czasopism: Ergonomics, International Journal of Industrial Ergonomics, Applied Ergonomics, Human Factors

[2] Materiały udostępnione na stronach http://ergonomia.ioz.pwr.wroc.pl, http://pl.wikipedia.org, http://en.wikipedia.org

[3] Proctor R.W., Zandt T.V., Human factors in simple and complex systems, Needham Heights: Allyn and Bacon, 1994.

[4] Salvendy, Gavriel (red), Handbook of Human Factors and Ergonomics, John Wiley & Sons, 2006.

[5] Ziobro E., Ergonomia, Wydawnictwo Politechniki Wrocławskiej, Wrocław, 1989.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Statystyka dla inżynierów
Name of subject in English: Statistics for engineers
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0092
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**100**		**50**		
Form of crediting	**Examination**		**crediting with grade**		
For group of courses mark final course with (X)					
Number of ECTS points	**4**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Competences acquired in the course: Probability

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SUBJECT OBJECTIVES

C1: Knowledge of the basics of exploratory data analysis and methods of mathematical statistics.
C2: Mastering the skills of exploratory data analysis and statistical inference.
C3: Mastering R package in statistical data analysis.

SUBJECT LEARNING OUTCOMES

Relating to knowledge:

PEU_W01: Knowledge of mathematical statistics.
PEU_W02: Knowledge of R package.

Relating to skills:
PEU_U01: Ability to use statistical methods as tools supporting decision making processes.

PROGRAM CONTENT		
Lectures		**Number of hours**
Lec 1	Conditions of obtaining credit. Exploratory data analysis: measurement and measurement scales, descriptive statistics, analysis of relationships between variables, graphical presentation of data.	4
Lec 2	Exploratory data analysis - case study.	4
Lec 3	Introduction to statistical inference: population, sample, statistics, estimators, parametric and nonparametric estimation, point and interval estimation.	2
Lec 4	Point estimation: the method of the maximum likelihood, properties of estimators.	4
Lec 5	Interval estimation for various sample sizes.	2
Lec 6	Introduction to hypothesis testing according to Fisher and Neyman-Pearson	4
Lec 7	Selected parametric tests.	2
Lec 8	Selected nonparametric tests.	4
Lec 9	Analysis of variance.	2
Lec 10	Summary of material. Practice test.	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Conditions of obtaining credit, guidelines for the organization of classes. Introduction to statistical software - R	1
Lab 2	Data structure. Basic operations.	2
Lab 3	Data export and import. Test 1 (20 min.)	2
Lab 4	Data transformation and data analysis	2
Lab 5	Data visualization I	2
Lab 6	Data visualization II	2
Lab 7	Confidence intervals . Testing statistical hypotheses	2
Lab 8	Test 2 (90 min.)	2
	Total hours	15

TEACHING TOOLS USED
N1. Presentation N2. Interactive charts

N3. Case study N4. Data analysis using R

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_W02	Written test 1 using R
F2	PEU_U01 PEU_W01 PEU_W02	Written test 2 using R
F3	PEU_W01	Exam
P(lecture)=F3		
P(lab.)=(F1+2*F2)/3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Aczel A. D., Sounderpandian J. *Statystyka w zarządzaniu*. Wydawnictwo Naukowe PWN, Warszawa 2018.
[2] Kapłon R. *Krótkie wprowadzenie do pakietu R*. Wrocław 2021. [available on ePortal]

SECONDARY LITERATURE:

[1] Klonecki W. *Statystyka dla inżynierów.* Wydawnictwo Naukowe Warszawa 1999.
[2] Krysicki W., Bartos J., Dyczka W., Królikowska K., Wasilewski M. *Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach. Część 2 – Statystyka matematyczna*, Wydawnictwo Naukowe PWN, Warszawa 2012.
[3] Gągolewski, M. *Programowanie w języku R*, Wydawnictwo Naukowe PWN, Warszawa 2016.
[4] Gatnar E., Walesiak M. (red.) *Statystyczna analiza danych z wykorzystaniem programu R*, Wydawnictwo Naukowe PWN, Warszawa 2009.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Modelowanie statystyczne
Name of subject in English: Statistical Modeling
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0093
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**100**		**50**		
Form of crediting	**Examination**		**crediting with grade**		
For group of courses mark final course with (X)					
Number of ECTS points	**4**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Competences acquired in the course: Probability

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SUBJECT OBJECTIVES

C1: Acquiring knowledge in the field of statistical modeling, with particular emphasis on regression models.
C2: Mastering the skills of building statistical models in relation to business problems.
C3: Mastering the skills of using the R programming language.

SUBJECT LEARNING OUTCOMES

Relating to knowledge:

PEU_W01: Knowledge in the field of statistical models, with particular emphasis on regression models. One knows how these models can be used to solve problems in organizational areas.
PEU_W02: Knowledge of R package.

Relating to skills:
PEU_U01: Ability to build an appropriate statistical model depending on the problem. To do this, one efficiently uses the R programming language.

PROGRAM CONTENT		
Lectures		**Number of hours**
Lec 1	Grading principles. Data and measurement, measurement scales, elements of descriptive statistics	4
Lec 2	Introduction to statistical inference: population, sample, statistics, estimators, point and interval estimation	4
Lec 3	Point estimation: maximum likelihood method and least squares method	2
Lec 4	Interval estimation and uncertainty in a parameter estimation	4
Lec 5	Hypothesis testing according to Fisher and Neyman-Pearson. Duality of confidence intervals and statistical tests	2
Lec 6	Significance tests and likelihood ratio tests	4
Lec 7	Introduction to regression models: essence, model formulation, parameter interpretation, regression to the mean	2
Lec 8	Linear and nonlinear regression models	4
Lec 9	Model validation using bootstrap method	2
Lec 10	Logistic regression models	2
Lec 11	Case study: application of regression models in business problems	
Lec 12	Statistical tests and regression models	
Lec 13	Summary of the material. Practice test.	
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Conditions of obtaining credit, guidelines for the organization of classes. Introduction to statistical software - R	1
Lab 2	Data structure. Basic operations.	2
Lab 3	Data export and import. Test 1 (20 min.)	2
Lab 4	Descriptive statistics with R package	2
Lab 5	Point and interval estimation, statistical hypothesis testing	2
Lab 6	Building linear and nonlinear regression models	2
Lab 7	Building logistic regression models	2
Lab 8	Test 2 (90 min.)	2

	Total hours	15

TEACHING TOOLS USED
N1. Presentation N2. Interactive charts N3. Case study N4. Data analysis using R

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_W02	Written test 1 using R
F2	PEU_U01 PEU_W01 PEU_W02	Written test 2 using R
F3	PEU_W01	Exam
P(lecture)=F3		
P(lab.)=(F1+2*F2)/3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Harrell Jr Frank E. *Regression Modeling Strategies: With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis*. Springer; 2nd ed. 2015.

[2] Magiera R. *Modele i metody statystyki matematycznej. Część II. Wnioskowanie statystyczne.* Oficyna Wydawnicza GiS, 2018.

[3] Kapłon R. *Krótkie wprowadzenie do pakietu R*. Wrocław 2021. [dostępne na ePortal]

SECONDARY LITERATURE:

[1] Gągolewski, M. *Programowanie w języku R*, Wydawnictwo Naukowe PWN, Warszawa 2016.

[2] Gatnar E., Walesiak M. (red.) *Statystyczna analiza danych z wykorzystaniem programu R*, Wydawnictwo Naukowe PWN, Warszawa 2009.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Badania operacyjne
Name of subject in English: Operations research
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0094
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**75**		**50**		
Form of crediting	**Examination**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**3**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in linear algebra, logic and probability calculus

SUBJECT OBJECTIVES

C1. Showing students basic optimization problems such as: linear programming, integer programming and minimum cost flow network problems; indication of the practical applications of these problems; presenting methods of solving the above problems.
C3. Showing students how to identify decision variables, input data and objectives in practical decision situations and how to build a mathematical programming model.
C5. Presenting mathematical programming languages which can be used to implement the models arising in practice

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 - Has basic knowledge in formulating optimization problems and methods of solving them.
PEU_W02 – Knows basic algorithms used in operations research.

relating to skills:

PEU_U01 - Is able to apply operations research methods as a tool supporting decision-making analyzes.
PEU_U02 - Is able to use specialized software, in particular mathematical programming languages, for building and solving optimization models.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Operations research methodology.	1
Lec 2	Linear programming problem – formulation and applications.	3
Lec 3	The simplex algorithm.	2
Lec 4	Duality and sensitivity analysis in linear programming	2
Lec 5	Integer programming – formulation and applications.	4
Lec 6	Methods of solving integer programming problems –the branch and bound and cutting plane algorithms.	2
Lec 7	The minimum cost flow problem.	2
Lec 8	The transportation problem – formulation and applications.	2
Lec 9	The network simplex algorithm for the transportation problem. Sensitivity analysis for the transportation problem.	2
Lec10	The shortest and the longest path problems. The CPM method for project scheduling.	2
Lec 11	The maximum flow and minimum cut problems.	2
Lec 12	Decision making under risk. Decision trees.	2
Lec 13	Multiobjective linear programming problems – formulation and solution methods	2
Lec 14	Preparation for the exam.	2
	Total hours	**30**

Laboratory		**Number of hours**
Lab 1	Introduction. Presentation of optimization software. Graphical method of solving linear programming problems.	2
Lab 2	Building and solving linear programming models for practical problems.	2
Lab 3	Building and solving linear programming models for practical problems.	2
Lab 4	Building and solving linear programming models for practical problems.	2
Lab 5	Building and solving linear programming models for practical problems.	2
Lab 6	Solving linear programming problems by using the simplex algorithm. Sensitivity analysis in linear programming.	2
Lab 7	Building and solving integer programming models for practical problems.	2
Lab 8	Building and solving integer programming models for practical problems.	2
Lab 9	Building and solving integer programming models for practical problems.	2

