

STUDY PROGRAMME DOCUMENTATION

# AI in business solutions

*Full-time first-cycle studies*

## General characteristics

### 1. General characteristics of the studies conducted

- 1) name of the field of study: *AI in business solutions*
- 2) level of education: **studies first cycle**
- 3) education profile: **practical profile**
- 4) form of study: **full-time**
- 5) professional title obtained by the graduate: **bachelor's degree**
- 6) indication of the field of science and scientific discipline to which the field of study is assigned, and in the case of assignment of the field to more than one discipline – indication of the leading discipline within which more than half of the learning outcomes will be achieved, and other disciplines:

**Field of science: social sciences**

**Scientific discipline: management and quality sciences**

Specification	Discipline	Percentage share of learning outcomes assigned to a given discipline in the total number of learning outcomes
Leading scientific discipline	management and quality sciences	78,3%
Other academic disciplines	technical informatics and telecommunications	21,7%
	Overall	100%

- 7) differences in relation to other programmes with similarly defined objectives and learning outcomes conducted at the University and assigned to the same scientific discipline.

Unlike the general academic program in Artificial Intelligence in Business, which focuses on supporting management processes with artificial intelligence and prepares graduates for analytical and advisory functions in management structures, *AI in Business Solutions* trains specialists who are ready to directly implement AI tools in a business environment.

## 2. Description of graduate profile

*including a description of the general educational objectives and employment opportunities (typical places of work) and continuing education opportunities for graduates*

A graduate of the *AI in business solutions* program is a person with technical skills in data analysis, business intelligence and the application of artificial intelligence in business, combined with soft and business skills. Graduates, conceptually referred to as solution designers, are able to understand business problems and propose appropriate solutions using available tools. They are generalists, able to find their place in a wide range of tasks.

A graduate of *AI in business solutions* is a person who combines solid analytical foundations with an understanding of business realities. They have practical knowledge of artificial intelligence and machine learning methods – they can recognise which algorithms and techniques best support specific processes in an organisation. They are at ease in the world of business analytics and business intelligence, and know how to obtain data from various sources and clean, process and interpret it. They combine hard skills with data narration and business storytelling.

Graduates use classic tools (e.g. Excel with Power Pivot, Solver or Power Query) as well as modern cloud-based platforms and no-code/low-code solutions, chatbots and process robotization. They know the basics of statistical and mathematical modeling, understand the principles of cybersecurity and data protection, and are aware of the ethical challenges of using artificial intelligence, which translates into the safe design of solutions.

He understands the industry context and is able to take a holistic view of the company's goals and challenges, enabling him to optimize processes and propose innovative improvements. He works well in a team, builds relationships and networks, and at the same time takes responsibility for the tasks he undertakes. He is open to new technologies and ready to harness the potential of AI in the organization.

Graduates of the *AI in business solutions* program are prepared to work as technical staff in IT, data analytics and artificial intelligence teams in a variety of companies, performing roles such as solution designer, business analyst with technical elements, junior data analyst, and AI tools specialist in business. Typical workplaces include:

- IT and Data Science/AI departments in companies from various sectors of the economy.
- Teams dealing with business intelligence and business analytics.
- Consulting and technology companies that specialize in the implementing of AI and analytical solutions for business.

Graduates of the first-cycle *AI in business solutions* program can continue their education in second-cycle programs in engineering and data analysis, data science, business analytics, and management, with specializations in areas such as analytics or technology.

### 3. Learning outcomes for the *AI in business solutions* programme

Description of learning outcomes for the <i>AI in business solutions</i> program			
Level of education:	First-cycle studies		
Education profile:	practical		
Symbol of the directional effect of learning	Description of the learning outcome	Symbol for universal first-degree characteristics for level 6*)	Symbol for the second degree of learning outcomes for level 6**) qualifications
<b>First-cycle graduate:</b>			
<b>in terms of knowledge</b>			
AIBS_W01	has an advanced knowledge and understanding of the concepts of economics, financial management and accounting, enabling the analysis and interpretation of economic phenomena	P6U_W	P6S_WG
AIBS_W02	has advanced knowledge of the main management paradigms and modern approaches to business process organisation, including the digital transformation of enterprises	P6U_W	P6S_WG
AIBS_W03	knows and understands the detailed principles of modern logistics systems and the importance of artificial intelligence methods in supply chain management	P6U_W	P6S_WG
AIBS_W04	knows advanced marketing management techniques, including Customer Relationship Management activities, and understands the role of marketing analytics in creating value for customers	P6U_W	P6S_WG
AIBS_W05	has advanced knowledge of research design methods, including market research, data analysis and interpretation of results in the context of managerial decision-making	P6U_W	P6S_WG
AIBS_W06	knows methods of managerial statistics, probability theory and mathematical foundations supporting business data analysis processes	P6U_W	P6S_WG

AIBS_W07	has an advanced understanding of the operation and principles of using information technologies, including databases, SQL, programming platforms (Python, low-code/ no-code platforms) and automation tools in business applications	P6U_W	P6S_WG
AIBS_W08	knows and understands advanced techniques of exploratory data analysis and information visualisation, including storytelling using business intelligence tools	P6U_W	P6S_WG
AIBS_W09	knows and understands classic and agile project management methodologies and the tools and techniques used within them	P6U_W	P6S_WG
AIBS_W10	knows the basic concepts and theories of epistemology, philosophy and management related to the creation, transfer and use of knowledge	P6U_W	P6S_WG
AIBS_W11	knows and understands the fundamental dilemmas of modern civilisation, including ethical and social issues related to the use of digital technologies, particularly in the areas of data analysis, decision automation and the development of artificial intelligence	P6U_W	P6S_WK
AIBS_W12	knows and understands the economic and legal conditions of business activity, including basic regulations concerning the digital market, e-commerce and personal data protection	P6U_W	P6S_WK
AIBS_W13	understands the basic principles of industrial property protection and copyright law, in particular in the context of creating, using and sharing data, software and other intangible assets, as well as health and safety and fire safety principles.	P6U_W	P6S_WK
AIBS_W14	knows and understands ethical standards of professional conduct, with particular emphasis on responsibility in information management and the use of digital technologies and AI	P6U_W	P6S_WK
AIBS_W15	knows and understands the principles of creating, developing and running businesses, in particular innovative forms of entrepreneurship based on digital technologies and artificial intelligence	P6U_W	P6S_WK
AIBS_W16	knows and understands the processes and methods of applying theoretical knowledge to solve practical problems in professional activities, particularly in the areas of artificial intelligence and digital technologies in business	P6U_W	P6S_WG
<b>in terms of skills</b>			
AIBS_U01	is able to formulate business problems and select appropriate sources of information, conduct critical analysis and synthesis in order to develop	P6U_U	P6S_UW

	recommendations supported by analytical methods and artificial intelligence tools		
AIBS_U02	is able to select and apply statistical, mathematical and analytical methods to interpret business data, thereby supporting management decision-making	P6U_U	P6S_UW
AIBS_U03	is able to design, implement and operate technological solutions in the field of artificial intelligence, business process automation and information systems, using programming platforms and low-code/no-code tools	P6U_U	P6S_UW
AIBS_U04	can use advanced tools for exploratory data analysis, information visualisation and business storytelling techniques to present analysis results	P6U_U	P6S_UW
AIBS_U05	can diagnose and analyse the logistical, financial and management problems of an organisation using data analysis tools and methods based on AI technologies	P6U_U	P6S_UW
AIBS_U06	integrates philosophical and epistemological knowledge with business practice, critically evaluating methods of acquiring and using data and information within an organisation	P6U_U	P6S_UW
AIBS_U07	can independently prepare documentation and reports on business and technology projects in accordance with professional document editing standards	P6U_U	P6S_UW
AIBS_U08	is able to design and implement business ventures in the field of digital entrepreneurship, e-commerce and innovative business models	P6U_U	P6S_UW
AIBS_U09	is able to perform tasks requiring the use of digital technologies in communication, marketing and customer relations, using advanced ICT tools	P6U_U	P6S_UW
AIBS_U10	can prepare and deliver presentations and conduct business negotiations, using effective interpersonal communication and self-presentation techniques	P6U_U	P6S_UW
AIBS_U11	can communicate effectively using specialized terminology in the fields of management, economics, data analysis and AI technology, adapting the message to different stakeholder groups	P6U_U	P6S_UK
AIBS_U12	can actively participate in debates, critically evaluating positions related to the use of artificial intelligence in business, the ethical consequences of technology, and the problems of modern civilisation	P6U_U	P6S_UK
AIBS_U13	is able to use a foreign language at CEFR level B2 in speech and writing, in professional contexts related to data analysis, management and business applications of artificial intelligence	P6U_U	P6S_UK

AIBS_U14	is able to effectively plan and carry out their own work in business and technology projects, taking into account deadlines, resources and expected end results	P6U_U	P6S_UO
AIBS_U15	is able to organise the work of a project team, assigning tasks and monitoring their implementation, taking into account the diversity of competences and team objectives	P6U_U	P6S_UO
AIBS_U16	is able to work effectively with members of interdisciplinary teams, actively participating in projects that integrate technological, analytical and business knowledge	P6U_U	P6S_UO
AIBS_U17	is able to independently plan and implement their own lifelong learning, acquire new skills and update their knowledge, especially in the field of rapidly developing digital technologies and artificial intelligence	P6U_U	P6S_UU
AIBS_U18	is able to formulate and solve problems and perform tasks typical for professional activities in the field of artificial intelligence in business, using knowledge in the field of data analysis, digital technologies and management	P6U_U	P6S_UW
AIBS_U19	is able to solve complex problems and perform tasks in the field of artificial intelligence in business under partially unpredictable conditions, through the selection and critical analysis of sources as well as the application of appropriate ICT methods and tools.	P6U_U	P6S_UW
<b>in terms of social skills</b>			
AIBS_K01	is ready to systematically and critically evaluate his/her own knowledge, skills, and the content acquired in the course of tasks, projects, and professional or scientific activities, particularly in a dynamic digital and technological environment.	P6U_K	P6S_KK
AIBS_K02	is ready to consciously use the specialist knowledge of experts and to consult with them when carrying out complex business, analytical or technological projects.	P6U_K	P6S_KK
AIBS_K03	is ready to independently seek expert support, including actively using various sources of scientific and professional information, when encountering difficulties in solving complex practical or cognitive problems.	P6U_K	P6S_KK
AIBS_K04	is ready to initiate and actively participate in initiatives serving the public and social interest, using his/her competences in digital technologies, data analytics and artificial intelligence.	P6U_K	P6S_KO



AIBS_K05	is ready to think and act in an entrepreneurial manner and to responsibly co-create economic and social initiatives that take into account innovation as well as ethical and social aspects of business activity.	P6U_K	P6S_KO
AIBS_K06	is ready to perform professional duties responsibly and ethically, ensuring compliance with professional ethics standards, respect for intellectual property, and the protection of data and privacy, as well as to expect the same conduct from co-workers and business partners.	P6U_K	P6S_KR

\*) Symbol of the universal first-level characteristics for level 6, included in the annex to the Act of 22 December 2015 on the Integrated Qualifications System, i.e. Journal of Laws of 2017, item 986.

\*\*) Symbol of the second degree learning outcomes for level 6 qualifications, included in the annex to the Regulation of the Minister of Science and Higher Education of 14 November 2018 on the characteristics of second degree learning outcomes for qualifications at levels 6–8 of the Polish Qualifications Framework, Journal of Laws of 2018, item 2218.



#### 4. Parametric characteristics of the field of study

Specification	The value of the parameter resulting from the study program	
Basic parameters		
Number of semesters	6	
Total number of hours of classes in the study plan	3382	
Total number of ECTS credits required to obtain qualifications corresponding to the level of education	198	
Number of hours of classes taught in the field of study by teachers employed at the University as their primary place of work	2405	
Total number of ECTS credits assigned in the study plan for foreign language classes	8	
Total number of ECTS credits assigned in the study plan for student internships	39	
Detailed parameters	Number of ECTS credits	Percentage share in the total number of ECTS credits for the entire study programme
ECTS credits assigned to the academic discipline:	198	100,00%
- leading	155	78,3%
- other	43	21,7%
The total number of ECTS credits that a student must obtain as part of classes conducted with the direct participation of academic teachers or other persons conducting classes.	132,6	67,0%
Total number of ECTS credits assigned in the study plan for classes in the field of humanities or social sciences – applies to fields of study assigned to disciplines within fields other than humanities or social sciences	6	3%
Total number of ECTS credits assigned in the study plan for elective courses	63	31,8%
Total number of ECTS credits assigned for classes developing practical skills – applies to practical fields of study	159	80,3%
Total number of ECTS credits assigned for classes related to scientific activity in the discipline or disciplines to which the field of study is assigned – applies to fields of study with a general academic profile	Not applicable	Not applicable
Total number of ECTS credits assigned to classes preparing students	Not applicable	Not applicable

for conducting scientific research or ensuring participation in such research – applies to general academic fields of study		
Number of ECTS credits that can be obtained through education using distance learning methods and techniques	34	17,2%

## 5. Description of the rules and forms of student internships

1. The aim of the internship is:

- 1) broadening and verifying the knowledge acquired during studies and developing the ability to apply it in practice,
- 2) learning about the principles of organisation and functioning mechanisms of enterprises and institutions,
- 3) creating conditions for professional activation in the labour market,
- 4) preparing students to perform assigned tasks independently.

2. Students may undertake internships, within the scope specified in the curriculum, in companies/institutions whose business profile enables the objectives of the internship to be achieved. In particular, these may be manufacturing, service or commercial companies in which processes are carried out that allow for the commercial application of artificial intelligence.

3. The duration of the internship in the *AI in business solutions* programme is 6 months.

4. Internships for full-time students are carried out in semesters 4 and 6.

5. In semester 4, the practical training comprises 500 teaching hours (45 minutes each), which is equivalent to 375 clock hours.

6 In semester 6, the practical training comprises 475 teaching hours (45 minutes each), which is equivalent to 356.25 clock hours.

7. Students undertake internships during their free time outside of teaching hours. Internships undertaken in the second and third years of study take place after the end of teaching hours in a given semester and end no later than 15 September.

