DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study: Business Engineering

Profile: general academic

Level of studies: second-level studies

Form of studies: full-time studies

1. General description

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

	psychology, digital marketing as well as project and business management. The best students will be able to conduct research with our scientists with the prospect of working in an academic environment. At the second degree of Business Engineering (BE), students can deepen their acquired knowledge and extend it by choosing one of two specializations: English-language specialization (Business Intelligence, BI) focused on aspects related to business analytics or Polish-language specialization (Project Management, ZPR) oriented on the management of various types of projects (business, IT, social, public, scientific, etc.). Business Intelligence (BI) is designed to provide students with cutting edge business knowledge and a strong foundation in both analytics – including computational statistics and machine learning – and core business areas, building a solid platform for a successful career. This specialization focuses on how to analyze data in order to identify and predict patterns and on how to visualize and present results to support managerial decisions and lead to innovative thinking in today's organizations. **Acquired skills and competences** Students will learn how to: • Use data analytics to stimulate business growth with newly discovered quantitative and qualitative skills. • Stay on top of the latest methods and approaches in computational statistics and machine learning.

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[MS4]University-wide course /group of courses – enter O
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| | Use cutting-edge techniques to immerse in case studies and apply new approaches to own data challenges. Use visualization software to identify trends, explore hypotheses, challenge assumptions, and create a more detailed, data-driven understanding of business activities. Conduct top-tier research and report the results to managers, peers and the public. Simulate realistic future paths of all kinds of business processes. Predict outcomes to enable making informed business decisions and developing winning strategies. Reach the right customers with the right products and communications. Leverage the power of data to make informed business decisions and thrive in a rapidly changing environment. **Career**
The demand for business analytics is high. Graduates who complete the Business Intelligence program in Business engineering will acquire computational skills and management expertise that the business world is actively seeking. Our program prepares students for data-driven decision support that is crucial for today's business activities across a broad range of industries including ICT, financial, energy and healthcare. The BE curriculum provides the skills to fill positions not only as business intelligence analysts, but also data analysts and consultants, revenue optimization analysts, risk managers, market analysts and many more. Given that the students |

	will have the opportunity to conduct research with affiliated faculty and senior staff, the program also prepares for careers in Academia.
1.7 Possibility of continuing studies: **doctoral school, postgraduate (post diploma) studies**	*1.8 Indicate connection with University's mission and its development strategy:* Business engineering graduates acquire business, analytical, social and technical competences. The educational program in Business engineering is coherent with the mission of Wrocław University of Science and Technology in the following areas: • Developing the professionalism and hard skills of graduates in business data analysis and project management that determine the functioning of the TechnoSphere • Aiming to provide high quality courses and providing the students of Business engineering and lecturers with conditions enabling open discussion and constructive criticism; • Developing the values and tradition of higher education, wide-ranging cooperation with other universities all over the world via students taking part in scientific conferences and the Erasmus program, and with employers via practical learning, carried out in the form of projects in specific organizations; • Developing creative, critical and tolerant graduates, as studying a course in Business engineering emphasizes on appropriate skills and attitudes development; • Striving to obtain a worthy place in the field of training specialists in the field of management among domestic and foreign universities.

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	The Faculty's development plan is in line with the University's strategy. In particular, the Faculty "... combines theoretical, research and expert competences with didactic and educational competences. The Faculty is a leading research and teaching center in Poland and a significant center on an international scale. The didactic and scientific-research profile as well as the quality of education and research in economic and technical sciences ensure it a suitable place in national and international rankings". Conducting Business engineering studies is a permanent element of the Faculty's development strategy. In line with the principle adopted at Wrocław University of Science and Technology, studies in the field of Business engineering have a general academic profile. The study curriculum meets all the requirements resulting from applicable law, including the Polish Qualifications Framework and the characteristics of obtaining engineering competences. In line with the University's strategy, in order to increase the attractiveness of studies on the educational market, the MSc studies education program is unique in that it uses the natural - in economic practice - complementarity of technical and economic education, enriched with an IT module. In accordance with the University's strategy and the Faculty's development plan, which indicate the need for links with the region and the economy, conditions are created and systematic contacts between students and enterprises and other institutions are forced in the didactic process. In line with the University's development strategy, the quality of education is systematically improved. This is achieved thanks to the scientific development of employees and the increase in their teaching competences, as well as thanks to the systematic enrichment of the Faculty's infrastructure, including the modernization of the rooms as well as teaching and laboratory aids.