Lab 10	Solving integer programming problems using the branch and bound algorithm.	2
Lab 11	Building and solving network flow models for practical problems.	2
Lab 12	Building and solving network flow models for practical problems.	2
Lab 13	Building and solving network flow models for practical problems.	2
Lab 14	Preparation for the test.	2
Lab 15	Written test.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Presentation N2. List of tasks N3. Computer software (mathematical modelling languages)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written exam
F2	PEU_U01 PEU_U02	Solving tasks using computer software
F3	PEU_U01 PEU_U02	Written test using computer software
P (Lecture) = F1 P (Laboratory) = 0.8 F3 + 0.2 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] H. Taha. Operations Research. An introduction. Prentice Hall 2011
[2] F. S. Hiller, G. J. Liberman. Introduction to Operations Research. Mc Graw Hill 2003
[3] W. L. Winston. Operations Research: Applications and Algorithms. PWS-KENT Publishing Company 1987

SECONDARY LITERATURE:

[1] H. Wagner. Badania Operacyjne. PWE Warszawa 1980.
[2] H. P. Williams. Model building in mathematical programming. Wiley 1990.
[3] R.K. Ahuja, T. L. Magnanti, J. B. Orlin. Network flows: theory, algorithms and applications. Prentice Hall, Inc., 1993
[4] R.S. Garfinkel, G. L. Nemhauser. Programowanie całkowitoliczbowe. PWN, 1978
[5] M. S. Bazaraa, J. J. Jarvis, H. D. Sherali. Linear programming and network flows. Wiley 2010.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Metody optymalizacji
Name of subject in English: Optimization methods
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0095
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**75**		**50**		
Form of crediting	**Examination**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**3**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,44**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in linear algebra, mathematical analysis, logic and probability calculus

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SUBJECT OBJECTIVES

C1. Showing students basic optimization problems and methods of solving them.
C3. Showing students how to identify decision variables, input data and objectives in practical decision situations and how to build optimization models for them.
C5. Presenting mathematical programming languages which can be used to implement the models arising in practice

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 - Has basic knowledge in formulating optimization problems and methods of solving them.
PEU_W02 – Knows basic algorithms used in optimization.

relating to skills:

PEU_U01 - Is able to apply optimization methods as a tool supporting decision-making analyzes.
PEU_U02 - Is able to use specialized software, in particular mathematical programming languages, for building and solving optimization models.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Introduction to optimization. Organizational issues	1
Lec 2	Linear programming problem – formulation and applications	3
Lec 3	The simplex algorithm for linear programming	2
Lec 4	Duality and sensitivity analysis in linear programming	2
Lec 5	Integer programming – formulation and applications.	4
Lec 6	Methods of solving integer programming problems –the branch and bound and cutting plane algorithms.	2
Lec 7	The minimum cost flow problem and its special cases	2
Lec 8	Project scheduling and task scheduling	2
Lec 9	The network simplex algorithm for the transportation problem. Sensitivity analysis for the transportation problem	2
Lec10	Multiobjective optimization problems – formulation and methods of solving	2
Lec 11	Goal programming	2
Lec 12	Nonlinear programming problems – applications and solution methods	2
Lec 13	Using metaheuristics for solving hard optimization problems	2
Lec 14	Preparation for the exam.	2
	Total hours	**30**

Laboratory		**Number of hours**
Lab 1	Introduction. Presentation of optimization software.	2
Lab 2	Building and solving linear programming models for practical problems.	2
Lab 3	Building and solving linear programming models for practical problems.	2
Lab 4	Building and solving linear programming models for practical problems.	2
Lab 5	Building and solving linear programming models for practical problems.	2
Lab 6	Solving linear programming problems by using the simplex algorithm. Sensitivity analysis in linear programming.	2
Lab 7	Building and solving integer programming models for practical problems.	2
Lab 8	Building and solving integer programming models for practical problems.	2
Lab 9	Building and solving integer programming models for practical problems.	2
Lab 10	Solving integer programming problems using the branch and bound algorithm.	2
Lab 11	Building and solving multiobjective models for practical problems.	2
Lab 12	Building and solving network flow models for practical problems.	2
Lab 13	Building and solving nonlinear models for practical problems	2

Lab 14	Preparation for the test.	2
Lab 15	Written test.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Presentation N2. List of tasks N3. Computer software (mathematical modelling languages)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Written exam
F2	PEU_U01 PEU_U02	Solving tasks using computer software
F3	PEU_U01 PEU_U02	Written test using computer software
P (Lecture) = F1 P (Laboratory) = 0.8 F3 + 0.2 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] H. Taha. Operations Research. An introduction. Prentice Hall 2011
[2] F. S. Hiller, G. J. Liberman. Introduction to Operations Research. Mc Graw Hill 2003
[3] W. L. Winston. Operations Research: Applications and Algorithms. PWS-KENT Publishing Company 1987

SECONDARY LITERATURE:

[1] Z. Michalewicz, D. B. Fogel. How to solve it: modern heuristics. Springer 2000
[2] H. P. Williams. Model building in mathematical programming. Wiley 1990.
[3] R.K. Ahuja, T. L. Magnanti, J. B. Orlin. Network flows: theory, algorithms and applications. Prentice Hall, Inc., 1993
[4] R.S. Garfinkel, G. L. Nemhauser. Programowanie całkowitoliczbowe. PWN, 1978
[5] M. S. Bazaraa, J. J. Jarvis, H. D. Sherali. Linear programming and network flows. Wiley 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Kasperski, adam.kasperski@pwr.edu.pl

Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Techniki eksploracji danych
Name of subject in English: Techniques of data mining
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0096
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**			**15**	
Number of hours of total student workload (CNPS)	**25**			**50**	
Form of crediting	crediting with grade			credinting with grade	
For group of courses mark (X) final course					
Number of ECTS points	**1**			**2**	
including number of ECTS points for practical classes (P)				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**			**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of mathematical statistics
2. Ability to work with statistical software

SUBJECT OBJECTIVES

C1 Acquiring knowledge of data mining methods and tools.
C2. Mastering the ability to solve real decision problems with the use of data mining methods and tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has a basic knowledge of the methods and techniques of data mining useful in decision-making processes.
PEU_W02 Has knowledge of the methods and techniques of data mining in the field of decision theory
PEU_W03 Knows the basic methods, techniques, data mining tools used in solving simple engineering tasks in the field of IT application in business

relating to skills:
PEU_U01: Can gather information necessary in decision-making processes.
PEU_U02: Can use tools and techniques of data mining in solving decision problems

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Conditions for completing the course. Methods and practical applications of data mining techniques - examples	1
Lec 2	Initial data processing: data visualization, data correctness, basic statistical tools, outliers	2
Lec 3	Selected classification methods: k-nearest neighbors algorithm	2
Lec 4	Selected grouping methods: k-means method	2
Lec 5	Decision trees	3
Lec 6	Association rules	3
Lec 7	Final test	2
	Total hours	15

Project		**Number of hours**
Proj 1	Conditions for completing the course. Collection and presentation of data for a given decision problem	2
Proj 2	Initial data processing	2
Proj 3	Implementation of the k-nearest neighbors algorithm	2
Proj 4	Implementation of the k-means algorithm	2

Proj 5	Implementation of decision tree algorithms	3
Proj 6	Implementation of association rules.	2
Proj 7	Presentation of the obtained solutions	2
	Total hours	15

TEACHING TOOLS USED
N1. R software environment N2. Multimedia presentations N3. Solving examples step by step N4. List of exercises tasks N5. Homework list

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_U02	Solving tasks and problems
F2	PEU_U01 PEU_U02	Completion of project by using at least one of the machine learning algorithms
F3	PEU_W01, PEU_W02 PEU_W03	Final test
P(project) = 0,2*F1+0,8*F2 P(lecture) = F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Morzy T. Eksploracja danych. Metody i algorytmy. PWN 2013.

[2] Han J., Kamber M.: Data Mining. Concept and Techniques, Elsevier Morgan Kaufmann Publishers, 2006.

[3] Larose D.T.: Discovering Knowledge in Data Analysis. An Introduction to Data Mining, John Wiley & Sons, 2005.

SECONDARY LITERATURE:

[1] Cooc D.J., Holder L.B.: Mining Graph Data, Hoboken, N.J. : Wiley-Interscience, 2007.

[2] Morrison D.F.: Multivariate Statistical Methods, McGrow-Hill, 1990.

[3] Olson D.L. Advance Data Mining Techniques, Springer, 2008.