8. A student may complete the internship:

- 1) presenting their own proposal for a place of internship in a company/institution of their choice,
- 2) taking advantage of the offer prepared by the University,
- 3) based on the work performed or other activities of a nature that enables the objectives of the internship to be achieved.

9. In order to credit the internship, the student submits a report on the student internship completed at the company/institution to the internship supervisor.

## 6. Description of the rules governing the certification process

The *AI in business solutions* study programme does not require students to write a thesis. After completing the full course of study, students take a final examination. A final project is planned as part of the Final Project I and Final Project II courses.

Graduation occurs after crediting the final examination. The final examination is held before the Examination Board appointed by the Dean. The conditions for admitting a student to the examination are specified in detail in the applicable Regulations for Studies at PL and the rules for awarding degrees at the Faculty of Management. The diploma examination in the field of *AI in business solutions* is an oral examination conducted in English, where students draw questions from a set of examination questions prepared by the Programme Council, covering the course material and verifying the learning outcomes available on the Faculty's website prior to the examination.

*Learning outcomes matrix (part I of the table)*

Symbol of the learning outcome for the field of study	Description of learning outcomes for the field of study	General university education modules (Courses)	Compulsory Courses module - management and business													Communication and interpersonal skills module			Information and knowledge						
		Health and safety at work	Intellectual property protection	Foreign languages	Organisational management	Economics	Introduction to finance and accounting	Marketing management	Logistics in the age of AI	E-entrepreneurship	Project management I	Project Management II	Modern business financing	Modern logistics systems	Customer Relationship Management	Business effectiveness and risk analysis	Digital transformation	Self-presentation	Negotiations and persuasion	Creativity in the organization	Teamwork and communication within the organisation	Epistemology and philosophy of knowledge	Data Literacy	Market research methodology	Market research project
Graduate of first-cycle studies:																									
In terms of knowledge:																									

AIBS_W01	has an advanced knowledge and understanding of the concepts of economics, financial management and accounting, enabling the analysis and interpretation of economic phenomena				++	+++	++					++										+++	++		
AIBS_W02	has advanced knowledge of the main management paradigms and modern approaches to business process organisation, including the digital transformation of enterprises				+++			++		++	+			++		+++		+++	++	++		++			+++
AIBS_W03	knows and understands the detailed principles of modern logistics systems and the importance of artificial intelligence methods in supply chain management								+++				+++												
AIBS_W04	knows advanced marketing management techniques, including Customer Relationship Management activities, and understands the role of marketing analytics in creating value for customers							+++				++		+++								++	++	++	
AIBS_W05	has advanced knowledge of research design methods, including market research, data analysis and interpretation of results in the context of managerial decision-making												++	+					+			++	+++	+++	
AIBS_W06	knows methods of managerial statistics, probability theory and mathematical foundations supporting business data analysis processes													+++									++	++	

AIBS_W07	has an advanced understanding of the operation and principles of using information technologies, including databases, SQL, programming platforms (Python, low-code/no-code platforms) and automation tools in business applications								++							++									
AIBS_W08	knows and understands advanced techniques of exploratory data analysis and information visualisation, including storytelling using business intelligence tools								+													+++	++	++	
AIBS_W09	knows and understands classic and agile project management methodologies and the tools and techniques used within them										+++	+++			+++				+++	+					
AIBS_W10	knows the basic concepts and theories of epistemology, philosophy and management related to the creation, transfer and use of knowledge														++				+++	+	+++	+++			+++
AIBS_W11	knows and understands the fundamental dilemmas of modern civilisation, including ethical and social issues related to the use of digital technologies, particularly in the areas of data analysis, decision automation and the development of artificial intelligence							+								++				++	+++	++	++	+	
AIBS_W12	knows and understands the economic and legal conditions of business activity, including basic regulations concerning the digital market, e-commerce and personal data protection		++			++				+++			++			++									

AIBS_W13	understands the basic principles of industrial property protection and copyright law, in particular in the context of creating, using and sharing data, software and other intangible assets, as well as health and safety and fire safety principles.	+	+++							++															
AIBS_W14	knows and understands ethical standards of professional conduct, with particular emphasis on responsibility in information management and the use of digital technologies and AI									++								+++							
AIBS_W15	knows and understands the principles of creating, developing and running businesses, in particular innovative forms of entrepreneurship based on digital technologies and artificial intelligence				++			+		+++			++			+			+++						+++
AIBS_W16	knows and understands the processes and methods of applying theoretical knowledge to solve practical problems in professional activities, particularly in the areas of artificial intelligence and digital technologies in business						+		+	+++	++	++	++			+	++		+						+
<b>In terms of skills:</b>																									
AIBS_U01	is able to formulate business problems and select appropriate sources of information, conduct critical analysis and synthesis in order to develop recommendations supported by analytical methods and artificial intelligence tools		++		+++	++	+	+	+++		++	++	++	+++	+	++	++		+++		+			++	++



AIBS_U02	is able to select and apply statistical, mathematical and analytical methods to interpret business data, thereby supporting management decision-making						+		++	++		++	++		++	+++								++	++	
AIBS_U03	is able to design, implement and operate technological solutions in the field of artificial intelligence, business process automation and information systems, using programming platforms and low-code/no-code tools										+++	++		++			++									
AIBS_U04	can use advanced tools for exploratory data analysis, information visualisation and business storytelling techniques to present analysis results										+++	+++			++									++	++	
AIBS_U05	can diagnose and analyse the logistical, financial and management problems of an organisation using data analysis tools and methods based on AI technologies		++		+++		+		+++	+++			+	+++					+						+++	
AIBS_U06	integrates philosophical and epistemological knowledge with business practice, critically evaluating methods of acquiring and using data and information within an organisation										+++	++						++	++		++			+	++	
AIBS_U07	can independently prepare documentation and reports on business and technology projects in accordance with professional document editing standards											++											+++	+++		

AIBS_U08	is able to design and implement business ventures in the field of digital entrepreneurship, e-commerce and innovative business models				+			++			+		++		++								++	++	
AIBS_U09	is able to perform tasks requiring the use of digital technologies in communication, marketing and customer relations, using advanced ICT tools							+++							++										
AIBS_U10	can prepare and deliver presentations and conduct business negotiations, using effective interpersonal communication and self-presentation techniques										++						+++	+++	++	+			++	++	
AIBS_U11	can communicate effectively using specialized terminology in the fields of management, economics, data analysis and AI technology, adapting the message to different stakeholder groups							++						+		+++	++	++		++			++		
AIBS_U12	can actively participate in debates, critically evaluating positions related to the use of artificial intelligence in business, the ethical consequences of technology, and the problems of modern civilisation																		++		++				
AIBS_U13	is able to use a foreign language at CEFR level B2 in speech and writing, in professional contexts related to data analysis, management and business applications of artificial intelligence			+++																					

AIBS_U14	is able to effectively plan and carry out their own work in business and technology projects, taking into account deadlines, resources and expected end results						+							++									++	++
AIBS_U15	is able to organise the work of a project team, assigning tasks and monitoring their implementation, taking into account the diversity of competences and team objectives						++												++	++			++	++
AIBS_U16	is able to work effectively with members of interdisciplinary teams, actively participating in projects that integrate technological, analytical and business knowledge						+++								++				++	+				
AIBS_U17	is able to independently plan and implement their own lifelong learning, acquire new skills and update their knowledge, especially in the field of rapidly developing digital technologies and artificial intelligence			++															+++					
AIBS_U18	is able to formulate and solve problems and perform tasks typical for professional activities in the field of artificial intelligence in business, using knowledge in the field of data analysis, digital technologies and management						+				++	++	++		++	++		++	++					
AIBS_U19	is able to solve complex problems and perform tasks in the field of artificial intelligence in business under partially unpredictable conditions, through the selection and critical analysis of sources as well as the application of appropriate ICT methods and tools.														+++	+++		+					++	++

**In terms of social skills:**

AIBS_K01	is ready to systematically and critically evaluate his/her own knowledge, skills, and the content acquired in the course of tasks, projects, and professional or scientific activities, particularly in a dynamic digital and technological environment.	+	++	+++	+++	++	++		+++		+++	+++		+++		++	+++	+++		+++	++	+++			+++
AIBS_K02	is ready to consciously use the specialist knowledge of experts and to consult with them when carrying out complex business, analytical or technological projects.									+++	+++			+					+		+	+++		++	++
AIBS_K03	is ready to independently seek expert support, including actively using various sources of scientific and professional information, when encountering difficulties in solving complex practical or cognitive problems.			++		+++			++								+++				++	++		++	
AIBS_K04	is ready to initiate and actively participate in initiatives serving the public and social interest, using his/her competences in digital technologies, data analytics and artificial intelligence.								+									++	++	++	++				
AIBS_K05	is ready to think and act in an entrepreneurial manner and to responsibly co-create economic and social initiatives that take into account innovation as well as ethical and social aspects of business activity.				++			+	+++					++	+++	++			+++	++	+			++	

AIBS_K06	is ready to perform professional duties responsibly and ethically, ensuring compliance with professional ethics standards, respect for intellectual property, and the protection of data and privacy, as well as to expect the same conduct from co-workers and business partners.	+++		++			+++	++		+++	++	++	++			++		+++	++		++		+++	+++		
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*Learning outcomes matrix (part II of the table)*

Symbol of the learning outcome for the field of study	Description of learning outcomes for the field of study	Compulsory Courses module - mathematics				Compulsory Courses module - IT						Compulsory Courses module - business IT					Compulsory Courses module - machine learning and artificial intelligence				
		Fundamentals of Mathematics	Probability theory	Mathematical foundations of ML	Management statistics	Editing and working with documents	Processing data in spreadsheets	Fundamentals of algorithmics and programming	Python for business data analysis	Databases and SQL for analysts	Low-Code/No-Code platforms	Cyber security	Robotic Process Automation	Business analysis and analytical thinking	BI and storytelling	Exploratory data analysis and visualisation	Financial modelling	Fundamentals of BI Ops and MLOps	Ethical and philosophical aspects of srtrificial intelligence	Machine learning and artificial intelligence models in business	AI in business optimisation
Graduate of first-cycle studies:																					
In terms of knowledge:																					
AIBS_W01	has an advanced knowledge and understanding of the concepts of economics, financial management and accounting, enabling the analysis and interpretation of economic phenomena												+			++	+	+++		++	

AIBS_W02	has advanced knowledge of the main management paradigms and modern approaches to business process organisation, including the digital transformation of enterprises				++						++	+++				+	++					
AIBS_W03	knows and understands the detailed principles of modern logistics systems and the importance of artificial intelligence methods in supply chain management																++			+++	++	
AIBS_W04	knows advanced marketing management techniques, including Customer Relationship Management activities, and understands the role of marketing analytics in creating value for customers																					
AIBS_W05	has advanced knowledge of research design methods, including market research, data analysis and interpretation of results in the context of managerial decision-making				++		++		+				++	++	+	+				+++		
AIBS_W06	knows methods of managerial statistics, probability theory and mathematical foundations supporting business data analysis processes	++	++	++	+++		+++							++	+	++				+++		
AIBS_W07	has an advanced understanding of the operation and principles of using information technologies, including databases, SQL, programming platforms (Python, low-code/no-code platforms) and automation tools in business applications				++			+++	+++	+++	+++	+++	++			++	++	+++		++	++	+++



AIBS_W08	knows and understands advanced techniques of exploratory data analysis and information visualisation, including storytelling using business intelligence tools								+++	+				+++	+++	+++	++				++	++
AIBS_W09	knows and understands classic and agile project management methodologies and the tools and techniques used within them																+					
AIBS_W10	knows the basic concepts and theories of epistemology, philosophy and management related to the creation, transfer and use of knowledge					+									++			+				
AIBS_W11	knows and understands the fundamental dilemmas of modern civilisation, including ethical and social issues related to the use of digital technologies, particularly in the areas of data analysis, decision automation and the development of artificial intelligence						+					+++	+++	+++	+	++			+++		+	+++
AIBS_W12	knows and understands the economic and legal conditions of business activity, including basic regulations concerning the digital market, e-commerce and personal data protection									++	+++									+++		

AIBS_W13	understands the basic principles of industrial property protection and copyright law, in particular in the context of creating, using and sharing data, software and other intangible assets, as well as health and safety and fire safety principles.											++			+				++			
AIBS_W14	knows and understands ethical standards of professional conduct, with particular emphasis on responsibility in information management and the use of digital technologies and AI						+					+++	++						+++		++	
AIBS_W15	knows and understands the principles of creating, developing and running businesses, in particular innovative forms of entrepreneurship based on digital technologies and artificial intelligence																					
AIBS_W16	knows and understands the processes and methods of applying theoretical knowledge to solve practical problems in professional activities, particularly in the areas of artificial intelligence and digital technologies in business			+++	+++				+++	+++	+++	+++	+++	++	+++	+	++			+++	+++	
In terms of skills:																						
AIBS_U01	is able to formulate business problems and select appropriate sources of information, conduct critical analysis and synthesis in order to develop recommendations supported by analytical methods and artificial intelligence tools						+++	++	++	+++	++	+++	++	+	++		+		+++	++	+++	+++

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

AIBS_U02	is able to select and apply statistical, mathematical and analytical methods to interpret business data, thereby supporting management decision-making	++	++	++	+++		+++	++	+++				++		++	+++				+++	
AIBS_U03	is able to design, implement and operate technological solutions in the field of artificial intelligence, business process automation and information systems, using programming platforms and low-code/no-code tools						++	+++	+++		+++	+++	++		+		+++		+++	+++	+++
AIBS_U04	can use advanced tools for exploratory data analysis, information visualisation and business storytelling techniques to present analysis results				++				+++	+++				+++	+++	++	++				+++
AIBS_U05	can diagnose and analyse the logistical, financial and management problems of an organisation using data analysis tools and methods based on AI technologies				+++		++					+++		+++		++				++	+++
AIBS_U06	integrates philosophical and epistemological knowledge with business practice, critically evaluating methods of acquiring and using data and information within an organisation				++			++				+++									++
AIBS_U07	can independently prepare documentation and reports on business and technology projects in accordance with professional document editing standards					+++	+++	++					++	++	++				++	++	