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[MS4]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

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	At the second degree of studies in the field of Business engineering, the study curriculum includes a set of learning outcomes and the corresponding substantive content of education, enabling graduates to effectively compete on the labor market. Students are prepared to continue their third-cycle studies at the Doctoral School and to conduct their own research. Graduates are also aware of the need to constantly act for their own professional development in cooperation with their home university.

2. **Detailed description**

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

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

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

        D2 Information and Technology Science: 15

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

        D1 51% ECTS points

        D2 49 % ECTS points

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

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

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

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

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

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

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

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

2.6.   The total number of ECTS points that a student must obtain in classes requiring direct participation of academic teachers or other persons conducting classes and students (enter the sum of ECTS points for courses / groups of courses marked with the BU[1] code) **62,9 ECTS**

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

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

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

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

2.9. Minimum number of ECTS points, which student has to obtain doing education blocks offered as part of University-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code O)
           3 ECTS points
2.10. Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points)
           48 ECTS points

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MS[4]University-wide course /group of courses – enter O
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3. Description of the process leading to learning outcomes acquisition:

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

4. List of education blocks:
4.1. List of obligatory blocks:
4.1.1 List of general education blocks
4.1.1.1 *Liberal-managerial subjects* block *(min. ...... ECTS points):*

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

4.1.1.2 *Foreign languages* block *(min. .... ECTS points):*

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

[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)

MS[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

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

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

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

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

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

[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)
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Altogether for general education blocks

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

4.1.2 List of basic sciences blocks
4.1.2.1 *Mathematics* block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] of course/group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN[5] classes	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1.	MAZ2581W	Descriptive analytics	2					K2_IZ_W2,4,5 U2,8-11, K1	30	120	4	4	2,8	T/Z	E		DN	P	PD
2.	MAZ2581L	Descriptive analytics			2			K2_IZ_W2,4,5 U2,8-11, K1	30	90	3	3	2,1	T	Z		DN	P	PD
		Total	**2**	**0**	**2**	**0**	**0**		**60**	**210**	**7**	**7**	**4.9**						

4.1.2.2 *Physics* block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] of course/group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN[5] classes	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
	FZZ2515WI	Physics of complex systems **GK**	1		1			K2_IZ_W11 U10,11,20,21 K1	30	120	4	4	2,1	w:T/Z l:T	Z		DN	P (2)	PD

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
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		Total	1	0	1	0	0		30	120	4	4	2,8						

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																	

Altogether for basic sciences blocks:

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

4.1.3 List of the main field of study blocks
4.1.3.1 *Obligatory main field of study* blocks

[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)
MS[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
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[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.	IZZ2000P	Creative and design thinking workshop					2	K2_IZ_W9 U10,11,18,22,23 K1-7	30	60	2	2	2,1	T	Z		DN	P	K
2.	IZZ2001Lw	Business simulations **GK**	1		2			K2_IZ_W1 U1,4,5,10,11, K1	45	150	5	5	3,5	w:T/Z l:T	Z		DN	P	K
3.	IZZ2001P	Business simulations				1		K2_IZ_W1 U1,4,5,10,11, K1	15	30	1	1	0,7	T	Z		DN	P	K
4.	EKZ2506Sw	Contemporary economics **GK**	1				1	K2_IZ_W6,7,9,13,14,U10, 11,15,16,18,24,25, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (1)	K
5.	ZMZ2661S	Contemporary management					2	K2_IZ_W6,7,9,13,14, U10,11,15-18,24,25, K1	30	60	2	2	1,4	T	Z		DN	P	K
6.	IZZ2003Pwl	Digital marketing and social media **GK**	1		2	1		K2_IZ_W7,9 U10,11,15, K1	60	120	4	4	2,8	w:T/Z l:T	Z		DN	P (3)	K
7.	IZZ2004W	Games and decisions in management	2					K2_IZ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		K
8.	IZZ2004L	Games and decisions in management			2			K2_IZ_W1,4,5,9,10 U1,5,8-11,26, K1	30	60	2	2	1,4	T	Z		DN	P	K
9.	ZMZ2662W	Project management	1					K2_IZ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T/Z	E		DN		K
10.	ZMZ2662L	Project management			2			K2_IZ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	30	60	2	2	1,4	T	Z		DN	P	K
11.	ZMZ2662P	Project management				1		K2_IZ_W,8-10,15,16 U10, 11, 17, 19, 22, 27, K1	15	60	2	2	1,4	T	Z		DN	P	K
12.	IZZ2007SI	Cloud computing services **GK**			1		1	K2_IZ_W3 U3,6,10,11, K1	30	120	4	4	2,8	T	Z		DN	P	K
		Total	**6**	**0**	**9**	**3**	**6**		**360**	**930**	**31**	**31**	**21,7**						