[4] Larose D. T., Data Mining Methods and Models, IEEE Computer Society Press, 2006.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Uczenie maszynowe
Name of subject in English: Machine learning
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0097
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**			**15**	
Number of hours of total student workload (CNPS)	**25**			**50**	
Form of crediting	crediting with grade			credinting with grade	
For group of courses mark (X) final course					
Number of ECTS points	**1**			**2**	
including number of ECTS points for practical classes (P)				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**			**0,6**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of mathematical statistics
2. Ability to work with statistical software

SUBJECT OBJECTIVES

C1 Acquiring knowledge of data mining methods and tools.
C2. Mastering the ability to solve real decision problems with the use of data mining methods and tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has a basic knowledge of the methods and algorithms of machine learning useful in decision-making processes.
PEU_W02 Has knowledge of the methods and algorithms of machine learning in the field of decision theory
PEU_W03 Knows the basic methods, algorithms and tools of machine learning used in solving simple engineering tasks in the field of IT application in business

relating to skills:
PEU_U01: Can gather information necessary in decision-making processes.
PEU_U02: Can use tools and algorithms of machine learning in solving decision problems

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Conditions for completing the course. Methods and practical applications of data mining techniques - examples	1
Lec 2	Initial data processing: data visualization, data correctness, basic statistical tools, outliers	2
Lec 3	Selected classification methods: k-nearest neighbors algorithm	2
Lec 4	Selected grouping methods: k-means method	2
Lec 5	Decision trees	3
Lec 6	Basic types of neural networks	3
Lec 7	Final test	2
	Total hours	15

Project		**Number of hours**
Proj 1	Conditions for completing the course. Collection and presentation of data for a given decision problem	1
Proj 2	Initial data processing	2
Proj 3	Implementation of the k-nearest neighbors algorithm	2
Proj 4	Implementation of the k-means algorithm	2

Proj 5	Implementation of decision tree algorithms	3
Proj 6	Implementation of neural networks algorithms	3
Proj 7	Presentation of the obtained solutions	2
	Total hours	15

TEACHING TOOLS USED
N1. R software environment N2. Multimedia presentations N3. Solving examples step by step N4. List of exercises tasks N5. Homework list

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01 PEU_U02	Solving tasks and problems
F2	PEU_U01 PEU_U02	Completion of project by using at least one of the machine learning algorithms
F3	PEU_W01, PEU_W02 PEU_W03	Final test
P(project) = 0,2*F1+0,8*F2 P(lecture) = F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Morzy T. Eksploracja danych. Metody i algorytmy. PWN 2013.

[2] Osowski S. Sieci neuronowe do przetwarzania informacji. Oficyna Wydawnicza Politechniki Warszawskiej

[3] Han J., Kamber M.: Data Mining. Concept and Techniques, Elsevier Morgan Kaufmann Publishers, 2006.

[4] Larose D.T.: Discovering Knowledge in Data Analysis. An Introduction to Data Mining, John Wiley & Sons, 2005.

SECONDARY LITERATURE:

[1] Cooc D.J., Holder L.B.: Mining Graph Data, Hoboken, N.J. : Wiley-Interscience, 2007.

[2] Morrison D.F.: Multivariate Statistical Methods, McGrow-Hill, 1990.

[3] Olson D.L. Advance Data Mining Techniques, Springer, 2008.

[4] Larose D. T., Data Mining Methods and Models, IEEE Computer Society Press, 2006.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza i klasyfikacja danych
Name of subject in English: Data analysis and classification
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0098
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**15**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of standard techniques and tools of data analysis
2. Experience in spreadsheet modelling with Excel

SUBJECT OBJECTIVES

C1 to get acquaintance with selected specialized applications of advanced statistical (model-driven) and computational (data-driven) methods as well as software tools for data analysis
C2 to develop practical experience and skills with selected top business analytics software packages

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 has basic knowledge of methods of business data exploration, analysis, and visualization as well as software supported data analysis.
relating to skills:
PEU_U01 can apply selected techniques for business data exploratory analysis and preprocessing for a particular decision problem
PEU_U02 can apply selected information technologies of available analytical packages for creating managerial dashboards

relating to social competences: PEU_K01 can interact and work in a team to solve a specific task with a clear distinction of the role of and input by individual members of the project team

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussing the conditions of obtaining credit. Introduction to analytics	1
Lec 2	Analytic process. CRISP methodology. Exploratory Data Analysis	2
Lec 3	Fundamentals of visualizations and managerial dashboards design	2
Lec 4	Introduction to Visual analytics. Introduction to Tableau	2
Lec 5	Taxonomy of analytic techniques. Predictive analytics in Tableau	2
Lec 6	Classification, clustering, regression in Tableau Desktop with R scripts	2
Lec 7	Forecasting in Tableau. Interpretability of predictive models	2
Lec 8	Analytics case studies. Moodle test (e-portal)	2
	Total hours	**15**

Laboratory		**Number of hours**
Lab1	Discussing the conditions of obtaining credit and lab safety rules. Introduction to analytics. Analytical process (data flow) - premises	1
Lab2	Business problem. Managerial dashboard design. Exploratory data analysis	2
Lab3	Developing managerial dashboards in Excel and Power Pivot	2
Lab4	Introduction to Tableau Desktop. KPI, Maps, Reference Lines	2
Lab5	Developing managerial dashboards and stories (parameters, LOD, table calculations, Explain Data)	2
Lab6	Analytic functionalities in Tableau (cluster, forecast, what-if)	2
Lab7	Predictive models and advanced analytics with R scripts in Tableau	2
Lab8	Presentation and discussion of the results of group projects	2
	Total hours	**15**

TEACHING TOOLS USED
N1. Teaching materials published on the WUST e-portal N2. Microsoft Excel with Power Pivot N3. Tableau Desktop, Tableau Prep N4. R Studio N5. Multimedia presentations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02 , PEU_K01	Task 1 (exploratory data analysis and preprocessing; 10 pts)
F2	PEU_U01, PEU_U02 , PEU_K01	Task 2 (dashboarding premises: business problem, dashboard requirements; 10 pts)
F3	PEU_U01, PEU_U02 , PEU_K01	Task 3 (managerial dashboard in Excel with Power Pivot; 10 pts)
F4	PEU_U01, PEU_U02, PEU_K01	Task 4 (basic dashboards in Tableau Desktop; 10 pts)
F5	PEU_U01, PEU_U02, PEU_K01	Task 5 (advanced analytics in Tableau Desktop; 10 pts)
F6	PEU_U01, PEU_U02, PEU_K01	Task 6 (predictive models n Tableau Desktop; 10 pts)
F7	PEU_U01, PEU_U02, PEU_K01	Task 7 (analytic project according to CRISP; 40 pts)
F8	PEU_W01	Written test.
F9		Activity [up to 10 pts]
P (Lecture) = F8		
P (Laboratory) = Sum (F1,F2,F3,F4,F5,F6) +F9; Grade: 3.0 from 40, 3.5 from 50, 4.0 from 60, 4.5 from 70, 5.0 from 80		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ferrari A., Russo M. (2020) Power BI i Power Pivot dla Excela. Analiza danych. Helion
[2] Walkenbach J., Alexander M. (2014) Analiza i prezentacja danych w Microsoft Excel [Excel dashboards and reports], Helion

SECONDARY LITERATURE:

[1] Brown L. (2021) Tableau Desktop Cookbook, O'Reilly Media
[2] Cichocki M. (2020) Przetwarzanie danych w Excelu. Laboratorium Power Query, Helion
[3] Laursen G.H.N., Thorlund J. (2016) Business Analytics for Managers, 2nd Edition, Wiley
[4] Loth A. (2019) Visual Analytics with Tableau, Wiley
[5] Milligan J.N. (2020) Learning Tableau 2020 - Fourth Edition, Packt Publishing
[6] Provost F., Fawcett T. (2015) Analiza danych w biznesie. Sztuka podejmowania skutecznych decyzji, Helion
[7] Sharda R., Delen D., Turban E. (2020) Analytics, Data Science, and Artificial Intelligence: Systems for Decision Support. Pearson
[8] Vaughan D. (2021) Umiejętności analityczne w pracy z danymi i sztuczną inteligencją: wykorzystywanie najnowszych technologii w rozwijaniu przedsiębiorstwa, Helion
[9] Wilke C.O. (2020) Podstawy wizualizacji danych: zasady tworzenia atrakcyjnych wykresów. Helion
[10] Yau N. (2013) Data points. Visualization that means something. Wiley

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza i prezentacja danych biznesowych
Name of subject in English: Business data analysis and visualisation
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0099
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**		**15**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**crediting with grade**		**crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,6**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of standard techniques and tools of data analysis
2. Experience in spreadsheet modelling with Excel

SUBJECT OBJECTIVES

C1 introducing business analytics, data-driven approaches for solving business problems, fundamentals of creating managerial dashboards
C2 practical introduction to Self-Service Business Intelligence – tools and techniques of simple data analysis and visualizations for solving managerial decision problems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEU_W01 has basic knowledge of methods of business data exploration, analysis, and visualization as well as software supported data analysis.

relating to skills:
PEU_U01 can apply selected techniques for business data exploratory analysis and preprocessing for a particular decision problem
PEU_U02 can apply selected information technologies of available analytical packages for creating managerial dashboards

relating to social competences:
PEU_K01 can interact and work in a team to solve a specific task with a clear distinction of the role of and input by individual members of the project team

PROGRAMME CONTENT		
Lecture		**Number of hours**
Lec 1	Discussing the conditions of obtaining credit. Introduction to visual analytics	1
Lec 2	CRISP methodology, exploratory analysis and preprocessing	2
Lec 3	Creating managerial dashboards and stories	2
Lec 4	Fundamentals of data visualization	2
Lec 5	Visual Analytics software. Introduction to Tableau	2
Lec 6	Descriptive, Predictive, and Prescriptive Analytics	2
Lec 7	Selected problems and technologies of business analytics	2
Lec 8	Analytics case studies. Moodle test (e-portal)	2
	Total hours	**15**

Laboratory		**Number of hours**
Lab1	Discussing the conditions of obtaining credit and lab safety rules. Introduction to analytics. Analytical process (data flow) - premises	1
Lab2	Business problem. Managerial dashboard design. Exploratory Data Analysis	2
Lab3	Developing managerial dashboards: Excel, Power Pivot, PowerBI	2
Lab4	Data preparation and analytic process in Tableau Prep	2
Lab5	Introduction to Tableau Desktop. KPI, Maps, Reference Lines	2
Lab6	Developing managerial dashboards and stories (LOD, table calculations, Explain Data)	2
Lab7	Advanced analytics in Tableau (cluster, forecast, parameters, what-if)	2
Lab8	Presentation and discussion of the results of group projects	2
	Total hours	**15**