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AIBS_U08	is able to design and implement business ventures in the field of digital entrepreneurship, e-commerce and innovative business models				++					++	++				++			++			+++	
AIBS_U09	is able to perform tasks requiring the use of digital technologies in communication, marketing and customer relations, using advanced ICT tools					+				++								++			++	++
AIBS_U10	can prepare and deliver presentations and conduct business negotiations, using effective interpersonal communication and self-presentation techniques																					
AIBS_U11	can communicate effectively using specialized terminology in the fields of management, economics, data analysis and AI technology, adapting the message to different stakeholder groups											++	+++	+								
AIBS_U12	can actively participate in debates, critically evaluating positions related to the use of artificial intelligence in business, the ethical consequences of technology, and the problems of modern civilisation											+++		++	++				+++	++	++	
AIBS_U13	is able to use a foreign language at CEFR level B2 in speech and writing, in professional contexts related to data analysis, management and business applications of artificial intelligence																					

AIBS_U14	is able to effectively plan and carry out their own work in business and technology projects, taking into account deadlines, resources and expected end results						+												+		
AIBS_U15	is able to organise the work of a project team, assigning tasks and monitoring their implementation, taking into account the diversity of competences and team objectives																		+++		
AIBS_U16	is able to work effectively with members of interdisciplinary teams, actively participating in projects that integrate technological, analytical and business knowledge							++													
AIBS_U17	is able to independently plan and implement their own lifelong learning, acquire new skills and update their knowledge, especially in the field of rapidly developing digital technologies and artificial intelligence							+++	+++	+++							+				
AIBS_U18	is able to formulate and solve problems and perform tasks typical for professional activities in the field of artificial intelligence in business, using knowledge in the field of data analysis, digital technologies and management				+++					+++	+++	+++	+++	++	++	+++	+++	+++	+++	+++	+++

AIBS_U19	is able to solve complex problems and perform tasks in the field of artificial intelligence in business under partially unpredictable conditions, through the selection and critical analysis of sources as well as the application of appropriate ICT methods and tools.																			+++	+++	+++
In terms of social skills:																						
AIBS_K01	is ready to systematically and critically evaluate his/her own knowledge, skills, and the content acquired in the course of tasks, projects, and professional or scientific activities, particularly in a dynamic digital and technological environment.	++	++	++	++	++	+++	++	+++	+++	+++	+++	+++	+++			+	+++	+++	+++	++	++
AIBS_K02	is ready to consciously use the specialist knowledge of experts and to consult with them when carrying out complex business, analytical or technological projects.				+++					++		+++		++	++			++				
AIBS_K03	is ready to independently seek expert support, including actively using various sources of scientific and professional information, when encountering difficulties in solving complex practical or cognitive problems.				++					+	+++	+++	+++	+++	+++					+++		

AIBS_K04	is ready to initiate and actively participate in initiatives serving the public and social interest, using his/her competences in digital technologies, data analytics and artificial intelligence.																			++		+++
AIBS_K05	is ready to think and act in an entrepreneurial manner and to responsibly co-create economic and social initiatives that take into account innovation as well as ethical and social aspects of business activity.																+++	++		+++		
AIBS_K06	is ready to perform professional duties responsibly and ethically, ensuring compliance with professional ethics standards, respect for intellectual property, and the protection of data and privacy, as well as to expect the same conduct from co-workers and business partners.					+		++				+++	++		+++							++



*Learning outcomes matrix (part III of the table)*

Symbol of the learning effect for the field of study	Description of learning outcomes for the field of study	Diploma module				Elective module - Technological project				Elective module - Business project			Elective module - Data in Business Activities						
		Diploma project I	Diploma project II	Student internships I	Student internships II	Object-oriented design	Signal processing	AI/ML systems engineering	Internet of Things	Virtual business accelerator	Virtual VC studio	E-commerce development	Logistics system project	Marketing Analytics and Marketing Intelligence	Customer Research and Behaviour Mode	AI-Based Fault Diagnosis	Systems based on LLM project	Image processing	Generative AI
Graduate of first-cycle studies:																			
In terms of knowledge:																			
AIBS_W01	has an advanced knowledge and understanding of the concepts of economics, financial management and accounting, enabling the analysis and interpretation of economic phenomena		++																

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AIBS_W02	has advanced knowledge of the main management paradigms and modern approaches to business process organization, including the digital transformation of enterprises			++														
AIBS_W03	knows and understands the detailed principles of modern logistics systems and the importance of artificial intelligence methods in supply chain management	+++	++	++														
AIBS_W04	knows advanced marketing management techniques, including Customer Relationship Management activities, and understands the role of marketing analytics in creating value for customers			++														
AIBS_W05	has advanced knowledge of research design methods, including market research, data analysis and interpretation of results in the context of managerial decision-making	+		++	++													
AIBS_W06	knows methods of managerial statistics, probability theory and mathematical foundations supporting business data analysis processes		++															

AIBS_W07	has an advanced understanding of the operation and principles of using information technologies, including databases, SQL, programming platforms (Python, low-code/no-code platforms) and automation tools in business applications	+++		+++	++	+++	+++	+++	++										
AIBS_W08	knows and understands advanced techniques of exploratory data analysis and information visualisation, including storytelling using business intelligence tools			++	+++														
AIBS_W09	knows and understands classic and agile project management methodologies and the tools and techniques used within them			+															
AIBS_W10	knows the basic concepts and theories of epistemology, philosophy and management related to the creation, transfer and use of knowledge																		
AIBS_W11	knows and understands the fundamental dilemmas of modern civilisation, including ethical and social issues related to the use of digital technologies, particularly in the areas of data analysis, decision automation and the		++																

	development of artificial intelligence																		
AIBS_W12	knows and understands the economic and legal conditions of business activity, including basic regulations concerning the digital market, e-commerce and personal data protection			++	++	++	++	++	++										
AIBS_W13	understands the basic principles of industrial property protection and copyright law, in particular in the context of creating, using and sharing data, software and other intangible assets, as well as health and safety and fire safety principles.	++				++	++	++	+										
AIBS_W14	knows and understands ethical standards of professional conduct, with particular emphasis on responsibility in information management and the use of digital technologies and AI	+++				+	+	++	+										
AIBS_W15	knows and understands the principles of creating, developing and running businesses, in particular innovative forms of entrepreneurship based on digital technologies and artificial intelligence			+	++														

AIBS_W16	knows and understands the processes and methods of applying theoretical knowledge to solve practical problems in professional activities, particularly in the areas of artificial intelligence and digital technologies in business	+++	++	+++	+++	++	++	++	++										
<b>In terms of skills:</b>																			
AIBS_U01	is able to formulate business problems and select appropriate sources of information, conduct critical analysis and synthesis in order to develop recommendations supported by analytical methods and artificial intelligence tools	+++	+++	++	++	+	+	+++	+++				+++	++	+++	+++	+++	++	+++
AIBS_U02	is able to select and apply statistical, mathematical and analytical methods to interpret business data, thereby supporting management decision-making		+++			++	++	+++	++				+++	+++	++	++	++	+++	+++
AIBS_U03	is able to design, implement and operate technological solutions in the field of artificial intelligence, business process automation and information systems, using programming platforms and low-code/no-code tools	+++	++	+++	+++	+++	+++	++	++	+++	+++	+++							

AIBS_U04	can use advanced tools for exploratory data analysis, information visualisation and business storytelling techniques to present analysis results	++	++		++								+++	++	+++	+++	+++	++	+++
AIBS_U05	can diagnose and analyse the logistical, financial and management problems of an organisation using data analysis tools and methods based on AI technologies		+++	++	++														
AIBS_U06	integrates philosophical and epistemological knowledge with business practice, critically evaluating methods of acquiring and using data and information within an organisation		+++										++	++	++	++	++	++	++
AIBS_U07	can independently prepare documentation and reports on business and technology projects in accordance with professional document editing standards	+++	++	+	+	++	++	++	++	++	++	++							
AIBS_U08	is able to design and implement business ventures in the field of digital entrepreneurship, e-commerce and innovative business models		+++							+++	+++	+++							

AIBS_U09	is able to perform tasks requiring the use of digital technologies in communication, marketing and customer relations, using advanced ICT tools		++		++					+++	++	+++	++	++	++	++	++	++	++
AIBS_U10	can prepare and deliver presentations and conduct business negotiations, using effective interpersonal communication and self-presentation techniques		+++		++								+	+	+	+	+	++	+
AIBS_U11	can communicate effectively using specialized terminology in the fields of management, economics, data analysis and AI technology, adapting the message to different stakeholder groups	+++			+														
AIBS_U12	can actively participate in debates, critically evaluating positions related to the use of artificial intelligence in business, the ethical consequences of technology, and the problems of modern civilisation	++	+	+	+								++	++	++	++	++	+++	+++
AIBS_U13	is able to use a foreign language at CEFR level B2 in speech and writing, in professional contexts related to data analysis, management and business applications of artificial intelligence																		

AIBS_U14	is able to effectively plan and carry out their own work in business and technology projects, taking into account deadlines, resources and expected end results			++						+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
AIBS_U15	is able to organise the work of a project team, assigning tasks and monitoring their implementation, taking into account the diversity of competences and team objectives	++		++		++	++	++	++				++	+++	++	++	++	+++	++
AIBS_U16	is able to work effectively with members of interdisciplinary teams, actively participating in projects that integrate technological, analytical and business knowledge			+++						+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
AIBS_U17	is able to independently plan and implement their own lifelong learning, acquire new skills and update their knowledge, especially in the field of rapidly developing digital technologies and artificial intelligence																		
AIBS_U18	is able to formulate and solve problems and perform tasks typical for professional activities in the field of artificial intelligence in business, using knowledge in	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	++	++	++	+++	++	+++	++



	the field of data analysis, digital technologies and management																	
AIBS_U19	is able to solve complex problems and perform tasks in the field of artificial intelligence in business under partially unpredictable conditions, through the selection and critical analysis of sources as well as the application of appropriate ICT methods and tools.																	
<b>In terms of social skills:</b>																		
AIBS_K01	is ready to systematically and critically evaluate his/her own knowledge, skills, and the content acquired in the course of tasks, projects, and professional or scientific activities, particularly in a dynamic digital and technological environment.	+++	+++	+++	++	+++	+++	++	++				+++	+++	+++	+++	+++	+++
AIBS_K02	is ready to consciously use the specialist knowledge of experts and to consult with them when carrying out complex business, analytical or technological projects.	++	+++	++	++					++	++	++	++	++	++	++	++	++

AIBS_K03	is ready to independently seek expert support, including actively using various sources of scientific and professional information, when encountering difficulties in solving complex practical or cognitive problems.		+++	++	++	++	++	++	++	+++	+++	+++	++	++	++	++	++	++	++
AIBS_K04	is ready to initiate and actively participate in initiatives serving the public and social interest, using his/her competences in digital technologies, data analytics and artificial intelligence.	++	+++	++	+++	+	+	++	++										
AIBS_K05	is ready to think and act in an entrepreneurial manner and to responsibly co-create economic and social initiatives that take into account innovation as well as ethical and social aspects of business activity.	++		++	+++	+	+	+	+	+++	+++	+++							
AIBS_K06	is ready to perform professional duties responsibly and ethically, ensuring compliance with professional ethics standards, respect for intellectual property, and the protection of data and privacy, as well as to expect the same conduct			+++	+++														

from co-workers and business partners.																			
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## Matrix of the learning outcomes verification system

Symbol of the learning effect for the field of study	Description of learning outcomes for the field of study	Assessment of a written paper	Assessment of an oral response	Assessment of completed subject exercises	Assessment of completed laboratory exercises	Assessment of completed laboratory reports	Assessment of the prepared project	Assessment of the project defence	Assessment of the prepared presentation, poster or paper	Assessment of class participation	Crediting of the internship report
First-cycle graduate:											
In the terms of knowledge:											
AIBS_W01	has an advanced knowledge and understanding of the concepts of economics, financial management and accounting, enabling the analysis and interpretation of economic phenomena	+	+				+				

AIBS_W02	has advanced knowledge of the main management paradigms and modern approaches to business process organization, including the digital transformation of enterprises	+				+	+				+
AIBS_W03	knows and understands the detailed principles of modern logistics systems and the importance of artificial intelligence methods in supply chain management	+					+				+
AIBS_W04	knows advanced marketing management techniques, including Customer Relationship Management activities, and understands the role of marketing analytics in creating value for customers	+									+
AIBS_W05	has advanced knowledge of research design methods, including market research, data analysis and interpretation of results in the context of managerial decision-making	+	+				+			+	+
AIBS_W06	knows methods of managerial statistics, probability theory and mathematical foundations supporting business data analysis processes	+	+				+				
AIBS_W07	has an advanced understanding of the operation and principles of using information technologies, including databases, SQL, programming platforms (Python, low-code/no-code platforms) and automation tools in business applications	+	+			+	+			+	+

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AIBS_W08	knows and understands advanced techniques of exploratory data analysis and information visualisation, including storytelling using business intelligence tools	+	+				+			+	+
AIBS_W09	knows and understands classic and agile project management methodologies and the tools and techniques used within them	+									+
AIBS_W10	knows the basic concepts and theories of epistemology, philosophy and management related to the creation, transfer and use of knowledge	+			+						
AIBS_W11	knows and understands the fundamental dilemmas of modern civilisation, including ethical and social issues related to the use of digital technologies, particularly in the areas of data analysis, decision automation and the development of artificial intelligence	+					+				
AIBS_W12	knows and understands the economic and legal conditions of business activity, including basic regulations concerning the digital market, e-commerce and personal data protection	+				+	+				+
AIBS_W13	understands the basic principles of industrial property protection and copyright law, in particular in the context of creating, using and sharing data, software and other intangible assets, as well as health and safety and fire safety principles.	+					+				

AIBS_W14	knows and understands ethical standards of professional conduct, with particular emphasis on responsibility in information management and the use of digital technologies and AI	+					+				
AIBS_W15	knows and understands the principles of creating, developing and running businesses, in particular innovative forms of entrepreneurship based on digital technologies and artificial intelligence	+									+
AIBS_W16	knows and understands the processes and methods of applying theoretical knowledge to solve practical problems in professional activities, particularly in the areas of artificial intelligence and digital technologies in business	+	+			+	+				+
<b>in terms of skills:</b>											
AIBS_U01	is able to formulate business problems and select appropriate sources of information, conduct critical analysis and synthesis in order to develop recommendations supported by analytical methods and artificial intelligence tools	+		+	+	+	+	+		+	+
AIBS_U02	is able to select and apply statistical, mathematical and analytical methods to interpret business data, thereby supporting management decision-making	+			+	+	+	+		+	