4.1.3.2 .... block

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

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

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

Altogether (for main field of study blocks):

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

4.2 List of optional blocks
4.2.1 List of general education blocks
4.2.1.1 Liberal-managerial subjects blocks *(min. ...... ECTS points):*

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
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[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.		**Social competences module**					2		30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2509S	Business psychology					2	K2_IZ_W12,16 U7,10,11,22,23, K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
	PSZ2510S	Leading teams and work groups					2	K2_IZ_W12,16 U7,10,11,22,23 K1-5,7	30	60	2	2	1,4	T	Z		DN	P	KO
2.		Business module	1			1			30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2663Wp	Business planning **GK**	1			1		K2_IZ_W6,7,14 U7,10,11,15-17,24,25 K1	30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2664Pw	Business models in developing environment **GK**	1			1		K2_IZ_W6,7,14 U10,11,15-18,24,25 K1	30	60	2	2	1,4	T	Z		DN	P	KO
	ZMZ2665Ws	Corporate Social Responsibility **GK**	1				1	K2_IZ_W6,7,14 U10,11,15,16,18,24, 25, K1	30	60	2	2	1,4	T	Z		DN	P	KO
		Total	1	0	0	1	2		60	120	4	4	2,8						

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

No.	Course/		Weekly number of hours	Learning effect symbol	Number of hours	Number of ECTS points	Form[2] of course/group of courses	Way[3] of crediting	Course/group of courses

[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)

MS[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

	group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN[5] classes	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1.	JZL	Foreign language (B2+)		1				K2_IZ_U10-14 K2_IZ_K1	15	30	1		0,5	T	Z	O		P	KO
2.	JZL	Foreign language (A1 or A2)		3				K2_IZ_U10-14 K2_IZ_K1	45	60	2		1,5	T	Z	O		P	KO
		Total	**0**	**4**	**0**	**0**	**0**		**60**	**90**	**3**		**2,0**						

4.2.1.3 Sporting classes block *(0. ECTS points):*

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

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

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

Altogether for general education blocks:

[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)

[MS4]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 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	4	0	1	2	120	210	7	4	4,8

4.2.2 List of basic sciences blocks

4.2.2.1 *Mathematics* block (min. .... ECTS points):

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

4.2.2.2 *Physics* block (min. .... ECTS points):

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

[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)

[MS4]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																		

4.2.2.3 *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]
		Total																	

Altogether for 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 blocks

4.2.3.1 .... 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)

MS[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 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					

4.2.4 List of specialization blocks

4.2.4.1 *Specialization subjects (e.g. whole specialization)* **blocks** *(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.	IZZ2002Wlp	Business intelligence workplace **GK**	1		2	1		K2_IZ_W1-3, 5 K2_IZ_U3,9-11 K2_IZ_K1	60	180	6	6	4,2	w:T/Z l,p:T	Z		DN	P (5)	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)

MS[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	BU classes	Form of course/group of courses	Way of crediting	University-wide	Concerning scientific activities	Practical	Type
2.	MAZ2582Wl	Predictive analytics **GK**	2		2			K2_IZ_W1,4,5 U1,5,8-11,26,K1	60	180	6	6	4,2	w:T/Z l:T	E (lec)		DN	P (3)	S
3.	IZZ2005Lw	Visual analytics **GK**	1		1			K2_IZ_W1-4 U1,2,3,9-11, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (2)	S
4.	IZZ2006Lw	Web scraping and analysis **GK**	1		1			K2_IZ_W2 U2,6,7,10,11, K1	30	90	3	3	2,1	w:T/Z l:T	Z		DN	P (2)	S
5.	MAZ2583W	Prescriptive analytics	2					K2_IZ_W1,4,5 U1,4,5,8-11,26, K1	30	60	2	2	1,4	T/Z	Z		DN		S
6.	MAZ2583L	Prescriptive analytics			2			K2_IZ_W1,4,5 U1,4,5,8-11,26, K1	30	90	3	3	2,1	T	Z		DN	P	S
		Total	7	0	8	1	0		240	690	23	23	16,1						