TEACHING TOOLS USED
N1. Teaching materials published on the WUST e-portal N2. Microsoft Excel with Power Pivot N3. Microsoft Power BI N4. Tableau Desktop, Tableau Prep N5. Multimedia presentations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02 , PEU_K01	Task 1 (exploratory data analysis and preprocessing; 10 pts)
F2	PEU_U01, PEU_U02 , PEU_K01	Task 2 (dashboarding premises: business problem, dashboard requirements; 10 pts)
F3	PEU_U01, PEU_U02 , PEU_K01	Task 3 (managerial dashboard in Excel with Power Pivot or PowerBI; 10 pts)
F4	PEU_U01, PEU_U02, PEU_K01	Task 4 (analytic process in Tableau Prep; 10 pts)
F5	PEU_U01, PEU_U02, PEU_K01	Task 5 (basic dashboards in Tableau; 10 pts)
F6	PEU_U01, PEU_U02, PEU_K01	Task 6 (advanced analytics in Tableau; 10 pts)
F7	PEU_U01, PEU_U02, PEU_K01	Task 7 (analytic project according to CRISP; 40 pts)
F8	PEU_W01	Written test.
F9		Activity [up to 10 pts]
P (Lecture) = F8		
P (Laboratory) = Sum (F1,F2,F3,F4,F5,F6) +F9; Grade: 3.0 from 40, 3.5 from 50, 4.0 from 60, 4.5 from 70, 5.0 from 80		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ferrari A., Russo M. (2020) Power BI i Power Pivot dla Excela. Analiza danych. Helion
[2] Walkenbach J., Alexander M. (2014) Analiza i prezentacja danych w Microsoft Excel [Excel dashboards and reports], Helion

SECONDARY LITERATURE:

[1] Brown L. (2021) Tableau Desktop Cookbook, O'Reilly Media
[2] Cichocki M. (2020) Przetwarzanie danych w Excelu. Laboratorium Power Query, Helion
[3] Laursen G.H.N., Thorlund J. (2016) Business Analytics for Managers, 2nd Edition, Wiley
[4] Loth A. (2019) Visual Analytics with Tableau, Wiley
[5] Milligan J.N. (2020) Learning Tableau 2020 - Fourth Edition, Packt Publishing
[6] Provost F., Fawcett T. (2015) Analiza danych w biznesie. Sztuka podejmowania skutecznych decyzji, Helion
[7] Sharda R., Delen D., Turban E. (2020) Analytics, Data Science, and Artificial Intelligence: Systems for Decision Support. Pearson
[8] Vaughan D. (2021) Umiejętności analityczne w pracy z danymi i sztuczną inteligencją: wykorzystywanie najnowszych technologii w rozwijaniu przedsiębiorstwa, Helion
[9] Wilke C.O. (2020) Podstawy wizualizacji danych: zasady tworzenia atrakcyjnych wykresów. Helion
[10] Yau N. (2013) Data points. Visualization that means something. Wiley

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Zał. nr 5 do ZW16/2020

FACULTY MANAGEMENT

SUBJECT CARD

Name of subject in Polish: **Narzędzia informatyczne w podejmowaniu decyzji menedżerskich**
Name of subject in English: **IT tools in managerial decision-making**
Main field of study: **Business Engineering**
Specialization: **Applications of IT in business**
Profile: **academic**
Level and form of studies: **1st level, full-time**
Kind of subject: **optional**
Subject code: **W08IZZ-SI0101**
Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points for direct teacher-student contact (BU) classes	**1,2**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has a basic knowledge of business management and decision making process. He knows the concepts and environment of databases and data warehouses, as well as the basics of information technology in management. He knows the basic software tools and their application in management. He has a general knowledge of information technics in management.
2. Student know basic software for solving management problems, specially designed for decision making based on data warehouses.
3. Student has basic skills in building IT tools to solve management problems, especially in the areas of relational database management system (SQL) and data warehousing, spreadsheets and using a statistical analysis package of choice.

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SUBJECT OBJECTIVES

C1. Acquisition of knowledge about the problems, methods and tools to identify and analyse multidimensional data in decision-making, and understanding of the role of information systems therein, and to identify the information requirements for these systems.

C2. Getting skills in choosing and using methods, and building IT supported decision models, identifying information requirements in developing and solving these models with selected tools.
C3. Getting social skills in information and communication techniques for management, which are specific to the collaborative process of preparing a decision supported by IT-technologies.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 - The student has a basic knowledge of the construction and application of IT tools, including multi-criteria analysis, in decision-making in an organization, in the environment of selected management information systems, databases, data warehouses, OLAP and BI (BIG DATA) systems.

relating to skills:

PEU_U01 - Using selected multi-criteria analysis methods and tools, in an environment of selected management information systems, databases and data warehouses and OLAP, is able to: (1) identify and analyze the needs of decision makers in obtaining and analyzing data for decision making, and (2) create and solve simple models of multi-criteria decision problems.

relating to social competences:

PEU_K01 - The student can independently as well as cooperatively as a team, develop knowledge and skills in the use of selected tools for identifying, analyzing, modeling and solving decision problems in the IT environment

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Discussion of the organization and content of the course and the rules for passing classes Classification of methods and decision support tools in the enterprise. Decision-making in the company, in an environment of various classes of management information systems.	**2**
Lec 2	Introduction to the selected environmental performance of laboratory work (spreadsheet, database management system, SQL, data warehouse).	**1**
Lec 3	Introduction to the business environment for work in the laboratory - business data model.	**2**
Lec 4	IT Tools for a collection and processing of operational data - databases (OLTP) and multidimensional data in decision-making.	**2**
Lec 5	Advanced analytical tools in the environment of spreadsheets, multi-criteria analysis tools - the construction and testing of the standard model of analysis (eg. buying a used car)	**2**
Lec 6	Advanced compositions and aggregations of data for business analytics in the database environment. Simple additive methods and the selected complex method (eg. AHP)	**2**
Lec 7	Examples of multi-criteria decision making in an enterprise, including public procurement and applications for EU funding	**2**

Lec 8	IT tools for collecting and processing management data. Advanced OLAP analyzes and reporting in a data warehouse environment	**3**
Lec 9	IT tools supporting big data analysis - introduction	**2**
Lec 10	IT tools supporting big data analysis - linked open data	**2**
Lec 11	IT tools supporting big data analysis - Internet of Things	**2**
Lec 12	Online decisions supporting tools - how to achieve profits on the Internet?	**2**
Lec 13	Remote access systems and distributed access control architecture in decision making	**2**
Lec 14	Time models in decision support tools in the enterprise (temporal databases)	**2**
Lec 15	Written test	**1**
	Total hours	**30**

Form of classes - laboratory		**Number of hours**
Lab 1	Organization of laboratory classes and discussion of the rules of passing the course. Introduction to the tasks. Basics of using the tools. Setting up analytical teams. Getting acquainted with dedicated business data (spreadsheets, database and data warehouse) for laboratory work.	**1**
Lab 2	Advanced OLTP-analysis of the decision-making - search and grouping of data and elements of descriptive statistics (database queries) in the orders processing (Task1)	**1**
Lab 3	Advanced OLAP-analysis of the decision-making – creating of queries and algorithms to support data analysis to answer questions management (Task1)	**2**
Lab 4	Tool of an multi-criteria decision analysis (MCDMA) - creating a report based on a simple method of MCDM (Task1)	**2**
Lab 5	MCDMA - creation of queries to support the ranking construction of the customers loyalty system (CRM) (Task1)	**2**
Lab 6	Creating documentation of the logical model of your own business: elements of business motivation, KPI, calculation and logical model (MS VISIO, ENTERPRISE ARCHITECT) (Project1)	**3**
Lab 7	Creating a physical model (data warehouse) of your own business based on the developed model (SQL) (Project1)	**3**
Lab 8	Examination of laboratory work (documentation evaluation)	**1**
	Total hours	**15**

TEACHING TOOLS USED
N1. Multimedia presentation N2. Software: MS Access, MS Excel, MS Visio, SQL Server N3. Laboratory instruction. N4. Project documentation template. N5. Web pages with descriptions of teaching activities

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1: attendance		presence
F2: activity	PEU_U01, PEU_K01,	Rating for: answering questions, asking questions and proposing solutions to partial problems
F3: analysis and reports in decision making	PEU_U01, PEU_K01,	Rating for documentation of analyzes (aggregation and rankings) in decision making – Task1
F4: project	PEU_U01, PEU_K01,	Assessment for the documentation of the project task (logical and physical model of the data warehouse of your own business) - Project1
F5: test	PEU_W01	Assessment of the test
P (lecture) = F5 P (laboratory) = 0,07*F1 + 0,10*F2 + 0,40*F3 + 0,43*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ben-Gan I., Podstawy języka T-SQL, APN PROMISE, 2016
[2] Kesra N., Metody analizy wielokryterialnej i wielowymiarowej we wspomaganiu decyzji, WN PWN, 2017
[3] Larose D.T., Odkrywanie wiedzy z danych. Wprowadzenie do eksploracji danych. , Wyd. Nauk. PWN, Warszawa 2006
[4] Stephenson D. Big data, nauka o danych i AI bez tajemnic. Podejmuj lepsze decyzje i rozwijaj swój biznes!, Wyd. Helion, 2019

SECONDARY LITERATURE:

[1] Lee Hyunjoung Sohn Il, Big Data w przemyśle, Wyd. Nauk. PWN, Warszawa 2017Surma J., Business intelligence. Making Decisions trough Data Analytics, Business Expert Press, New York, 2011
[2] Mayer-Schönberger V., Cukier K., Big Data. Rewolucja, która zmieni nasze myślenie, pracę i życie, MTBiznes. 2013
[3] Surma J., Cyfryzacja życia w erze Big Data. Człowiek, biznes, państwo. Wyd. Nauk. PWN, Warszawa 2017.
[4] Todman Ch., Projektowanie hurtowni danych, Wyd. WN-T, 2003.
[5] Amir D. Aczel, Jayavel Sounderpandian, Statystyka w zarządzaniu, Complete Business Statistics, Wydawnictwo Naukowe PWN, Wydanie: 2, 2017,
[6] Cormen T.H., Leiserson Ch. E., Rivest R.L. Wprowadzenie do algorytmów,WN-T Warszawa, 2001
[7] Knight G., Excel. Analiza danych biznesowych. Wyd. HELION, Gliwice, 2006.
[8] Misztal M., Wykorzystanie drzew klasyfikacyjnych do wspomagania procesów podejmowania decyzji, Wyd. StatSoft, Kraków, 2000, ss. 31-42.
[9] Surma J., Business intelligence , PWN, Warszawa, 2009
[10] Surma J., Business intelligence. Making Decisions trough Data Analytics, Business Expert Press, New York, 2011

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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Anna Lamek, anna.lamek@pwr.edu.pl

Zał. nr 5 do ZW16/2020

FACULTY MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Narzędzia informatyczne w podejmowaniu decyzji w usługach
Name of subject in English: IT tools in decision making in services
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ- SI0101
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical (P) classes			**2**		
including number of ECTS points for direct teacher-student contact (BU) classes	**1,2**		**0,6**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has a basic knowledge of business management and decision making process. He knows the concepts and environment of databases and data warehouses, as well as the basics of information technology in management. He knows the basic software tools and their application in management. He has a general knowledge of information technics in management.
2. Student know basic software for solving management problems, specially designed for decision making based on data warehouses.
3. Student has basic skills in building IT tools to solve management problems, especially in the areas of relational database management system (SQL) and data warehousing, spreadsheets and using a statistical analysis package of choice.

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SUBJECT OBJECTIVES

C1. Acquisition of knowledge about the problems, methods and tools for identification and analysis of multidimensional data in decision-making processes, with emphasis on their progress in services, and understanding of the role of information systems in this area, as well as identification of information requirements for such systems.

C2. Getting skills in choosing and using methods and building IT-assisted decision-making models in the enterprise (with emphasis on services), to identify information requirements in decision-making, and to solve these models with selected tools.
C3. Getting social skills in information and communication techniques for management, which are specific to the collaborative process of preparing a decision supported by IT-technologies.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 - The student has a basic knowledge of the construction and application of IT tools, including multi-criteria analysis, in decision-making in an organization (with a focus on services), in the environment of selected management information systems, databases, data warehouses, OLAP and BI (BIG DATA) systems.

relating to skills:

PEU_U01 - Using selected multi-criteria analysis methods and tools, in an environment of selected management information systems, databases and data warehouses and OLAP, is able to (with a focus on services): (1) identify and analyze the needs of decision makers in obtaining and analyzing data for decision making, and (2) create and solve simple models of multi-criteria decision problems.

relating to social competences:

PEU_K01 - The student can independently as well as cooperatively as a team, develop knowledge and skills in the use of selected tools for identifying, analyzing, modeling and solving decision problems in the IT environment

PROGRAMME CONTENT		
Form of classes – lecture		**Number of hours**
Lec 01	Discussion of the organization and content of the course and the rules for passing classes. Classification of methods and decision support tools in the enterprise. Decision-making in the company, in an environment of various classes of management information systems (with a focus on services).	**3**
Lec 02	Introduction to the selected environmental performance of laboratory work (spreadsheet, database management system, SQL, data warehouse).	**1**
Lec 03	Introduction to the business environment for work in the laboratory - business data model for trade and services. IT Tools for a collection and processing of operational data - databases (OLTP) and multidimensional data in decision-making.	**4**
Lec 04	Advanced analytical tools in the environment of spreadsheets, multi-criteria analysis tools - the construction and testing of the standard model of analysis (eg. order and implementation of car repair service in the workshop)	**3**
Lec 05	Advanced compositions and aggregations of data for business analytics (with a focus on services) in the database environment. Simple additive methods and the selected complex method	**3**
Lec 06	Examples of multi-criteria decision making in an enterprise, including public procurement and applications for EU funding. Use of IT tools	**4**

	for collecting and processing management data. Advanced OLAP analyzes and reporting in a data warehouse environment	
Lec 07	IT tools supporting big data analysis - introduction	**2**
Lec 08	IT tools supporting big data analysis - linked open data	**2**
Lec 09	IT tools supporting big data analysis - Internet of Things	**2**
Lec 10	Online decisions supporting tools - how to achieve profits on the Internet?	**2**
Lec 11	Remote access systems and distributed access control architecture in decision making	**2**
Lec 12	Time models in decision support tools in the enterprise (temporal databases). Written test	**2**
	Total hours	**30**

Form of classes - laboratory		**Number of hours**
Lab 1	Organization of laboratory classes and discussion of the rules of passing the course. Introduction to the tasks, with emphasis on Project1, concerning the service sector. Basics of using the tools. Setting up analytical teams. Getting acquainted with dedicated business data (spreadsheets, database and data warehouse) for laboratory work.	**2**
Lab 2	Advanced OLTP-analysis of the decision-making - search and grouping of data and elements of descriptive statistics (database queries) in the orders processing (Task1)	**1**
Lab 3	Advanced OLAP-analysis of the decision-making – creating of queries and algorithms to support data analysis to answer questions management (Task1)	**2**
Lab 4	Tool of an multi-criteria decision analysis (MCDMA) - creating a report based on a simple method of MCDM and creation of queries to support the ranking construction of the CRM - customers loyalty system (Task1)	**3**
Lab 5	Creating documentation of the logical model of your own business in a service company: elements of business motivation, KPI, calculation and logical model (MS VISIO, ENTERPRISE ARCHITECT) (Project1)	**3**
Lab 6	Creating a physical model (data warehouse) of your own business in a service company: based on the developed model (SQL) (Project1)	**3**
Lab 7	Examination of laboratory work (documentation evaluation)	**1**
	Total hours	**15**

TEACHING TOOLS USED
N1. Multimedia presentation N2. Software: MS Access, MS Excel, MS Visio, SQL Server N3. Laboratory instruction. N4. Project documentation template. N5. Web pages with descriptions of teaching activities

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1: attendance		presence
F2: activity	PEU_U01, PEU_K01,	Rating for: answering questions, asking questions and proposing solutions to partial problems
F3: analysis and reports in decision making	PEU_U01, PEU_K01,	Rating for documentation of analyzes (aggregation and rankings) in decision making – Task1
F4: project	PEU_U01, PEU_K01,	Assessment for the documentation of the project task (logical and physical model of the data warehouse of your own business) - Project1
F5: test	PEU_W01	Assessment of the test
P (lecture) = F5 P (laboratory) = 0,07*F1 + 0,10*F2 + 0,40*F3 + 0,43*F4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ben-Gan I., Podstawy języka T-SQL, APN PROMISE, 2016
[2] Kesra N., Metody analizy wielokryterialnej i wielowymiarowej we wspomaganiu decyzji, WN PWN, 2017
[3] Pelikant A. Hurtownie danych, Helion, 2021
[4] Stephenson D. Big data, nauka o danych i AI bez tajemnic. Podejmuj lepsze decyzje i rozwijaj swój biznes!, Wyd. Helion, 2019

SECONDARY LITERATURE:

[1] Lee Hyunjoung Sohn Il, Big Data w przemyśle, Wyd. Nauk. PWN, Warszawa 2017Surma J., Business intelligence. Making Decisions trough Data Analytics, Business Expert Press, New York, 2011
[2] Mayer-Schönberger V., Cukier K., Big Data. Rewolucja, która zmieni nasze myślenie, pracę i życie, MTBiznes. 2013
[3] Surma J., Cyfryzacja życia w erze Big Data. Człowiek, biznes, państwo. Wyd. Nauk. PWN, Warszawa 2017.
[4] Todman Ch., Projektowanie hurtowni danych, Wyd. WN-T, 2003.
[5] Amir D. Aczel, Jayavel Sounderpandian, Statystyka w zarządzaniu, Complete Business Statistics, Wydawnictwo Naukowe PWN, Wydanie: 2, 2017,
[6] Cormen T.H., Leiserson Ch. E., Rivest R.L. Wprowadzenie do algorytmów,WN-T Warszawa, 2001
[7] Knight G., Excel. Analiza danych biznesowych. Wyd. HELION, Gliwice, 2006.
[8] Misztal M., Wykorzystanie drzew klasyfikacyjnych do wspomagania procesów podejmowania decyzji, Wyd. StatSoft, Kraków, 2000, ss. 31-42.
[9] Surma J., Business intelligence , PWN, Warszawa, 2009
[10] Surma J., Business intelligence. Making Decisions trough Data Analytics, Business Expert Press, New York, 2011
[11] Larose D.T., Odkrywanie wiedzy z danych. Wprowadzenie do eksploracji danych. , Wyd. Nauk. PWN, Warszawa 2006

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Projektowanie systemów zarządzania w organizacjach zorientowanych procesowo
Name of subject in English: Management systems design in process-oriented organizations
Main field of study: Business Engineering
Specialization: Applications of IT in Business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0102
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**			**30**	
Number of hours of total student workload (CNPS)	**50**			**50**	
Form of crediting	**Examination**			**Crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points	**2**			**2**	
including number of ECTS points for practical (P) classes				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,84**			**1,2**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Not any.

SUBJECT OBJECTIVES

To ensure fundamental knowledge (including application aspects) about:
C1. components of management systems,
C2. operation of management systems.