AIBS_U03	is able to design, implement and operate technological solutions in the field of artificial intelligence, business process automation and information systems, using programming platforms and low-code/no-code tools	+		+	+	+	+	+		+	+
AIBS_U04	can use advanced tools for exploratory data analysis, information visualisation and business storytelling techniques to present analysis results				+	+	+	+		+	+
AIBS_U05	can diagnose and analyse the logistical, financial and management problems of an organisation using data analysis tools and methods based on AI technologies	+		+	+	+	+	+		+	+
AIBS_U06	integrates philosophical and epistemological knowledge with business practice, critically evaluating methods of acquiring and using data and information within an organisation	+		+	+		+	+		+	
AIBS_U07	can independently prepare documentation and reports on business and technology projects in accordance with professional document editing standards				+	+	+	+		+	+
AIBS_U08	is able to design and implement business ventures in the field of digital entrepreneurship, e-commerce and innovative business models			+		+	+	+		+	



AIBS_U09	is able to perform tasks requiring the use of digital technologies in communication, marketing and customer relations, using advanced ICT tools			+	+	+	+	+		+	+
AIBS_U10	can prepare and deliver presentations and conduct business negotiations, using effective interpersonal communication and self-presentation techniques	+		+	+		+	+	+	+	+
AIBS_U11	can communicate effectively using specialized terminology in the fields of management, economics, data analysis and AI technology, adapting the message to different stakeholder groups	+		+	+	+	+	+	+	+	+
AIBS_U12	can actively participate in debates, critically evaluating positions related to the use of artificial intelligence in business, the ethical consequences of technology, and the problems of modern civilisation	+		+	+	+	+	+		+	+
AIBS_U13	is able to use a foreign language at CEFR level B2 in speech and writing, in professional contexts related to data analysis, management and business applications of artificial intelligence	+	+								
AIBS_U14	is able to effectively plan and carry out their own work in business and technology projects, taking into account deadlines, resources and expected end results			+	+	+	+	+		+	+

AIBS_U15	is able to organise the work of a project team, assigning tasks and monitoring their implementation, taking into account the diversity of competences and team objectives			+	+		+	+		+	+
AIBS_U16	is able to work effectively with members of interdisciplinary teams, actively participating in projects that integrate technological, analytical and business knowledge			+	+	+	+	+		+	+
AIBS_U17	is able to independently plan and implement their own lifelong learning, acquire new skills and update their knowledge, especially in the field of rapidly developing digital technologies and artificial intelligence	+	+	+	+	+	+			+	
AIBS_U18	is able to formulate and solve problems and perform tasks typical for professional activities in the field of artificial intelligence in business, using knowledge in the field of data analysis, digital technologies and management	+		+	+	+	+	+		+	+
AIBS_U19	is able to solve complex problems and perform tasks in the field of artificial intelligence in business under partially unpredictable conditions, through the selection and critical analysis of sources as well as the application of appropriate ICT methods and tools.				+	+	+	+		+	
<b>in the terms of the social skills:</b>											

AIBS_K01	is ready to systematically and critically evaluate his/her own knowledge, skills, and the content acquired in the course of tasks, projects, and professional or scientific activities, particularly in a dynamic digital and technological environment.	+	+	+	+	+	+	+	+	+	+
AIBS_K02	is ready to consciously use the specialist knowledge of experts and to consult with them when carrying out complex business, analytical or technological projects.	+		+		+	+	+		+	+
AIBS_K03	is ready to independently seek expert support, including actively using various sources of scientific and professional information, when encountering difficulties in solving complex practical or cognitive problems.	+	+	+	+	+	+	+	+	+	+
AIBS_K04	is ready to initiate and actively participate in initiatives serving the public and social interest, using his/her competences in digital technologies, data analytics and artificial intelligence.	+			+		+	+		+	+
AIBS_K05	is ready to think and act in an entrepreneurial manner and to responsibly co-create economic and social initiatives that take into account innovation as well as ethical and social aspects of business activity.	+		+	+	+	+	+		+	+

AIBS_K06	is ready to perform professional duties responsibly and ethically, ensuring compliance with professional ethics standards, respect for intellectual property, and the protection of data and privacy, as well as to expect the same conduct from co-workers and business partners.	+		+	+	+	+	+		+	+
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## Study Plan

1<sup>st</sup> semester

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L (lecture)	C (Classes)	L/S (Laboratory/Seminar)	P (Project)	Independent work
AIBS S01 01 00	Health and safety at work	Z	KPIB	0	5	5	0	0	0	0
AIBS S01 02 00	Library Training	Z		0	2		2	0	0	0
AIBS S01 03 00	Physical Education	Z		0	30	0	30	0	0	0
AIBS S01 04 00	Organisational management	E	KZ	4	100	30	30	0	0	40
AIBS S01 05 00	Economics	Z	KEIS	2	50	30	0	0	0	20
AIBS S01 06 00	Introduction to finance and accounting	Z	KFIR	4	100	30	30	0	0	40
AIBS S01 07 00	Marketing management	E	KM	4	100	30	30	0	0	40
AIBS S01 08 00	Logistics in the age of AI	Z	KOP	4	100	30	0	30	0	40
AIBS S01 09 00	Creativity in the organization	Z	KZ	2	50	0	0	30	0	20
AIBS S01 10 00	Epistemology and philosophy of knowledge	Z	KMIWZ	3	75	15	30	0	0	30
AIBS S01 11 00	Data Literacy	Z	KMIWZ	2	50	30	0	0	0	20
AIBS S01 12 00	Fundamentals of Mathematics	E	KMIWZ	4	100	30	30	0	0	40
<b>Total</b>				<b>29</b>	<b>762</b>	<b>230</b>	<b>182</b>	<b>60</b>	<b>0</b>	<b>290</b>

## 2nd semester

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L	C	L/S	P	Independent work
AIBS S02 13 00	Physical Education	Z	SWFiS	0	30	0	30	0	0	0
AIBS S02 14 01	Polish language	Z	SJO	2	50	0	30	0	0	20
AIBS S02 14 02	German language									
AIBS S02 14 03	Spanish language									
AIBS S02 15 00	Negotiations and persuasion	Z	KZ	3	75	15	0	30	0	30
AIBS S02 16 00	Probability Theory	E	KMIWZ	4	100	30	30	0	0	40
AIBS S02 17 00	Mathematical Foundations of ML	E	KMIWZ	4	100	30	30	0	0	40
AIBS S02 18 00	Editing and Working with Documents	Z	KZ	2	50	0	0	30	0	20
AIBS S02 19 00	Processing Data in Spreadsheets	Z	KMIWZ	2	50	0	0	30	0	20
AIBS S02 20 00	Fundamentals of Algorithmics and programming	Z	KMIWZ	4	100	30	0	30	0	40
AIBS S02 21 00	Databases and SQL for Analysts	Z	KOP	3	75	15	0	30	0	30
AIBS S02 22 00	Ethical and Philosophical Aspects of artificial intelligence	Z	KMIWZ	3	75	15	30	0	0	30
<b>Total</b>				<b>27</b>	<b>685</b>	<b>135</b>	<b>150</b>	<b>150</b>	<b>0</b>	<b>270</b>

### 3<sup>d</sup> semester

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L	C	L/S	P	Independent work
AIBS S03 23 01	Polish language	Z	SJO	2	50	0	30	0	0	20
AIBS S03 23 02	German language									
AIBS S03 23 03	Spanish language									
AIBS S03 24 00	E-entrepreneurship	Z	KEIS	4	100	30	0	0	30	40
AIBS S03 25 00	Business effectiveness and risk analysis	Z	KFIR	3	75	15	30	0	0	30
AIBS S03 26 00	Self-presentation	Z	KM	3	75	0	45	0	0	30
AIBS S03 27 00	Teamwork and communication within the organisation	Z	KZ	3	75	15	30	0	0	30
AIBS S03 28 00	Market research methodology	Z	KM	3	75	15	0	0	30	30
AIBS S03 39 00	Management Statistics	E	KMIWZ	4	100	30	0	30	0	40
AIBS S03 30 00	Python for Business Data Analysis	Z	KMIWZ	3	75	0	0	45	0	30
AIBS S03 31 00	Robotic Process Automation	Z	KPIB	3	75	15	0	30	0	30
<b>Total</b>				<b>28</b>	<b>680</b>	<b>120</b>	<b>135</b>	<b>105</b>	<b>60</b>	<b>280</b>

#### 4<sup>th</sup> semester

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L	C	L/S	P	Independent work
AIBS S04 32 01	Polish language	Z	SJO	2	50	0	30	0	0	20
AIBS S04 32 02	German language									
AIBS S04 32 03	Spanish language									
AIBS S04 33 00	Project Management I	Z	KMIWZ	4	100	30	0	0	30	40
AIBS S04 34 00	Modern logistics systems	Z	KOP	3	75	15	0	30	0	30
AIBS S04 35 00	Customer Relationship Management	Z	KM	3	75	15	0	30	0	30
AIBS S04 36 00	Market research project	Z	KM	3	75	15	0	0	30	30
AIBS S04 37 00	Knowledge management	Z	KZ	2	50	30	0	0	0	20
AIBS S04 38 00	Low-Code / No-Code Platforms	Z	KOP	2	50	0	0	30	0	20
AIBS S04 39 00	Business Analysis and Analytical Thinking	Z	KOP	3	75	15	0	30	0	30
AIBS S04 40 00	Machine Learning and Artificial Intelligence Models in Business	Z	KMIWZ	2	50	0	0	30	0	20
<b>Elective module: Technological design - 1 out of 4 to choose from</b>										
AIBS S04 41 01-04	EC I	Z		3	75	15	0	0	30	30
<b>Elective module: Business project - 1 out of 3 to choose from</b>										
AIBS S04 42 01-03	EC II	Z		2	50	0	0	0	30	20
AIBS S04 43 00	Student Internships I	Z		20	500	0	0	0	0	0
<b>Total</b>				<b>49</b>	<b>1205</b>	<b>135</b>	<b>30</b>	<b>150</b>	<b>120</b>	<b>290</b>

Elective Courses to choose from in the module: SIB S04 41 01 - *Object-Oriented programming*, SIB S04 41 02 - *Signal processing*, SIB S04 41 03 - *AI/ML systems engineering*, SIB S04 41 04 - *Internet of Things*, SIB S04 42 01 - *Virtual business accelerator*, SIB S04 42 02 - *Virtual VC studio*, SIB S04 42 03 - *E-commerce development*



## 5<sup>th</sup> semester

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L	C	L/S	P	Independent work
AIBS S05 44 01	Polish language	Z	SJO	2	50	0	30	0	0	20
AIBS S05 44 02	German language									
AIBS S05 44 03	Spanish language									
AIBS S05 45 00	Project Management II	Z	KMIWZ	4	100	30	0	0	30	40
AIBS S05 46 00	Digital transformation	Z	KPIB	3	75	15	0	30	0	30
AIBS S05 47 00	Cyber Security	Z	KIO	3	75	15	0	30	0	30
AIBS S05 48 00	BI and Storytelling	Z	KOP	3	75	15	0	30	0	30
AIBS S05 49 00	Exploratory Data Analysis and Visualisation	Z	KMIWZ	3	75	15	0	30	0	30
AIBS S05 50 00	Financial Modelling	Z	KFIR	3	75	15	0	30	0	30
AIBS S05 51 00	Fundamentals of BI Ops and MLOps	Z	KOP	3	75	15	0	30	0	30
AIBS S05 52 00	Natural Language Processing	Z	KMIWZ	3	75	15	0	30	0	30
AIBS S05 53 00	Diploma Project I	Z	KMIWZ	3	75	0	0	0	30	45
<b>Total</b>				<b>30</b>	<b>750</b>	<b>135</b>	<b>30</b>	<b>210</b>	<b>60</b>	<b>315</b>

6<sup>th</sup> semestr

Course code	Name of the Course	Form of assessment	Department	ECTS	Total number of hours					
					Sum	L	C	L/S	P	Independent work
AIBS S06 54 00	Intellectual property protection	Z	KOP	1	25	15	0	0	0	10
AIBS S06 55 00	Modern business financing	Z	KFIR	3	75	15	0	0	30	30
AIBS S06 56 00	AI in Business Optimisation	Z	KMIWZ	4	100	30	0	30	0	40
AIBS S06 57 00	Diploma Project II	Z	KMIWZ	4	100	0	0	0	30	70
<b>Elective module: Data in Business Activities - 2 z 7</b>										
AIBS S06 58 01-07	Project IIIa	Z		2	50	0	0	0	30	20
	Project IIIb	Z		2	50	0	0	0	30	20
AIBS S06 59 00	Student Internships II	Z		19	475	0	0	0	0	0
<b>Razem</b>				<b>35</b>	<b>875</b>	<b>60</b>	<b>0</b>	<b>30</b>	<b>120</b>	<b>190</b>

Elective Courses to choose from in the Data in Business Activities module SIB S06 58 01 - *Logistics System Project*, SIB S06 58 02 - *Marketing Analytics and Marketing Intelligence*, SIB S06 58 03 - *Customer Research and Behaviour Mode*, SIB S06 58 04 - *AI-Based Fault Diagnosis*, SIB S06 58 05 - *Systems Based on LLM Project*, SIB S06 58 06 - *Image Processing*, SIB S06 58 07 - *Generative AI*

## Course content (Course syllabuses)

### Module (Course) syllabus Field of study: *AI in business solutions* First-cycle studies

<b>Course:</b>	<b>Health and safety at work</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 01 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	5
Lecture	5
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	0
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

Course objectives	
<b>C1</b>	Preparing students to work with health and safety regulations
<b>C2</b>	Introducing students to technical solutions aimed at protecting employees' health and ensuring fire safety, illustrated with examples implemented in the facilities of Lublin University of Technology
<b>C3</b>	Preparing students to provide basic first aid

Prerequisites in terms of knowledge, skills, and other competencies	
<b>1</b>	Brak

Learning outcomes	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic principles of occupational health and safety
	<b>In the terms of social skills:</b>
<b>EK 2</b>	is ready to continuously seek the best organisational and technical solutions aimed at improving occupational safety

Course content	
	Course content
<b>W1</b>	Sources of regulations concerning occupational safety.
<b>W2</b>	Types of hazards that may occur in the workplace and preventive measures.
<b>W3</b>	Accidents at work.
<b>W4</b>	Fire protection of buildings.
<b>W5</b>	Alarm procedures and providing first aid.