4.2.4.2 *Diploma profile* block *(min. ECTS points)*:

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] of course/group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN[5] classes	BU[1] classes			University-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1.	IZZ2008S	Diploma seminar I (BI Day)					1	K2_IZ_U10,11,26 K2_IZ_K1,5,6,7	15	30	1	1	0,7	T	Z		DN	P	S
2.	IZZ2009S	Diploma seminar II					1	K2_IZ_U10,11,26 K2_IZ_K1,6,7	15	60	2	2	1,4	T	Z		DN	P	S
3.	IZZ2010D	MSc Thesis				4		K2_IZ_U10,11,26 K2_IZ_K1,6,7	60	450	15	15	10,5	T/Z	Z		DN	P	S
		Total	0	0	0	4	2		90	540	18	18	12,6						

Altogether for specialization blocks:

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

[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)

MS[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

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7	0	8	5	2	330	1230	41	41	28,7

4.3 Training block - concerning principles of training crediting – attachment no. …

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

Name of training				
Number of ECTS points	**Number of ECTS points for BU[1] classes**		**Training crediting mode**	**Code**
Training duration		**Training objective**		

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

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

[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)
MS[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. Ways of verifying assumed learning outcomes

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

6. Range of diploma examination

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

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

Business simulations

[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)
[MS4]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. The concept of simulation. The cycle of simulation study

   5.1. What is simulation and what are the goals of a simulation? List and briefly discuss the basic steps in a simulation study.

6. Main simulation methods used in management

   6.1. Name main simulation methods used to support decision making in management and characterize one of them. Give examples of applications.

Descriptive analytics

7. Random variables and their distributions

   7.1. Name and describe the main measures which describe the distribution of a random variable.

8. Linear relationship between variables

   8.1. What is a linear regression and how can you estimate it?

9. Nonlinear relationship between variables

   9.1. Provide and describe an example of a nonlinear model which can be used to describe a relationship between variables. How can you estimate it?

Business intelligence workplace

10. Descriptive analytics - data visualization tools

    10.1.   What tools can be used (in your preferred programming language) to visualize categorical, discrete and continuous data. Provide examples and elaborate on the pros and cons.

11. Predictive analytics tools and models

    11.1.   Describe a sample forecasting problem. What type of methods (algorithms, models) and what software would you use to compute the forecasts? Elaborate on the pros and cons of your choice.

Contemporary economics

12. Phases of the business cycle

    12.1.   List and characterize the phases of the business cycle (4 phases).

13. Market structures

    13.1.   List the basic structures of the market and characterize one.

Contemporary management

14. New business models and organizational designs

    14.1.   Describe a virtual organization. Give an example.

15. Leadership and decision making

    15.1.   What are the differences between leadership and management?

Digital marketing and social media

16. Search Engine Optimization (SEO) techniques

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

17. Social media marketing content

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

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

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

Game and decisions in management

19. Risk and uncertainty modeling in optimization problems

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

20. Non-cooperative games

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

21. Cooperative games

    21.1.   Describe solution concepts of cooperative games.

Predictive analytics

22. Regression vs neural networks

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

23. Point and probabilistic forecasts

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

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[MS4]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
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Visual analytics

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

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

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

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

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

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

Web scraping and analysis

26. Methods of web scraping

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

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

Project management

27. Time management of project implementation

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

28. Project stakeholders management

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

29. Project metrics

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

Cloud computing services

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

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

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

Prescriptive analytics

31. Decision making: methods to evaluate alternatives

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[MS4]University-wide course /group of courses – enter O
[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

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

Business module

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

Social competences module

Business psychology

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

Leading teams and work groups

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

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

[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)
[MS4]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	Crediting by deadline of... (number of semester)

8. Plan of studies (attachment no. 3)

Approved by faculty student government legislative body:

18.10.2021

Date

Maciej Bartosik Bartosik

name and surname, signature of student representative

14.10.2021

Date

Dean's signature

DZIEKAN

dr hab. inż. Katarzyna Tworek, prof. uczelni

(1)

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MS[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