To ensure fundamental skills to:

C3. designing of management systems.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEU_W01 - basic knowledge about basic issues of organization and operation of the company
PEU_W02 - basic knowledge about the development trends of management sciences
PEU_W03 - common principles, methodologies and technologies useful for engineering analysis, modeling and design of systems and processes

Relating to skills:
PEU_W01 – ability to use basic knowledge to formulate and solve engineering tasks in project management, business process management
PEU_U02 - ability to analyze the objects, systems and processes and to assess their existing solutions using the tools of management engineering.
PEU_U03 – ability to formulate and solve simple engineering tasks

Relating to social competences:
PEU_K01 - awareness of the need to develop knowledge and skills in the organization and management science
PEU_K02 - awareness that the work of a manager is to continuously identify, analyze and resolve problems in organizations
PEU_K03 - awareness to communicate, persuade and defend their views

PROGRAMME CONTENT

Lecture		**Number of hours**
Lec 1	The concept of the management system, management system elements. Organizational information, program of classes, rules of conducting the exam.	1
Lec 2	Design, process, areas, principles, methodology	2
Lec 3	Fundamentals of engineering design	2
Lec 4	Design of strategic management systems	2
Lec 5	Design of the value chain	2
Lec 6	Design of the organizational structures	2
Lec 7	Design the normative system of organization and organizational culture	2
Lec 8	Design of the incentive systems	2
	Total hours	15

Project		**Number of hours**
Pro1	Description of the organization - its current goals and social subsystem. Organizational information, program of classes, rules for completing the project.	2

Pro2	Description of the organization – its current structure and technology	2
Pro3	The choice of object design – enterprise management system	2
Pro4	Formulating of the purpose of the designed system, clarifying tasks – business and operation model	2
Pro5	Building of a system model of an organization	2
Pro6	Identification of organizational processes, their hierarchy and their goals	2
Pro7	Optimization of organizational processes	2
Pro8	Analysis of organizational structure – measurement of organizational structure traits	2
Pro9	Optimization of organizational structure – shaping of organizational structure traits	2
Pro10	Specification of data for the description of workplace and possible equipment requirements	2
Pro11	Shaping the construction form of a technical object and determining the form of the working environment for selected variants of the project	2
Pro12	Measurement and evaluation of organizational culture according to organizational goals	2
Pro13	Shaping norms and values according to organizational goals	2
Pro14	Preparation of the implementation - selection and training of personnel, development of employee support measures	2
Pro15	Preparation of the implementation – development of documentation, preparation of documentation	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Questions to students during lecture N3. Case studies N4. Discussion of selected issues N5. Analysis and evaluation of real organization’s assigned characteristics N6. Project prepared by students

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01	Examination in the form of a written test

	PEU_W02 PEU_W03	
F2	PEU_U01 PEU_U02 PEU_U03	Completed project
F3	PEU_K01 PEU_K02 PEU_K03	Activity of the student in the approach to the topic, readiness to undertake discussions and defend one's views
P (lecture) = 1,0*F1 P (project) = 0,8*F2 +0,2*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Analiza i projektowanie systemów zarządzania przedsiębiorstwem (red. A. Stabryła), Mfiles.pl, Kraków 2010.
[2] Metodologia projektowania systemów organizacyjnych przedsiębiorstwa (red. A. Stabryła), C.H. Beck, Warszawa 2015.
[3] Praktyka projektowania systemów organizacyjnych przedsiębiorstwa (red. A. Stabryła), Mfiles.pl, Kraków 2014.

SECONDARY LITERATURE:

[1] Hurst K. Engineering Design Principles. Butterworth-Heinemann/Elsevier, Oxford 1999.
[2] Krawiec F., Zarządzanie projektem innowacyjnym produktu i usługi, Difin, Warszawa 2000.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Projektowanie systemów zarządzania w organizacjach zorientowanych projektowo
Name of subject in English: Management systems design in project-oriented organizations
Main field of study: Business Engineering
Specialization: Applications of IT in Business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0103
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**15**			**30**	
Number of hours of total student workload (CNPS)	**50**			**50**	
Form of crediting	**Examination**			**Crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points	**2**			**2**	
including number of ECTS points for practical (P) classes				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**0,84**			**1,2**	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Not any.

SUBJECT OBJECTIVES

To ensure fundamental knowledge (including application aspects) about:
C1. components of management systems,
C2. operation of management systems.

To ensure fundamental skills to:
C3. designing of management systems.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01 - basic knowledge about basic issues of organization and operation of the company
PEU_W02 - basic knowledge about the development trends of management sciences
PEU_W03 - common principles, methodologies and technologies useful for engineering analysis, modeling and design of systems and processes

Relating to skills:

PEU_W01 – ability to use basic knowledge to formulate and solve engineering tasks in project management, business process management
PEU_U02 - ability to analyze the objects, systems and processes and to assess their existing solutions using the tools of management engineering.
PEU_U03 – ability to formulate and solve simple engineering tasks

Relating to social competences:

PEU_K01 - awareness of the need to develop knowledge and skills in the organization and management science
PEU_K02 - awareness that the work of a manager is to continuously identify, analyze and resolve problems in organizations
PEU_K03 - awareness to communicate, persuade and defend their views

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	The concept of the management system, management system elements. Organizational information, program of classes, rules of conducting the exam.	1
Lec 2	Design, process, areas, principles, methodology	2
Lec 3	Fundamentals of engineering design	2
Lec 4	Design of strategic management systems	2
Lec 5	Designing of project management systems	2
Lec 6	Design of the organizational form of projects	2
Lec 7	Design the normative system of organization and organizational culture	2
Lec 8	Design of the incentive systems	2
	Total hours	15

Project		Number of hours
Pro1	Description of the organization - its current goals and social subsystem. Organizational information, program of classes, rules for completing the project.	2
Pro2	Description of the organization – its current structure and technology	2

Pro3	The choice of object design – enterprise management system	2
Pro4	Formulating of the purpose of the designed system, clarifying tasks – business and operation model	2
Pro5	Building of a system model of an organization	2
Pro6	Identification of the features of the management system that influence a project management system	2
Pro7	Designing of project management processes	2
Pro8	Analysis of organizational structure – measurement of organizational structure traits	2
Pro9	Optimization of the organizational structure and selection of the organizational form of projects - shaping structural dimensions	2
Pro10	Specification of data for the description of workplace and possible equipment requirements	2
Pro11	Shaping the construction form of a technical object and determining the form of the working environment for selected variants of the project	2
Pro12	Measurement and evaluation of organizational culture according to organizational goals	2
Pro13	Shaping norms and values according to organizational goals	2
Pro14	Preparation of the implementation - selection and training of personnel, development of employee support measures	2
Pro15	Preparation of the implementation – development of documentation, preparation of documentation	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentations N2. Questions to students during lecture N3. Case studies N4. Discussion of selected issues N5. Analysis and evaluation of real organization's assigned characteristics N6. Project prepared by students

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 PEU_W02	Examination in the form of a written test

	PEU_W03	
F2	PEU_U01 PEU_U02 PEU_U03	Completed project
F3	PEU_K01 PEU_K02 PEU_K03	Activity of the student in the approach to the topic, readiness to undertake discussions and defend one's views
P (lecture) = 1,0*F1 P (project) = 0,8*F2 +0,2*F3		

PRIMARY AND SECONDARY LITERATURE

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[1] Analiza i projektowanie systemów zarządzania przedsiębiorstwem (red. A. Stabryła), Mfiles.pl, Kraków 2010.
[2] Metodologia projektowania systemów organizacyjnych przedsiębiorstwa (red. A. Stabryła), C.H. Beck, Warszawa 2015.
[3] Praktyka projektowania systemów organizacyjnych przedsiębiorstwa (red. A. Stabryła), Mfiles.pl, Kraków 2014.
[4] M. Trocki, Organizacja projektowa, PWE, Warszawa 2014.

SECONDARY LITERATURE:

[1] Hurst K. Engineering Design Principles. Butterworth-Heinemann/Elsevier, Oxford 1999.
[2] Krawiec F., Zarządzanie projektem innowacyjnym produktu i usługi, Difin, Warszawa 2000.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Projektowanie stanowisk pracy
Name of subject in English: Workstations design
Main field of study: Business Engineering
Specialization: Applications of IT in business
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code: W08IZZ-SI0104
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**Crediting with grade**		**Crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of mathematical analysis and linear algebra.
2. Basic knowledge of descriptive statistics.
3. Knowledge of mathematical optimization problems.
4. Knowledge of work environment physics.

SUBJECT OBJECTIVES

To provide basic knowledge, including its application aspects, regarding:
C1: the ability to analyse various aspects of workstations using methods of objective and subjective nature
C2: methods of modelling and designing various aspects of workstations

Development of basic skills, regarding:
C3: objective and subjective evaluation of different aspects of workstations
C4: applications of selected methods and tools to design and optimise workplaces

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01: has detailed knowledge of objective and subjective methods of evaluation, analysis and design principles of various aspects of workplaces.

relating to skills:

PEU_U01: can evaluate with the help of objective and subjective methods the existing designs of workstations and make their modifications with the use of optimization methods, as well as can use appropriate methods and computer tools to design workstations correctly, additionally can apply in practice the environment for virtual workstation design and use human digital, statistical models.