Didactic methods	
<b>1</b>	Informative lecture
<b>2</b>	Work with materials

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
<b>O1</b>	Assessment of a written paper (test)	60%

Required textbooks and other reading	
<b>1</b>	Materials available on the website of the Central Institute for Labour Protection <a href="http://www.ciop.pl/">http://www.ciop.pl/</a> .

Recommended (supplementary) textbooks and other reading	
<b>1</b>	"Occupational Safety - Science and Practice" ("OSSP") - a monthly journal Central Institute for Labour Protection

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>5</b>
Participation in lectures	5
<b>Student's own work, including:</b>	<b>0</b>
Preparation for lectures	0
<b>Total student's workload</b>	<b>5</b>
<b>Total number of the course ECTS credits</b>	<b>0</b>

Learning outcomes matrix
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Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W13+	C1-C3	W1-W5	1, 2	O1
EK 2	AIBS_K01+	C1-C3	W1-W5	1, 2	O1

Author of the course syllabus:	Dr hab. Inż. Krzysztof Czarnocki, prof. uczelni
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Organizational unit:	Department of Information and Business Processes

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First-cycle studies**

<b>Przedmiot:</b>	<b>Library Orientation</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 02 00
<b>Rok:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	2
Lecture	-
Exercises	2
Laboratory	-
Project	-
<b>Number of ECTS credits:</b>	0
<b>Method of completion form (evaluation):</b>	credit without a grade
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Familiarization with the services provided by the PL Library
<b>C2</b>	Acquiring basic knowledge about the specific nature, character and distribution of collections made available by the PL Library
<b>C3</b>	Familiarisation with the rights and obligations of readers, as specified in the regulations governing access to resources and the activities of the Library at the Scientific and Technical Information Centre of the Lublin University of Technology.
<b>C4</b>	Acquiring skills in using the library's computer catalogue, multi-search engine and selected electronic resources.
<b>C5</b>	Developing the need to continuously acquire knowledge by using the resources of the library's computer catalogue and other sources of knowledge.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Basic computer skills
<b>2</b>	Knowledge of basic information techniques

<b>Learning outcomes</b>	
	In the terms of knowledge:
<b>EK 1</b>	knows the rules governing the PL Library information and search system (online catalogue)
<b>EK 2</b>	is familiar with the content of electronic resources offered by the CINT PL website in the field of education
	In the terms of skills:
<b>EK 3</b>	is able to use licensed electronic resources available via the CINT website and

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	specialist documents
	In the terms of social skills:
<b>EK 4</b>	is ready to make informed choices and utilise library collections and electronic knowledge resources necessary for the process of education and self-education, in accordance with ethical principles and copyright laws

<b>Course content</b>	
<b>Class format - practical classes</b>	
	Course content
<b>ĆW1</b>	Learning about the services provided by the Scientific and Technical Information Centre. Familiarisation with the rules for accessing resources and the activities of the Library at the Scientific and Technical Information Centre of the Lublin University of Technology. Characteristics of library collections. Learning about the CINT PL website, which helps users find the information they are looking for. Presentation on search tools: using the library's computer catalogue and multi-search engine. Presentation of selected electronic resources – the ROCK institutional repository, the IBUK Reading Room, and other specialist documents. Use of library resources in accordance with ethical principles and copyright law.
<b>ĆW2</b>	Placing an order for a book or magazine via the library's computer catalogue. Searching for resources in the IBUK Reading Room and Ebookpoint BIBLIO.

<b>Didactic methods</b>	
<b>1</b>	Course-related classes – other

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed course exercises	100%

<b>Literatura podstawowa</b>	
<b>1</b>	CINT page <a href="https://cint.pollub.pl">https://cint.pollub.pl</a> .
<b>2</b>	Regulations on Access to Library Collections and Service Provision at the Centre for Scientific and Technical Information
<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Guides and manuals available on the website CINT <a href="https://cint.pollub.pl">https://cint.pollub.pl</a> .

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>2</b>
Participation in classes	2
<b>Student's own work</b>	<b>0</b>

<b>Total student's workload</b>	2
<b>Total number of the course ECTS credits</b>	0

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W14++	C1-C5	ĆW1-ĆW2	1	O1
<b>EK 2</b>	AIBS_W14+ AIBS_W16+	C1-C5	ĆW1-ĆW2	1	O1
<b>EK 3</b>	AIBS_U01++ AIBS_U17+ AIBS_U19++	C1-C5	ĆW1-ĆW2	1	O1
<b>EK 4</b>	AIBS_K01++ AIBS_K03+++ AIBS_K06+++	C1-C5	ĆW1-ĆW2	1	O1

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<b>Organizational unit:</b>	Scientific and Technical Information Centre



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First-cycle studies**

<b>Course:</b>	<b>Intellectual Property Protection</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S06 54 00
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	15
Lecture	15
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	1
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Provide students with knowledge of types of intellectual property, principles of its legal protection, conditions for obtaining protection, entities entitled to acquire it, possibilities of trading intellectual property rights in business activities, and skills in using databases on specific industrial property rights.
<b>C2</b>	Familiarize students with the classification of the effects of human creative work according to categories of intellectual property.
<b>C3</b>	To develop students' ability to assess the possibilities of protecting their own creative work and to use the protected results of others' work in the context of business operations.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	none

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the types and basic characteristics of intellectual property and the legal grounds and basis for their protection
<b>EK 2</b>	has knowledge of intellectual property law agreements and the possibilities of using protected intellectual property assets
<b>EK 3</b>	knows the basic databases of industrial property rights and the basic principles of drafting patent descriptions and patent claims

	<b>In the terms of skills:</b>
<b>EK 4</b>	can identify specific intellectual property assets that are legally protected within a given company
<b>EK 5</b>	is able to perform basic checks in databases for information on protected industrial property rights
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to appreciate the value of knowledge and the results of creative activity, ensuring respect for intellectual property

<b>Course content</b>	
	Course content - lecture
<b>W1</b>	The concept of intellectual and industrial property, intangible assets, types and basic characteristics of intellectual property assets (works, inventions, utility models, industrial designs, trademarks, geographical indications, integrated circuit topographies, company names, business names, know-how, new plant varieties).
<b>W2</b>	National and international patent protection systems (UPRP, EPC, PCT); the conditions of patentability of an invention and the criteria for obtaining protection rights for a utility model; the concept of patent purity. Non-patentable solutions (patent exclusions); the concept of the entity entitled to a patent and the entity entitled under a patent; the inventor's property and moral rights; the scope of patent rights and the limitations of patent protection.
<b>W3</b>	Expiry and revocation of patents, supplementary protection certificates (SPCs) (extension of patent protection), International Patent Classification (IPC), basic databases on inventions, rules for completing patent applications and drafting descriptions of inventions and patent claims.
<b>W4</b>	Industrial design protection systems (national, EU and international) and the scope and grounds for granting by the Patent Office rights arising from industrial design registration. Rules for the disposal of assets intellectual property (including licence agreements, transfer agreements rights to intangible assets).
<b>W5</b>	The concept and types of trademarks and trademark protection systems: national (UPRP), EU (EUIPO) and international (Madrid Agreement and Protocol to the Agreement). Absolute and relative grounds for refusal of trademark registration. Scope of protection of ordinary and renowned trademarks. Invalidation and expiry of trademark protection rights. Trademark databases.
<b>W6</b>	Subject of Copyright (Work) - Concept and Grounds for Protection, Copyright Holder. Owner of copyright. Content of the copyright (moral and economic rights, agreements on disposal of economic rights).
<b>W7</b>	Protection of economic and moral rights (claims). Permitted personal use of protected works. Permitted public use of protected works. Image protection.

Didactic methods	
1	Informative lecture
2	Conversational lecture
3	Case study
4	Demonstration with explanations

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	50%

Required textbooks and other reading	
1	Collection of basic regulations: Current Act on Copyright and Related Rights
2	Goldstein P., Trimble M., <i>International Intellectual Property Law: Cases and Materials</i> , 6th ed., West Academic Publishing, St. Paul 2023.

Recommended (supplementary) textbooks and other reading	
1	European Patent Office, <i>Inventor's Handbook</i> , EPO, München 2008.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	15
Participation in lectures	15
Student's own work, including:	10
Preparation for lectures	10
Total student's workload	25
Total number of the course ECTS credits	1

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W13+++ AIBS_W12++	C1-C3	W1, W2, W4-W6	1-3	O1
EK 2	AIBS_W13+++	C1	W4, W6	1-3	O1

	AIBS_W12++				
EK 3	AIBS_W13+++ AIBS_W12++	C1-C3	W3, W5	1-4	O1
EK 4	AIBS_U05++ AIBS_U01+	C2, C3	W1, W2, W4- W6	1-3	O1
EK 5	AIBS_U01++ AIBS_U05+	C1	W3, W5	1-4	O1
EK 6	AIBS_K06+++ AIBS_K01++	C1-C3	W1-W7	1-4	O1

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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Polish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S02 14 01
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English, Polish

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Polish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of Polish at B1 level

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Vocabulary related to university and studying. Self-presentation.
ĆW2	Basic mathematical terminology. Numbers and symbols.
ĆW3	Systems and devices – operating principles, applications, examples.
ĆW4	Materials and artificial intelligence.
ĆW5	Working in an organisation.
ĆW6	Artificial intelligence in business.
ĆW7	Machine learning as an area of artificial intelligence.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language exercises
2	Lexical and grammatical language exercises
3	Working with source texts or other materials, including audio and audiovisual materials
4	Work carried out in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of an oral response	51 %

Required textbooks and other reading	
1	S. Rudziński, E. Białecka, T. Borowczyk, Testy dla kandydatów na studia techniczne, Wyd. Uniwersytetu Łódzkiego. (Tests for candidates for technical studies, published by the University of Łódź.)
Recommended (supplementary) textbooks and other reading	
1	D. Wróbel, A. Zielińska, G. Rudziński, Matematyka dla cudzoziemców, Wydawnictwo Uniwersytetu Łódzkiego. (Mathematics for Foreigners, University of Łódź Press.)
2	M. Herrera – Nowak, Gramopedia. Gramatyka na B1, Akademia Języka Polskiego. (Gramopedia. Grammar at B1 level, Polish Language Academy.)
3	Original materials and materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20

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<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

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<b>Organizational unit:</b>	Department of Foreign Language



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Polish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S03 23 01
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English, Polish Language

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Polish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.



Course content	
ĆW1	Geometric shapes. Description of instruments and their characteristics.
ĆW2	Components and assemblies, manufacturing techniques and robotics.
ĆW3	Planning and design.
ĆW4	Scenario planning.
ĆW5	Innovative technologies in business – microchipping and biometrics.
ĆW6	Artificial intelligence in industry. Social robotics.
ĆW7	The development of artificial intelligence and its significance for the market and the labour market.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	S. Rudziński, E. Białecka, T. Borowczyk, Testy dla kandydatów na studia techniczne, Wyd. Uniwersytetu Łódzkiego. (Tests for candidates for technical studies, published by the University of Łódź.)
Recommended (supplementary) textbooks and other reading	
1	D. Wróbel, A. Zielińska, G. Rudziński, Matematyka dla cudzoziemców, Wydawnictwo Uniwersytetu Łódzkiego. (Mathematics for Foreigners, University of Łódź Press.)
2	M. Herrera – Nowak, Gramopedia. Gramatyka na B1, Akademia Języka Polskiego. (Gramopedia. Grammar at B1 level, Polish Language Academy.)
3	Original materials and materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in classes	30
Student's own work, including:	20

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Preparation for classes	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

Author of the course syllabus:	Mgr Ewelina Zbrońska
E-mail address:	<a href="mailto:e.zbronska@pollub.pl">e.zbronska@pollub.pl</a>
Organizational unit:	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Polish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 32 01
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English, Polish Language

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Polish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Problems and crisis in the organisation.
ĆW2	Difficult situations – causes, preventive measures and remedies.
ĆW3	Technological process – needs analysis, creative solutions.
ĆW4	Innovation and creativity.
ĆW5	Modern solutions in business – shadow work, or unpaid tasks.
ĆW6	Algorithms.
ĆW7	Artificial intelligence and ethics.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	M. Kowalska, O biznesie po polsku. Wprowadzenie do języka biznesu. Podręcznik do nauki języka polskiego, Universitas. (About business in Polish. Introduction to business language. Polish language textbook, Universitas.)
Recommended (supplementary) textbooks and other reading	
1	I. Kugiel-Abuhasna, Łowcy słów, Agdalnasser Abuhasna IT Services. (Word hunters, Agdalnasser Abuhasna IT Services).
2	M. Herrera – Nowak, Gramopedia. Gramatyka na B1, Akademia Języka Polskiego. (Gramopedia. Grammar at B1 level, Polish Language Academy)
3	Original materials and materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50

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<b>Total number of the course ECTS credits</b>	<b>2</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	15	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Ewelina Zbrońska
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Polish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S05 44 01
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English, Polish Language

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Polish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Security and cybersecurity – threats, risks and protection.
ĆW2	Procedures and instructions.
ĆW3	Monitoring in and protection.
ĆW4	Smart buildings.
ĆW5	Big Data and consumer behaviour.
ĆW6	Artificial intelligence in medicine.
ĆW7	Artificial Intelligence Threats.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of an oral response	51 %

Required textbooks and other reading	
1	Original materials and materials obtained from an online database.
Recommended (supplementary) textbooks and other reading	
1	B. Miłosz, M. Szabelska, E. Zbrońska, Mapy myśli dla studentów uczelni technicznych, Lublin 2025. (Mind maps for technical university students, Lublin 2025.)
2	M. Herrera – Nowak, Gramopedia. Gramatyka na B1, Akademia Języka Polskiego. (Gramopedia. Grammar at B1 level, Polish Language Academy.)

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2



### Learning outcomes matrix

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Ewelina Zbrońska
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<b>Organizational unit:</b>	Department of Foreign Language



**Module (Course) syllabus**  
**Field of study: AI in business solutions**  
First - cycle studies

<b>Course:</b>	<b>German Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S02 14 02
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	German, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of German language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of German at B1 level

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Vocabulary related to university and studying. Self-presentation.
ĆW2	Basic mathematical terminology. Numbers and symbols.
ĆW3	Systems and devices – operating principles, applications, examples.
ĆW4	Materials and artificial intelligence.
ĆW5	Working in an organisation.
ĆW6	Artificial intelligence in business.
ĆW7	Machine learning as an area of artificial intelligence.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of an oral response	51 %

Required textbooks and other reading	
1	Jabłońska D., Energie, Roboter, Autos, Züge, SJO Politechniki Krakowskiej, 2014
Recommended (supplementary) textbooks and other reading	
1	Guzik D., Alles digital..., SJO Politechniki Krakowskiej, 2002.
2	Bęza S., Nowe repetytorium gramatyki języka niemieckiego Wydawnictwo Szkolne PWN, 2001. (New German grammar revision guide Wydawnictwo Szkolne PWN, 2001)
3	Materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Andrzej Nikitiuk
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: AI in business solutions**  
First - cycle studies

<b>Course:</b>	<b>German Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S03 23 02
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	German, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of German language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Geometric shapes. Description of instruments and their characteristics.
ĆW2	Components and assemblies, manufacturing techniques and robotics.
ĆW3	Planning and design.
ĆW4	Scenario planning.
ĆW5	Innovative technologies in business – microchipping and biometrics.
ĆW6	Artificial intelligence in industry. Social robotics.
ĆW7	The development of artificial intelligence and its impact on the market and the labor market.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	Jabłońska D., Energie, Roboter, Autos, Zuge, SJO Politechniki Krakowskiej, 2014.
Recommended (supplementary) textbooks and other reading	
1	Dębski A., Dzida S., Deutsch für Mathematiker und Physiker, Wydawnictwa Szkolne PWN, 2001.
2	Guzik D., Alles digital..., SJO Politechniki Krakowskiej, 2002.
3	Materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Andrzej Nikitiuk
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>German Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 32 02
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	German, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of German language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.



Course content	
ĆW1	Problems and crisis in the organisation.
ĆW2	Difficult situations – causes, preventive measures and remedies.
ĆW3	Technological process – needs analysis, creative solutions.
ĆW4	Innovation and creativity.
ĆW5	Modern solutions in business – shadow work, or unpaid tasks.
ĆW6	Algorithms.
ĆW7	Artificial intelligence and ethics.
ĆW8	Expanding language skills

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of an oral response	51 %

Required textbooks and other reading	
1	Jabłońska D., Energie, Roboter, Autos, Züge, SJO Politechniki Krakowskiej, 2014.
Recommended (supplementary) textbooks and other reading	
1	Dębski A., Dzida S., Deutsch für Mathematiker und Physiker, Wydawnictwa Szkolne PWN, 2001.
2	Guzik D., Alles digital..., SJO Politechniki Krakowskiej, 2002.
3	Materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2



### Learning outcomes matrix

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Andrzej Nikitiuk
<b>E-mail address:</b>	<a href="mailto:a.nikitiuk@pollub.pl">a.nikitiuk@pollub.pl</a>
<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: AI in business solutions**  
First - cycle studies

<b>Course:</b>	<b>German Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S05 44 02
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	German Language, Polish Language

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of German language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

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Course content	
ĆW1	Security and cybersecurity – threats, risks and protection.
ĆW2	Procedures and instructions.
ĆW3	Monitoring in and protection.
ĆW4	Smart buildings.
ĆW5	Big Data and consumer behaviour.
ĆW6	Artificial intelligence in medicine.
ĆW7	Artificial Intelligence Threats.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of an oral response	51 %

Required textbooks and other reading	
1	Jabłońska D., Energie, Roboter, Autos, Zuge, SJO Politechniki Krakowskiej, 2014.
Recommended (supplementary) textbooks and other reading	
1	Dębski A., Dzida S., Deutsch für Mathematiker und Physiker, Wydawnictwa Szkolne PWN, 2001.
2	Guzik D., Alles digital..., SJO Politechniki Krakowskiej, 2002.
3	Materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

### Learning outcomes matrix

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 2	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 3	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 4	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 5	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
EK 6	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1 5	O1, O2
EK 7	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Andrzej Nikitiuk
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: AI in business solutions**  
First - cycle studies

<b>Course:</b>	<b>Spanish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S02 14 03
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	Spanish, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Spanish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of Spanish at B1 level

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

Course content	
ĆW1	Vocabulary related to university and studying. Self-presentation.
ĆW2	Basic mathematical terminology. Numbers and symbols.
ĆW3	Systems and devices – operating principles, applications, examples.
ĆW4	Materials and artificial intelligence.
ĆW5	Working in an organisation.
ĆW6	Artificial intelligence in business.
ĆW7	Machine learning as an area of artificial intelligence.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	Sardinero Francos, C., Castro Viudez, F., & Rodero Diez, I. (2022). <i>Español en marcha 4. Podręcznik. Nueva edición 2022</i> . SGEL.
Recommended (supplementary) textbooks and other reading	
1	Larrañaga Domínguez, A., & Arroyo Hernández, M. (2005, 17 sierpnia). <i>El léxico de los negocios B2. Practica Tu Español</i> . SGEL.
2	Centellas Rodríguez, L. (2018). <i>Profesionales de los negocios: Libro del alumno + Cuaderno de actividades + audio</i> . EnClave-ELE.
3	Materials obtained from an online database.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	30
Participation in classes	30
<b>Student's own work, including:</b>	20
Preparation for classes	20
<b>Total student's workload</b>	50

<b>Total number of the course ECTS credits</b>	<b>2</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Monika Szabelska, mgr Weronika Eustachiewicz
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: AI in business solutions**  
First - cycle studies

<b>Course:</b>	<b>Spanish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S03 23 03
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	Spanish, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Spanish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>	
<b>Class format - practical classes</b>	



Course content	
ĆW1	Geometric shapes. Description of instruments and their characteristics.
ĆW2	Components and assemblies, manufacturing techniques and robotics.
ĆW3	Planning and design.
ĆW4	Scenario planning.
ĆW5	Innovative technologies in business – microchipping and biometrics.
ĆW6	Artificial intelligence in industry. Social robotics.
ĆW7	The development of artificial intelligence and its impact on the market and the labor market.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	Sardinero Francos, C., Castro Viudez, F., & Rodero Diez, I. (2022). <i>Español en marcha 4. Podręcznik. Nueva edición 2022.</i> SGEL.
Recommended (supplementary) textbooks and other reading	
1	Larrañaga Domínguez, A., & Arroyo Hernández, M. (2005, 17 sierpnia). <i>El léxico de los negocios B2. Practica Tu Español.</i> SGEL.
2	Centellas Rodríguez, L. (2018). <i>Profesionales de los negocios: Libro del alumno + Cuaderno de actividades + audio.</i> EnClave-ELE.
3	Materiały pozyskane z internetowej bazy danych.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in classes	30
Student's own work, including:	20
Preparation for classes	20
Total student's workload	50

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<b>Total number of the course ECTS credits</b>	<b>2</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Monika Szabelska, mgr Weronika Eustachiewicz
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Spanish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 32 03
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	Spanish, English

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Spanish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in classes from the previous semester

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>	
<b>Class format - practical classes</b>	

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Course content	
ĆW1	Problems and crisis in the organisation.
ĆW2	Difficult situations – causes, preventive measures and remedies.
ĆW3	Technological process – needs analysis, creative solutions.
ĆW4	Innovation and creativity.
ĆW5	Modern solutions in business – shadow work, or unpaid tasks.
ĆW6	Algorithms.
ĆW7	Artificial intelligence and ethics.
ĆW8	Expanding language skills

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	Sardinero Francos, C., Castro Viudez, F., & Rodero Diez, I. (2022). <i>Español en marcha 4. Podręcznik. Nueva edición 2022</i> . SGEL.
Recommended (supplementary) textbooks and other reading	
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2	Centellas Rodríguez, L. (2018). <i>Profesionales de los negocios: Libro del alumno + Cuaderno de actividades + audio</i> . EnClave-ELE.
3	Materiały pozyskane z internetowej bazy danych.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in classes	30
Student's own work, including:	20
Preparation for classes	20
Total student's workload	50

<b>Total number of the course ECTS credits</b>	<b>2</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Monika Szabelska, mgr Weronika Eustachiewicz
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<b>Organizational unit:</b>	Department of Foreign Language

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Spanish Language</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S05 44 03
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	Spanish, Polish Language

<b>Course objectives</b>	
<b>C1</b>	Develop language skills in four areas: listening, reading, speaking, and writing at level B2 of the Common European Framework of Reference for Languages.
<b>C2</b>	Acquisition of Spanish language skills in the field of basic professional language needed in the workplace

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Completion of material covered in the previous semester's classes

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can use vocabulary related to the discussed programme content
<b>EK 2</b>	can use the grammatical structures discussed during the semester
<b>EK 3</b>	is able to express themselves orally and in writing on topics related to specialist language, including those related to their field of study
<b>EK 4</b>	understand and interpret written and oral statements on topics related to the field of study
<b>EK 5</b>	can use learning materials independently
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work systematically and critically evaluate their knowledge
<b>EK 7</b>	is ready to acquire, update, and accumulate knowledge from various sources in order to enhance their professional and personal competencies

<b>Course content</b>
<b>Class format - practical classes</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

Course content	
ĆW1	Security and cybersecurity – threats, risks and protection.
ĆW2	Procedures and instructions.
ĆW3	Monitoring in and protection.
ĆW4	Smart buildings.
ĆW5	Big Data and consumer behaviour.
ĆW6	Artificial intelligence in medicine.
ĆW7	Artificial Intelligence Threats.
ĆW8	Expanding language skills.

Didactic methods	
1	Conversational language practice
2	Lexical and grammatical language practice
3	Working with source texts and other materials, including audio and audiovisual resources
4	Work performed in groups
5	Work performed individually

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of an oral response	51%

Required textbooks and other reading	
1	Sardinero Francos, C., Castro Viudez, F., & Rodero Diez, I. (2022). <i>Español en marcha 4. Podręcznik. Nueva edición 2022</i> . SGEL.
Recommended (supplementary) textbooks and other reading	
1	Larrañaga Domínguez, A., & Arroyo Hernández, M. (2005, 17 sierpnia). <i>El léxico de los negocios B2. Practica Tu Español</i> . SGEL.
2	Centellas Rodríguez, L. (2018). <i>Profesionales de los negocios: Libro del alumno + Cuaderno de actividades + audio</i> . EnClave-ELE.
3	Materiały pozyskane z internetowej bazy danych.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in classes	30
Student's own work, including:	20
Preparation for classes	20
Total student's workload	50



<b>Total number of the course ECTS credits</b>	<b>2</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 2</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 3</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 4</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 5</b>	AIBS_U13+++ AIBS_U17++	C1, C2	ĆW1-ĆW8	1-5	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2	ĆW1-ĆW8	1 5	O1, O2
<b>EK 7</b>	AIBS_K01+++ AIBS_K03++	C1, C2	ĆW1-ĆW8	1-5	O1, O2

<b>Author of the course syllabus:</b>	Mgr Monika Szabelska, mgr Weronika Eustachiewicz
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<b>Organizational unit:</b>	Department of Foreign Language



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Organisational management</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 04 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	exam
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Provide students with knowledge about the nature of management and leadership
<b>C2</b>	Develop students' ability to apply their knowledge to diagnose, identify, and solve organizational management problems
<b>C3</b>	Develop students' readiness to enhance their professional competencies and demonstrate initiative and creativity in solving management problems

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	defines and explains fundamental concepts in the field of management
<b>EK 2</b>	distinguishes and characterises managerial activities, roles and skills
<b>EK 3</b>	recognises and characterises fundamental problems related to management, also in the context of modern management concepts
	<b>In the terms of skills:</b>

EK 4	applies in practice the principles related to performing basic managerial functions
EK 5	solves basic problems related to managerial work
	<b>In the terms of social skills:</b>
EK 6	is ready to critically evaluate their knowledge and to continuously enhance their qualifications
EK 7	is ready to demonstrate independence, initiative, and creativity in solving basic management problems

Course content	
Class format: lectures	
	Course content
W1	Management – its essence and significance. Basic concepts: organisation, management, leadership. Management functions.
W2	Organised cycle of action. Leadership roles and skills.
W3	The organisation's environment. The organisation as a system.
W4	Planning and decision-making in an organisation.
W5	Strategic management. SWOT analysis.
W6	Organisational function. Principles of construction and classification of organisational structures.
W7	Leadership function. Human resource management.
W8	Management styles. Motivation and motivating within an organisation.
W9	Groups and communication within the organisation.
W10	Control function.
W11	Entrepreneurship in organisations.
W12	The life cycle of an organisation.
W13	Management by delegation. Teal organisation.
W14	Learning and intelligent organisations.
W15	Distributed and virtual organisations.
Class format: practical classes	
	Course content
ĆW1	Organisation: definitions and characteristics.
ĆW2	Identifying management functions and managerial roles.
ĆW3	The cycle of organised activity.
ĆW4	The organisation as a system.
ĆW5	Planning organisational projects – preparing a plan.
ĆW6	Strategic management – conducting a SWOT analysis.
ĆW7	Organising and designing organisational structures.
ĆW8	Motivation in organisations: need-based theories.
ĆW9	Organisational communication and teamwork skills.

ĆW10	Designing individual and team entrepreneurial initiatives.
ĆW11	L.E. Greiner's organisational life-cycle (growth) model: identifying and analysing stages and crises in a manufacturing company.
ĆW12	The agile organisation – case study.
ĆW13	The teal organisation (“dream company”) – case study.
ĆW14	Mix Bank – a learning organisation – case study.
ĆW15	The world of contemporary organisations – wrap-up and current trends.