PROGRAMME CONTENT		
Lecture		**Number of hours**
Wy1	Overview of organizational issues. Introduction, historical background, basic concepts. Characteristics of design problems and their typologies	2
Wy2	General principles of workstation organization. Basic heuristics.	2
Wy3	Anthropometry and its use in design. Statistical basics. Preparation, organization and use of data in anthropometric atlases.	2
Wy4	Human models: phantoms, probands, virtual models and computer aided design. Use of biomechanical properties of digital human models in visual field and workload analysis.	2
Wy5	The issue of placement of objects on the plane - mathematical basis. Models of ergonomic object placement, first and second order criteria.	4
Wy6	Types, characteristics of algorithms and heuristics for solving problems with placement of objects on a plane.	2
Wy7	Use of artificial intelligence methods in workspace design.	2
Wy8	Characteristics and properties of methods for studying elementary movements.	2
Wy9	Design of control panels - properties of signaling and control instruments.	2
Wy10	Experimental approach to analysis and design of workplaces: study of objective and subjective aspects.	2
Wy11	Characteristics and applicability of the SOWA method: A comprehensive subjective method of workload assessment at workstations	2
Wy12	The issue of Fitts' law and its application in the design of workstations and workstations equipped with interactive systems.	2
Wy13	Analysis and evaluation of the design quality of interfaces of interactive systems.	2
Wy14	Credit test	2
	Total hours	**30**

Laboratory		Number of hours
La1	Overview of organizational issues. Design of a selected workstation in a virtual 3D graphics environment using the Jack system.	4
La2	Anthropometric analysis using digital mannequins with appropriate statistical properties using the Jack system. Preparation of animations visualizing ranges and limitations of digital mannequins in a virtual workspace.	4
La3	Analysis of visual field and biomechanical loads (NIOSH methods, OWAS, RULA methods) in the designed workspace by means of digital manikins using the simulation capabilities of the Jack system.	4
La4	Simulation comparative analysis of the effectiveness of selected algorithms supporting the design of object placement on the work plane.	4
La5	Conducting a study of elementary movements and their optimization using the selected method.	2
La6	Preparing and conducting a survey of total workload using the SOWA method.	2
La7	Statistical analysis and interpretation of results obtained using the SOWA method	2
La8	Experimental study of the issue of compatibility of control and signaling panels.	2
La9	Study of Fitts' law on models of real workstations. Simulation of Fitts' law for practical tasks prepared in the Jack system environment.	4
La10	Experimental study of Fitts' law in interactive systems	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditional lecture with the use of multimedia presentation
N2. Case studies
N3. Discussion on selected problems
N4. Self-analysis and evaluation of set aspects of a real organization.
N5. Own work - independent study: preparation for laboratory classes and preparation for the credit colloquium.
N6. Jack computer system.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
PW (Lecture)= F1	PEU_W01	Credit colloquium.
PL (Laboratory) =F2	PEU_U01	Assessments of assignments, tests

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Grandjean E., Fitting the task to the man, Taylor & Francis, 1988.

[2] Kuliński M., Jach K., Koszela-Kulińska J., Metodyka doradztwa w zakresie ergonomii stanowisk pracy, Podręcznik ergonomiczny. Wielowymiarowy model wsparcia i identyfikacji kompetencji zawodowych. Zeszyt 4, Wojewódzki Urząd Pracy w Gdańsku, Gdańsk 2014

[3] Tytyk E., Projektowanie ergonomiczne, Wydawnictwo Naukowe PWN, Warszawa-Poznań, 2001.

SECONDARY LITERATURE:

[4] Artykuły z czasopism: International Journal of Production Research, Ergonomics, Human-Computer Interactions, International Journal of Human-Computer Studies, International Journal of Industrial Ergonomics, Interacting with Computers, Applied Ergonomics, Human Factors, Behaviour & Information Technology

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[6] JACK. User Manual, Version 8.0.1. Siemens Product Lifecycle Management Software Inc., 2013.

[7] Koradecka D. [red.], Bezpieczeństwo pracy i ergonomia, Centralny Instytut Ochrony Pracy, Warszawa, 1999.

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[9] McCormick E.J., Antropotechnika – przystosowanie konstrukcji maszyn i urządzeń do człowieka, Wydawnictwo Naukowo-Techniczne, Warszawa, 1964.

[10] Nowak E., Atlas antropometryczny populacji polskiej - dane do projektowania. The Anthropometric Atlas of Polish Population - Data for Design, IWP Warszawa, 2001

[11] Paluszkiewicz L., Ergonomiczne właściwości przyrządów sygnalizacyjnych i sterowniczych, Instytut Wydawniczy CRZZ, Warszawa, 1975.

[12] Pheasant S., Bodyspace: anthropometry, ergonomics and Design, Taylor & Francis

[13] Proctor R.W., Zandt T.V., Human factors in simple and complex systems, Needham Heights: Allyn and Bacon, 1994.

[14] Salvendy, Gavriel (red), Handbook of Human Factors and Ergonomics, John Wiley & Sons, 2006.

[15] Ziobro E., Ergonomia, Wydawnictwo Politechniki Wrocławskiej, Wrocław, 1989.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: **Projektowanie systemów interakcyjnych**
Name of subject in English: **Interactive systems design**
Main field of study: **Business Engineering**
Specialization: **Applications of IT in business**
Profile: **academic**
Level and form of studies: **1st level, full-time**
Kind of subject: **optional**
Subject code: **W08IZZ-SI0105**
Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**30**		
Number of hours of total student workload (CNPS)	**50**		**50**		
Form of crediting	**Crediting with grade**		**Crediting with grade**		
For group of courses mark (X) final course					
Number of ECTS points	**2**		**2**		
including number of ECTS points for practical classes (P)			**2**		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**1,2**		**1,2**		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of mathematical analysis and linear algebra.
2. Basic knowledge of descriptive statistics.
3. Knowledge of mathematical optimization problems.
4. Basic knowledge of the functionality of information systems.

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SUBJECT OBJECTIVES

To provide basic knowledge, including its application aspects, regarding:
C1: the ability to analyse various aspects of interactive systems using methods of objective and subjective nature.
C2: methods of modelling and designing various aspects of interactive systems.

Development of basic skills, regarding:
C3: objective and subjective evaluation of different aspects of interactive systems.

C4: applications of selected methods and tools to design and optimise interactive systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01: has detailed knowledge of objective and subjective methods of evaluation, analysis and design principles of various aspects of interactive systems.

relating to skills:

PEU_U01: can evaluate with the help of objective and subjective methods the existing designs of interactive systems and make their modifications with the use of optimization methods, as well as can use appropriate methods and computer tools to design interactive systems correctly.

PROGRAMME CONTENT

	Lecture	**Number of hours**
Wy1	Overview of organizational issues. Introduction, historical background, basic concepts. Characteristics of design problems and their typologies	2
Wy2	Structure and contents of ISO/IEC 25010:2011 Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - System and software quality models	2
Wy3	Structure and contents of ISO 9241 Ergonomics of Human System Interaction	2
Wy4	Heuristic evaluation methods (checklists, cognitive walkthrough methods).	2
Wy5	Task analysis as a paradigm for evaluating and designing interactive systems.	2
Wy6	Keystroke Level Model (KLM) as a method of evaluating of interactive system effectiveness and efficiency.	2
Wy7	The issue of element placement in graphical interfaces of interactive systems - mathematical basis. Models of ergonomic object placement, first and second order criteria.	2
Wy8	Types, characteristics of algorithms and heuristics for solving problems with placement of element placement in graphical interfaces of interactive systems.	2
Wy9	The issue of Fitts' law and its application in the design of interactive systems.	2
Wy10	Design of control panels - properties of signaling and control instruments.	2
Wy11	Experimental approach to analysis and design of interactive systems: study of objective and subjective aspects.	4
Wy12	Characteristics and applicability of the Analytic Hierarchy Process (AHP) method for designing interactive systems	4
Wy13	Credit test	2
	Total hours	**30**

Laboratory		Number of hours
La1	Overview of organizational issues. Presentation of health and safety rules and regulations applicable to the laboratory.	1
La2	Application of heuristic methods (checklists, cognitive wandering method) to evaluate the usability of the graphical interface of an interaction system.	3
La3	Evaluation of the effectiveness and efficiency of the interaction system based on the Keystroke Level Model method.	2
La4	Optimization of the interaction system by task analysis method.	4
La5	Experimental study of Fitts' law in interfaces of graphical interaction systems.	2
La6	Experimental study of the issue of compatibility of control and signaling panels.	2
La7	Simulation-based comparative analysis of the effectiveness of selected algorithms supporting the design of element placement in graphical interfaces of interactive systems.	4
La8	Preliminary design of the graphical interface of the interaction system.	2
La9	Rapid interface prototyping in *visual* systems, *Power Point*.	4
La10	Preparing and conducting a survey of subjective aspects of usability of designed interfaces using the Analytic Hierarchy Process (AHP) method.	4
	Statistical analysis and interpretation of results obtained using the AHP method.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Classic blackboard and chalk. N2. Dry erase board and markers. N3. Projector and multimedia presentations. N4. Analysis of case studies.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
PW (Lecture)= F1	PEU_W01	Credit colloquium.
PL (Laboratory) =F2	PEU_U01	Assessments of assignments, tests

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Krug S. 2014, Nie każ mi myśleć, Helion

[2] Mayhew D. 1999, The usability engineering lifecycle, Morgan Kaufman

[3] Preece J., Sharp H., Rogers Y. 2015, Interaction Design: Beyond Human-Computer Interaction, Wiley.

SECONDARY LITERATURE:

[1] Materials made available at http://ergonomia.ioz.pwr.wroc.pl, http://pl.wikipedia.org, http://en.wikipedia.org

[2] Articles from the following journals: Ergonomics, Human-Computer Interactions, International Journal of Human-Computer Studies, International Journal of Industrial Ergonomics, Interacting with Computers, Applied Ergonomics, Human Factors, Behaviour & Information Technology.

[3] Paluszkiewicz L., Ergonomiczne właściwości przyrządów sygnalizacyjnych i sterowniczych, Instytut Wydawniczy CRZZ, Warszawa, 1975.

[4] Helander M. (1995). Human-Computer Interaction. Elsevier, Amsterdam.

[5] Lewis C. Rieman J. 1994 Zadaniowe projektowanie komunikacji z użytkownikiem, Internetowa wersja książki (wersja polska z ftp.sunrise.pg.gda.pl/pub).

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Projektowanie wizualnego przekazu marketingowego
Name of subject in English: Designing a visual marketing message
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: 1st level, full-time
Kind of subject: optional
Subject code W08IZZ-SI0106
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				**30**	
Number of hours of total student workload (CNPS)				**50**	
Form of crediting				**crediting with grade**	
For group of courses mark (X) final course					
Number of ECTS points				**2**	
including number of ECTS points for practical classes (P)				**2**	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				**1,2**	

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Understands and knows the basic functionality of simple graphic systems.
2. Has basic knowledge of marketing.

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SUBJECT OBJECTIVES

C1: To gain skills to use tools to analyze and support the design of visual marketing messages.
C2: To acquire and consolidate social competence in the ability to cooperate in a student group. Developing habits of cooperation with designers of visual marketing messages.

SUBJECT EDUCATIONAL EFFECTS

Relating to skills:
PEU_U01: Is able to use selected tools to graphically design a visual marketing message.
PEU_U02: Can apply selected computer graphics methods to design visual marketing message.

Relating to social competence:
PEU_K01: Acquire and develop teamwork skills to optimally solve assigned problems.
PEU_K02: Develop the ability of self-assessment and self-control while working.

Project		**Number of hours**
Pr1	Overview of organizational issues.	1
Pr2	Consultation in project teams: initial assumptions and outline of the subject matter of the marketing message project and selection of graphic methods and techniques planned to be used.	3
Pr3	Consultation in project teams: preliminary modeling and prototyping of marketing message variants.	2
Pr4	Consultation in project teams: development and preparation of visual elements of the marketing message in the form of two-dimensional raster graphics.	2
Pr5	Consultation in project teams: development and preparation of elements of the visual marketing message in the form of two-dimensional vector graphics.	2
Pr6	Consultation in project teams: development and preparation of elements of the visual marketing message in the form of three-dimensional graphic objects.	4
Pr7	Consultation in project teams: use of light control, map projection and texture overlay on three-dimensional graphic objects to enhance the elements of the visual marketing message.	4
Pr8	Consultation in project teams: development and preparation of simple three-dimensional animations to enhance the visual marketing message.	4
Pr9	Consultations in project teams: evaluation and analysis of designed variants of marketing message.	2
Pr10	Consultation in project teams: verification and validation of the final design of the marketing message.	2
Pr11	Defense session of individual projects. Demonstration of the results of individual teams in the form of presentation and written report.	4
	Total hours	**30**

TEACHING TOOLS USED

N1. Dry erase board and markers.
N2. Projector and multimedia presentations.
N3. 2D graphics creation software (*Gimp*).
N4. 3D modeling, rendering and animation software (*3ds Max*).

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01 – PEU_U05	Project realization and report preparation
F2	PEU_U01 – PEU_U05	Presentation and defense of the project
P=0.8*F1 + 0.2*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Hughes, J., Dam, A. van, McGuire, M., Sklar, D., Foley, J., Feiner, S., & Akeley, K. (2013). Computer Graphics: Principles and Practice (3rd edition). Addison-Wesley Professional.

[2] Scott, D. M. (2015). The New Rules of Marketing and PR: How to Use Social Media, Online Video, Mobile Applications, Blogs, News Releases, and Viral Marketing to Reach Buyers Directly (5th edition). Wiley.

[3] Wedel, M., & Pieters, R. (2007). Visual Marketing: From Attention to Action. Taylor & Francis Group.

SECONDARY LITERATURE:

[1] Artykuły i materiały dydaktyczne z serwera http://ergonomia.ioz.pwr.wroc.pl.

[2] Dokumentacja online oprogramowania 3ds Max https://help.autodesk.com.

[3] Kotler, P., & Keller, K. L. (2018). Marketing (23rd ed.). Dom Wydawniczy Rebis. Poznań.

[4] Lindsay P.H., Norman D.A. (1984). Procesy przetwarzania informacji u człowieka. Wprowadzenie do psy¬cho¬lo¬gii, Państwowe Wydawnictwo Naukowe, Warszawa.

[5] Młodkowski J. (1998), Aktywność wizualna człowieka, Wydawnictwo Naukowe PWN, Warszawa, Łódź.

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Zał. nr 5 do ZW 16/2020

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza Matematyczna
Name of subject in English: Calculus
Main field of study: Business Engineering
Specialization:
Profile: academic
Level and form of studies: first level, full-time
Type of subject: obligatory
Subject code: W13IZZ-SI0001
Group of courses: YES

	Lecture	Exercise class	Laboratory	Project	Seminar
Number of hours of organized University classes (ZZU)	**30**	**30**			
Number of hours of total student workload (CNPS)	**225**				
Form of crediting	**Examination**				
For a group of courses mark the final course (X)	**X**				
Number of ECTS points	**9**				
including number of ECTS points for practical (P) classes	**4**				
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	**2,64**				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. High school graduation in mathematics (at basic level).

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SUBJECT OBJECTIVES

C1. Acquiring basic knowledge related to solving equations and inequalities involving elementary functions such as polynomials and rational functions, exponential and logarithmic functions.
C2. Learning the basic concepts, theorems, methods and applications of calculus of functions of one and two variables .
C3. Constructing mathematical models with the aim of applications in economy and technology.

SUBJECT LEARNING OUTCOMES

Relating to knowledge, the student:

PEU_W01 possesses basic knowledge essential for solving equations and inequalities involving absolute value, polynomials, and rational, exponential and logarithmic functions

PEU_W02 knows basic properties of elementary functions and basics of differential calculus and integral calculus of function of one variable

PEU_W03 possesses basic knowledge of calculus of functions of two variables.

Relating to skills, the student:

PEU_U01 is capable of solving equations and inequalities involving absolute value, polynomials, and rational, exponential and logarithmic functions

PEU_U02 can calculate limits of sequences and functions, can determine asymptotes of functions, can calculate derivatives of functions and interpret calculation results, can calculate and interpret indefinite and definite integrals

PEU_U03 is capable of finding extrema of functions of two variables.

Relating to social competences, the student:

PEU_K01 can, without assistance, search for necessary information in the literature

PEU_K02 understands the need for systematic and independent work on mastery of course material.

PROGRAMME CONTENT

Lectures		**Number of hours**
Lec 1	Absolute value; equations and inequalities. Geometric interpretation. Economy based examples.	2
Lec 2	Polynomials and rational functions; equations and inequalities. Graphical interpretation.	2
Lec 3	Exponential and logarithmic functions. Natural logarithm. Graphs of functions. Simplifying algebraic expressions involving exponentials and logarithms. Economy based examples.	2
Lec 4	Limits of sequences, basic properties of limits. Applications of a geometric sequence and arithmetic sequence in economy.	2
Lec 5	Limit of a function. Continuity. Asymptotes. Examples of applications.	4
Lec 6	The derivative of a function; geometric and physical interpretation. Rules of differentiation. Chain rule. Higher order derivatives. Applications.	4
Lec 7	Intervals of monotonicity of a function. Local and global extrema. Intervals of convexity and concavity. Study of graphs of functions.	4
Lec 8	Indefinite integral, definition and basic properties. Indefinite integral of certain classes of functions, including polynomials and exponential functions. Integration by parts and by substitution.	2
Lec 9	Definite integral; definition and basic properties. Geometric interpretation. Connection between definite and indefinite integral.	2
Lec 10	Applications of definite integrals.	2
Lec 11	Functions of two or more variables. Partial derivatives; geometric interpretation. Partial derivatives of composite functions. Local extrema of functions of two variables. Applications and examples.	4
	Total hours	30

Classes		**Number of hours**
Ex 1	Absolute value: solving equations and inequalities.	2

Ex 2	Decomposition of a polynomial into irreducible components. Solving polynomial and rational (functions) equations and inequalities.	2
Ex 3	Equations and inequalities with exponential and logarithmic functions.	2
Ex 4	Computing proper and improper limits of sequences.	2
Ex 5	Computing proper and improper limits of functions. Asymptotes. Verifying continuity of functions.	4
Ex 6	Computing derivatives of various functions using rules of differentiation. Tangent line to the graph.	4
Ex 7	Determining local and global extrema of a function. Examination of a function.	4
Ex 8	Indefinite integral of elementary functions, including polynomials and exponentials. Integration by parts and by substitution.	2
Ex 9	Calculating definite integrals. Area of a flat region as an application of definite integral.	2
Ex 10	Calculating partial derivatives. Finding local and global extrema of functions of two variables.	4
Ex 11	Tests	2
	Total hours	30

TEACHING TOOLS USED
N1. Lecture – traditional method N2. Exercise class – traditional method (problems sessions and discussion) N3. Office hours N4. Student's individual work – preparation for the classes

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
F - Ex	PEU_U01-PEU_U03 PEU_K01-PEU_K02	oral presentations, quizzes, tests
F - Lec	PEU_W01-PEU_W03 PEU_K02	Exam
P	PEU_U01-PEU_U03 PEU_W01-PEU_W03 PEU_K01-PEU_K02	Rules set by the lecturer

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2007.

[2] M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2007.

[3] M. Zakrzewski, Markowe wykłady z matematyki. Analiza. Oficyna Wydawnicza GiS, Wrocław 2013.

[4] M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2007.

[5] M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2007.

SECONDARY LITERATURE:

[1] F. Leja, Rachunek Różniczkowy i Całkowy, Wydawnictwo Naukowe PWN, 2012.

[2] W. Krysicki, L. Włodarski, Analiza Matematyczna w Zadaniach, Cz. I, PWN, Warszawa 1999.

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