Didactic methods	
1	Informative lecture
2	Guided class discussion
3	Case study
4	Subject-specific practical classes

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of completed course exercises	51%
O3	Assessment of class participation	51%

Required textbooks and other reading	
1	Griffin R.W., Fundamentals of Management, 13th Edition, Cengage, 2021.
2	Robbins S.P., Coulter M.A., De Cenzo D.A., Fundamentals of Management (11th Edition), Pearson Education, Londyn 2019.
3	Neck C.P., Houghton J.D., Murray E.L., Management, Sage Publications, 2021.
4	Mellor R.B., Coulton G., Chick A., Bifulco A., Mellor N., Fisher A. Entrepreneurship for Everyone: A Student Textbook, SAGE Publications Ltd, 2008.

Recommended (supplementary) textbooks and other reading	
1	Collins J., Porras J., Built to Last: Successful Habits of Visionary Companies, HarperCollins/HarperBusiness Essentials, 2002.
2	Drucker P., The Practice of Management, HarperCollins, 2010.
3	Gordon A. (red.), Principles of Management Science, Clanrye International, New York 2018.

Student's Workload	
Form of activity	Average number of hours to complete the activity

<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in classes	30
<b>Student's own work, including:</b>	<b>40</b>
Studying the literature on the subject	15
Preparing for the examination	15
Preparation for classes	10
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W01+ AIBS_W02+++ AIBS_W15+	C1	W1-W12	1, 2	O1
<b>EK 2</b>	AIBS_W01++ AIBS_W02+++ AIBS_W15+	C1	W1-W12	1, 2	O1
<b>EK 3</b>	AIBS_W01++ AIBS_W02+++ AIBS_W15++	C1	W1-W15	1, 2	O1
<b>EK 4</b>	AIBS_U08+	C2	ĆW1-ĆW15	2, 3, 4	O2, O3
<b>EK 5</b>	AIBS_U01+++ AIBS_U05+++	C2	ĆW1-ĆW15	2, 3, 4	O2, O3
<b>EK 6</b>	AIBS_K01+++	C3	ĆW1-ĆW15	2, 3, 4	O2, O3
<b>EK 7</b>	AIBS_K05++ AIBS_K06++	C3	ĆW1-ĆW15	2, 3, 4	O2, O3

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<b>Organizational unit:</b>	Department of Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Economics</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 05 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	30
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To acquire knowledge about the functioning of a market economy, with a particular focus on the decision-making mechanisms of households and enterprises in the context of diverse market structures
<b>C2</b>	To acquire knowledge of fundamental economic categories in the context of micro- and macroeconomic analysis
<b>C3</b>	To understand the relationships and dependencies between economic theory and economic reality
<b>C4</b>	To develop an attitude oriented towards continuous knowledge expansion and intellectual development in the context of social competencies

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has structured knowledge about basic economic processes and phenomena, including the market mechanism and the functioning of the national economy
<b>EK 2</b>	understands the cause-and-effect relationships between economic theory and economic reality and the principles of enterprise operation
<b>EK 3</b>	knows basic economic categories and uses economic terminology to correctly

	interpret micro- and macroeconomic phenomena, including calculating demand and supply elasticity, costs, revenues, and key macroeconomic indicators
	<b>In the terms of skills:</b>
EK 4	can apply acquired economic knowledge to analyze, interpret, and explain economic phenomena in micro- and macroeconomic terms
	<b>In the terms of social skills:</b>
EK 5	Is ready to critically assess their knowledge and skills, and to acquire new knowledge while expanding their competencies.
EK 6	Is ready to independently seek expert support, including actively using diverse scholarly and industry information sources related to economic issues.

Course content	
Class format: lectures	
	Course content
W1	Introduction to economics
W2	Fundamental economic problems
W3	Functioning of a market economy
W4	Price mechanism and market elasticity
W5	Consumer choice theory
W6	Producer behavior and production decisions
W7	Functioning of enterprises in different market structures
W8	Macroeconomic perspective of the economy
W9	Aggregate demand and supply model (AD-AS)
W10	Economic growth process
W11	Business cycles in the economy
W12	State interventionism and economic liberalism
W13	Instruments of economic policy
W14	Inflation and deflation
W15	Labor market and unemployment

Didactic methods	
1	Informative lecture
2	Conversational lecture
3	Case study

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold

O1	Assessment of a written paper (test format; open-ended questions; problem-based)	60%
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Required textbooks and other reading		
1	Mankiw, N. Gregory. Essentials of Economics. 5th ed., South-Western Cengage Learning, 2008.	
2	Principles of Business: Economics. [First edition]., Salem Press, a division of EBSCO Information Services, Incorporated, 2018.	
3	Baetjer, Howard. Economics and Free Markets: An Introduction. 1st ed., Cato Institute, 2017.	

Recommended (supplementary) textbooks and other reading		
1	Coulter, Steve. Everyday Economics : A User's Guide to the Modern Economy. Agenda Publishing, 2023, <a href="https://doi.org/10.1017/9781911116370">https://doi.org/10.1017/9781911116370</a> .	
2	Kishtainy, Niall. A Little History of Economics. First edition., Yale University Press, 2017, <a href="https://doi.org/10.12987/9780300226317">https://doi.org/10.12987/9780300226317</a> .	

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in lectures	30
Student's own work, including:	20
Self-study of lecture material, Preparing for the examination	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W01+++	C1-C3	W1-W15	1, 2, 3	O1
EK 2	AIBS_W01+++ AIBS_W12++	C1-C3	W1-W15	1, 2, 3	O1
EK 3	AIBS_W01+++ AIBS_W12++	C1-C3	W1-W15	1, 2, 3	O1
EK 4	AIBS_U01++	C1-C3	W1-W15	1, 2, 3	O1

EK 5	AIBS_K01++	C4	W1-W15	1, 2, 3	O1
EK 6	AIBS_K03+++	C4	W1-W15	1, 2, 3	O1

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<b>Organizational unit:</b>	Department of Economics, Innovation and Social Capital



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Introduction to Finance and Accounting</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 06 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introducing students to fundamental concepts in finance and accounting
<b>C2</b>	Helping students understand the essence of the accounting system, its functioning, and principles
<b>C3</b>	Teaching students how to use financial data provided by the accounting system
<b>C4</b>	Developing students' readiness to take an active approach in solving problems that require the use of financial data from the accounting system

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows fundamental concepts in finance and accounting
<b>EK 2</b>	understands the functioning of the accounting system within an organization and its role in the company's information system
<b>EK 3</b>	understands financial data provided by the accounting system
	<b>In the terms of skills:</b>
<b>EK 4</b>	is able to interpret financial data provided by the accounting system

EK 5	is able to compile and retrieve information about financial processes occurring in an organization based on data recorded in accounting books
EK 6	is able to select appropriate financial information sources regarding a company's situation to solve specific business problems
	<b>In the terms of social skills:</b>
EK 7	Is ready to critically assess their own knowledge of finance and accounting and expand it to correctly interpret financial data

Course content	
Class format: lectures	
	Course content
W1	Concept of finance and financial phenomena (essence, theories, and functions). Money and its functions. Corporate finance: essence, types, and legal-organizational forms of enterprises. Classification of financial phenomena.
W2	Essence of accounting: concept, scope, functions, principles of accounting, national and international accounting regulations. Accounting entities.
W3	Company assets. Balance sheet presentation of fixed and current assets.
W4	Sources of financing company assets. Characteristics of internal and external financing sources. Financing sources vs. legal-organizational forms of enterprises. Balance sheet presentation of liabilities.
W5	Economic transactions. Concept and classification of economic transactions, types of economic transactions, principles of recording transactions in accounts.
W6	Accounting accounts: structure and classification of accounts, principles of operation of asset, liability, and mixed accounts, correspondence between accounts, double-entry principle.
W7	Corporate financial reporting: balance sheet, statement of changes in equity, profit and loss account, cash flow statement, additional information.
W8	Recording fixed assets (intangible assets, tangible fixed assets, fixed assets under construction). Balance sheet valuation of fixed assets.
W9	Recording financial assets (short- and long-term financial assets, cash assets).
W10	Recording settlements (settlements with customers and suppliers, employee settlements, tax and legal settlements).
W11	Recording materials and goods.
W12	Cost accounting – costs of core operating activities, other operating costs, financial costs.
W13	Recording the sale of products, goods, and materials, other operating revenues, financial revenues.
W14	Posting financial results in comparative and analytical variants. Recording capital, reserves, and financial result distribution.
Class format: practical classes	

	Course content
ĆW1	Functional and entity taxonomy of financial phenomena
ĆW2	Exercises in accounting principles and asset classification; identifying accounting entities
ĆW3	Sources of corporate financing
ĆW4	Sources of company assets: characteristics of equity (own) and debt/external financing
ĆW5	Exercises on accounting principles and the classification of equity and liabilities
ĆW6	Exercises on preparing a company balance sheet
ĆW7	Balance-sheet transactions and accounting documentation
ĆW8	Income statement: exercises on the basics of the profit and loss account
ĆW9	Recording property, plant & equipment and intangible assets
ĆW10	Recording cash and settlements (receivables/payables)
ĆW11	Recording materials and merchandise turnover
ĆW12	Cost accounting using class 4 and class 5 accounts
ĆW13	Exercises on profit-and-loss transactions and their recognition in the books
ĆW14	Determining the net financial result and its accounting allocation/settlement

Didactic methods	
1	Informative lecture
2	Calculation exercises
3	Subject-specific practical classes
4	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	51%
O2	Assessment of a written paper (problem-solving)	51%

Required textbooks and other reading	
1	Philips F., Clor-Proell C., Libby R., Libby P., Fundamentals of Financial Accounting, 8 <sup>th</sup> Edition, McGrawHill, New York, 2024.
2	Wild J., Fundamental Accounting Principles, 25 <sup>th</sup> edition, , McGrawHill, New York, 2020.

Recommended (supplementary) textbooks and other reading
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1	Adelowotan M., Achepsah Leke C., Artificial Intelligence in Accounting, Auditing and Finance: A Guide for Implementation and Use, Springer, 2025.
2	Ng C., Alarcon J, Artificial Intelligence in Accounting, Taylor & Francis Ltd., 2020.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	60
Participation in lectures	30
Participation in classes	30
Student's own work, including:	40
Preparation for the assesment	10
Preparation for classes	30
Total student's workload	100
Total number of the course ECTS credits	4

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W01++	C1	W1-W3, W5	1	O1
EK 2	AIBS_W01+ AIBS_W16+	C2	W2, W4, W6, W7, W10	1	O1
EK 3	AIBS_W01+	C3	W7-W9, W11- W14	1	O1
EK 4	AIBS_U02+	C3	ĆW1, ĆW6- ĆW8, ĆW14	2, 3, 4	O2
EK 5	AIBS_U01+ AIBS_U05+	C3	ĆW9-ĆW13	2, 3, 4	O2
EK 6	AIBS_U01+ AIBS_U05+ AIBS_U18+	C4	ĆW2, ĆW3- ĆW6	2, 3, 4	O2
EK 7	AIBS_K01++	C4	W1-W14, ĆW1-ĆW14	1, 2, 3, 4	O1, O2

Author of the course syllabus:	dr inż. Tomasz Żminda
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**Organizational  
unit:**

Department of Finance and Accounting

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Marketing Management</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 07 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	exam
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce students to the core concepts of contemporary marketing management.
<b>C2</b>	To introduce students to the determinants of marketing management, including the role of AI in marketing.
<b>C3</b>	To equip students with tools for developing market strategy.
<b>C4</b>	To introduce students to the process of designing customer value (value proposition design).

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	defines fundamental marketing concepts.
<b>EK 2</b>	identifies the components of customer value creation.
<b>EK 3</b>	explains the significance and key elements of the marketing management process.
	<b>In the terms of skills:</b>
<b>EK 4</b>	Selects and applies tools for marketing-strategy formulation.
<b>EK 5</b>	Plans and organises the value-design process (value proposition design).

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

<b>EK 6</b>	Collaborates effectively in a team to solve a defined problem in marketing management.
	<b>In the terms of social skills:</b>
<b>EK 7</b>	Is ready to evaluate the impact of marketing on the market environment from the standpoint of ethics and applicable legal and industry standards.

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	The definition of marketing in the new reality.
<b>W2</b>	New marketing conditions. The role of AI in marketing.
<b>W3</b>	Marketing planning. Structure of a marketing plan.
<b>W4</b>	Consumer market analysis.
<b>W5</b>	Behavioural decision-making theory.
<b>W6</b>	Market and target customer segmentation.
<b>W7</b>	Positioning strategy.
<b>W8</b>	Product management.
<b>W9</b>	Brand building.
<b>W10</b>	Price management.
<b>W11</b>	Marketing communication management.
<b>W12</b>	Distribution channel management.
<b>Class format: practical classes</b>	
	Course content
<b>ĆW1</b>	Identifying the essence of marketing management in the new reality.
<b>ĆW2</b>	Identification of major market forces: technology, globalisation, physical environment, social responsibility.
<b>ĆW3</b>	Creating a marketing plan.
<b>ĆW4</b>	The consumer's purchasing decision-making process.
<b>ĆW5</b>	The purchasing process in the business market.
<b>ĆW6</b>	Strategic and tactical selection of the target market.
<b>ĆW7</b>	Creating value propositions for customers and positioning.
<b>ĆW8</b>	Value design – product.
<b>ĆW9</b>	Value design – brand.
<b>ĆW10</b>	Designing integrated marketing communications. AI in advertising.
<b>ĆW11</b>	Value design – distribution.
<b>ĆW12</b>	Socially responsible marketing.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture

2	Case study
3	Guided class discussion
4	Subject-specific practical classes

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of completed course exercises	51%

Required textbooks and other reading	
1	Kotler P., Keller K., Brady M., Goodman M., Hansen T., Marketing management, Pearson, 2024.
2	Armstrong G., Kotler P., Harker M., Bernnan R., Marketing: An introduction, Pearson, 2019.
3	Kotler P., Keller K., Chernev, Marketing management. Global edition, Pearson 2021.

Recommended (supplementary) textbooks and other reading	
1	Kotler P., Kartajaya H., Setiawan I., Marketing 6.0. The future is immersive, Hoboken, New Jersey, Wiley, 2024.
2	Kotler P., Kartajaya H., Setiawan I., Marketing 5.0. Technologie for Humanity, John Wiley & Sons, 2021.
3	Kotler P., Kartajaya H., Setiawan I., Marketing 4.0. Moving from Traditional to Digital, John Wiley & Sons, 2016.
4	Roetzer P., Kaput M., Marketing Artificial Intelligence: AI, Marketing, and the Future of Business, Matt Holt Books, 2022.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparing for the examination	20
Preparation for classes	20
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>



Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02++ AIBS_W04++ AIBS_W11+	C1, C2, C3	W1-W12	1, 2	O1
EK 2	AIBS_W02+ AIBS_W04+++ AIBS_W11+ AIBS_W15+	C1, C2, C3	W1-W3, W6-W7	1, 2	O1
EK 3	AIBS_W02++ AIBS_W04+++ AIBS_W11+ AIBS_W15+	C1, C2, C3	W1-W3, W8-W12	1, 2	O1
EK 4	AIBS_U01+ AIBS_U08++ AIBS_U09+++ AIBS_U11++ AIBS_U14+	C3	ĆW1, ĆW3, ĆW6-ĆW7	2, 3, 4	O2
EK 5	AIBS_U01+ AIBS_U08++ AIBS_U09+++ AIBS_U11+ AIBS_U14+	C4	ĆW2, ĆW4, ĆW5, ĆW8-ĆW11	2, 3, 4	O2
EK 6	AIBS_U09+++ AIBS_U11++ AIBS_U15++ AIBS_U16+++	C2, C3, C4	ĆW1-ĆW12	2, 3, 4	O2
EK 7	AIBS_K05+ AIBS_K06+++	C2, C3, C4	ĆW1-ĆW12	2, 3, 4	O2

<b>Author of the course syllabus:</b>	Dr inż. Joanna Wyrwisz
<b>E-mail address:</b>	j.wyrwisz@pollub.pl
<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Logistics in the Age of AI</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 08 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce students to the fundamentals, place, and role of logistics and its subsystems in contemporary economic systems.
<b>C2</b>	To equip students to use correct terminology in logistics and related enabling technologies, including artificial intelligence.
<b>C3</b>	To develop basic skills in identifying logistics processes in enterprises and interpreting them using data and digital tools.
<b>C4</b>	To strengthen a disposition toward self-directed learning, deepening knowledge, and applying it to solve problems arising in professional practice.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic issues related to logistics
<b>EK 2</b>	knows logistics subsystems; distinguishes, describes their components and diagnoses typical processes that characterize them
<b>EK 3</b>	understands the impact of digital technologies and AI on logistics operations
	<b>In the terms of skills:</b>

<b>EK 4</b>	can use appropriate logistics terminology and identify logistics systems and processes, taking into account the possibilities of supporting them with digital and analytical tools
<b>EK 5</b>	analyzes and evaluates the operation and organization of logistics systems and proposes changes based on these analyses.
<b>EK 6</b>	solves basic problems related to the functioning and organisation of logistics subsystems, including the use of available digital tools and data analysis
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to critically evaluate their own knowledge, independently expand it, and apply it to solving problems in professional practice

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Concepts, scope and essence of logistics.
<b>W2</b>	Phased division of logistics: procurement, production, distribution, reverse logistics.
<b>W3</b>	Logistics subsystems in a company: transport and storage.
<b>W4</b>	Logistics systems infrastructure.
<b>W5</b>	IT systems in logistics, including the role of AI in logistics.
<b>W6</b>	Supply chain management and how it can be supported by AI methods.
<b>W7</b>	Logistics service providers.
<b>W8</b>	Contemporary trends in logistics development.
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Introduction to the subject.
<b>L2</b>	The concept and essence of logistics.
<b>L3</b>	The use of demand forecasting methods.
<b>L4</b>	Selection of suppliers.
<b>L5</b>	Methods for determining the volume of supplies.
<b>L6</b>	Inventory management methods.
<b>L7</b>	Analysis of packaging functions and labelling of logistics units.
<b>L8</b>	Identification of logistics processes.
<b>L9</b>	Transport infrastructure.
<b>L10</b>	Route optimisation – the travelling salesman problem.
<b>L11</b>	Distribution centres.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Guided class discussion

3	Case study
4	Subject-specific practical classes

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	50%
O2	Assessment of completed laboratory reports	50%

Required textbooks and other reading	
1	Gleissner, Herbert, i Femerling, Christian C. Logistics. Basics – Exercises – Case Studies. Springer, New York, 2016.
2	San, Jai. Artificial Intelligence in Supply Chain Management: Harnessing AI for Supply Chain Excellence: Optimizing Demand Forecasting, Inventory Management, and Sustainable Logistics in a Data-Driven World. Independently published, 2024.
3	Szymonik, Andrzej. Logistics and Supply Chain Management. Technical University of Lodz Press, Łódź, 2012.
4	Christopher, Martin. Logistics and Supply Chain Management. Pearson Education Limited, London, 2023.
5	Waters, Donald. Operations Management: Producing Goods and Services. Financial Times Prentice Hall, 2001.

Recommended (supplementary) textbooks and other reading	
1	Coyle, John J., Langley, C. John, Gibson, Brian J., i Novack, Robert A. Supply Chain Management: A Logistics Perspective (9th ed.). South-Western College Publishing, Mason, 2012.
2	Fertsch, Marek, i Grzybowska, Katarzyna. Logistics in the Enterprises – Selected Aspects: Monograph. Publishing House of Poznan University of Technology, 2010.
3	Robertson, Peter W. Supply chain analytics: using data to optimise supply chain processes. Routledge Taylor & Francis Group, 2020.
4	Szymonik, Andrzej. Information technologies in logistics. Technical University of Lodz, 2012.
5	Karim, Md. Abdullahel, i Habib, Md. Mamun. What to Know about Supply Chain Management. Nova Science Publishers, 2022.
6	3PL Study Focuses on Getting Back to Basics, Logistics Management (Highlands Ranch, Colo.), vol. 61, no. 10, Oct. 2022, p. 1.
7	Kulisz, Monika. Evaluation of SAP System Implementation in an Enterprise of the Automotive Industry – Case Study. Applied Computer Science, vol. 14, no. 4, 2018, pp. 81-92.
8	<a href="https://logisticsportal.net">https://logisticsportal.net</a>

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in laboratory classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for the laboratory classes	20
Preparation for the assessment	20
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03+++	C1, C2	W1-W8	1, 3	O1
EK 2	AIBS_W03+++	C1, C2	W1-W6, W8	1, 3	O1
EK 3	AIBS_W03+++ AIBS_W07++ AIBS_W08+ AIBS_W16+	C1, C2	W5-W8	1, 3	O1
EK 4	AIBS_U01+++ AIBS_U05+++	C1, C2, C3	L1-L11	2, 3, 4	O2
EK 5	AIBS_U01+++ AIBS_U02++ AIBS_U05+++	C1, C2, C3	L1-L11	2, 3, 4	O2
EK 6	AIBS_U01+++ AIBS_U02++ AIBS_U05+++	C1, C2, C3	L1-L11	2, 3, 4	O2
EK 7	AIBS_K01+++ AIBS_K03++ AIBS_K06++	C4	W1-W8 L1-L11	1-4	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>E- entrepreneurship</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 24 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To learn about the process of starting one's own business and the basic principles of organizing it
<b>C2</b>	To acquire knowledge linking e-business with traditional business models
<b>C3</b>	To understand the choice of forms of legal solutions when running a business

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows and understands legal regulations, norms and standards concerning business activity in the business environment, including security in e-business
<b>EK 2</b>	knows and understands the principles of creation and development of individual and organisational entrepreneurship
<b>EK 3</b>	knows and understands subject matter in the field of e-entrepreneurship in the practice of business and social activities and mechanisms of functioning of the traditional and digital market
	<b>In the terms of skills:</b>
<b>EK 4</b>	is able to analyse available sources of financing for selected business models and assess their adjustment to the objectives of the company

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<b>EK 5</b>	is able to select appropriate tools of economic and financial analysis supporting decisions on financing business projects
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to think and act in an entrepreneurial manner both independently and in teamwork

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	The concept of entrepreneurship; types of entrepreneurship and entrepreneurial organisations, characteristics of an entrepreneurial person and entrepreneurial orientation. Specificities of entrepreneurial management in the digital space.
<b>W2</b>	Traditional entrepreneurship versus e-entrepreneurship. The essence of e-entrepreneurship in the practice of business and social activities - Individual, corporate and social e-entrepreneurship
<b>W3</b>	Traditional market vs. digital space market - Platform approach as a model of market organisation
<b>W4</b>	E-business models - definition, main components, creation of business models
<b>W5</b>	New directions in the development of e-business models
<b>W6</b>	Marketing activities in digital space. Content marketing
<b>W7</b>	Financial planning in e-business
<b>W8</b>	From idea to financial success of an enterprise
<b>W9</b>	Taxes in e-business. Labour relations in e-entrepreneurship
<b>W10</b>	Innovation in e-entrepreneurship. Technology parks and other innovation centres
<b>Class format: project</b>	
	Course content
<b>P1</b>	Description of the e-enterprise idea - What does it offer, to whom, how and why?
<b>P2</b>	Market and competition analysis - Who are the customers? What are the trends? Who is already active in this area?
<b>P3</b>	Business model (e.g. Canvas) - Customer segments, value proposition, channels, customer relationships, revenue streams, costs, etc.
<b>P4</b>	Basic technological aspects - What tools/technologies will be used (e.g. e-commerce platform, online payments, analytics tools)?
<b>P5</b>	Mock-up or MVP demo - Simple prototype of a website/app/shop
<b>P6</b>	Feasibility and risk analysis - Solving calculus of sets and relations

<b>Didactic methods</b>
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1	Conversational lecture
2	Problem-based lecture
3	Project method
4	Work performed in groups
5	Case study

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of the prepared project	51%

Required textbooks and other reading	
1	Sarasvathy, Saras D., Effectuation: Elements of Entrepreneurial Expertise, Eldgar Publishing, 2022.
2	Tracy, Brian, Entrepreneurship: How to Start and Grow Your Own Business, G&D Media, 2021.
3	Rzepka, Agnieszka, Innovation in the Digital Economy: New Approaches to Management for Industry 5.0, Routledge, New York – London, 2023.

Recommended (supplementary) textbooks and other reading	
1	Nielsen, N.H., The Startup Funding Book, Ventus Publishing, London 2017.
2	Coulter, Steve. Everyday Economics : A User's Guide to the Modern Economy. Agenda Publishing, 2023, <a href="https://doi.org/10.1017/9781911116370">https://doi.org/10.1017/9781911116370</a> .

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in the project	30
<b>Student's own work, including:</b>	<b>40</b>
Studying the literature on the subject	10
Preparation for crediting	15
Project preparation and realisation	15
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W12+++ AIBS_W13++	C1, C3	W1-W3	1, 2	O1
EK 2	AIBS_W02++ AIBS_W15+++	C1, C2, C3	W1, W4 -W8	1, 2, 3	O1
EK 3	AIBS_W15+++ AIBS_W02++ AIBS_W12+ AIBS_W16+++	C1, C2	W7 -W10.	1, 2, 3	O1
EK 4	AIBS_U05+++	C1, C3	P1-P5	1, 2, 3	O2
EK 5	AIBS_U02++ AIBS_U05+++	C1, C3	P1-P.	1,2,4	O2
EK 6	AIBS_K05+++ AIBS_K04+	C3	W7-8, W10, P1-P6	1,4,5	O1, O2

<b>Author of the course syllabus:</b>	dr hab. Agnieszka Rzepka, prof. uczelni
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<b>Organizational unit:</b>	Department of Economics, Innovation and Social Capital

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Project management I</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 33 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Wykład	30
Ćwiczenia	0
Laboratorium	0
Projekt	30
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce students to fundamental concepts, principles, and the project life cycle
<b>C2</b>	To familiarise students with the main traditional project management methodologies
<b>C3</b>	To develop students' ability to use tools and techniques of the traditional (plan-driven) approach to project management
<b>C4</b>	To develop teamwork skills

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has knowledge of project management methods, including preparing project charters, work breakdown structures (WBS), schedules (e.g., Gantt charts, CPM), critical path analysis, and other key tools supporting project execution
<b>EK 2</b>	knows the principles of project resource planning and use – understands how to identify, allocate, and optimize resources (human, material, time, and financial) at different project stages

EK 3	knows project management methodologies and the principles of selecting them for the project context
EK 4	is familiar with risk assessment, quality control and the organisation of the project team's work
	<b>In the terms of skills:</b>
EK 5	applies tools and techniques for planning, organising, and controlling project delivery – independently uses WBS, scheduling (Gantt charts, CPM), risk registers, responsibility matrices (e.g., RACI), and Earned Value Management (EVM) to manage a project across its life cycle
EK 6	plans and organises the work of the project team – defines roles, assigns tasks, manages communication, and motivates team members; applies project-team organisation models and effectively coordinates group activities
EK 7	analyses the progress of the project and formulates conclusions about its effectiveness
	<b>In the terms of social skills:</b>
EK 8	is ready to acknowledge and leverage expert knowledge, integrating the competencies of team members from different areas of the organisation
EK 9	is ready to recognise the importance of expert knowledge and consultation in addressing practical project-management problems, and to critically assess their own competencies in this area
EK 10	is ready to assume responsibility for delivering assigned project tasks and to make decisions under project uncertainty

Course content	
Class format: lectures	
	Course content
W1	The nature of project management – project definitions; characteristics and types of projects; overview of methodologies (PRINCE2, PMBOK – <i>Project Management Body of Knowledge</i> , IPMA); certification systems; the project triple constraint (iron triangle).
W2	Project planning – goal formulation (SMART), alignment with the organisation's mission and strategy, project life-cycle phases, causes of project failure, project portfolio management.
W3	Project structure and context – organisational context, roles in the project team, stakeholder analysis, project environment.
W4	Scheduling and resources – Work Breakdown Structure (WBS), Resource Breakdown Structure (RBS), Responsibility Assignment Matrix (RAM), RACI, Gantt chart, milestones, critical path, PERT and CPM, schedule management, resource optimisation (levelling/smoothing).
W5	Team and communication management – team development (Tuckman model), leadership styles, motivation, internal team communication.

<b>W6</b>	Project budgeting and control – cost estimating, budgeting, Earned Value Management (EVM), Milestone Trend Analysis (MTA), quality and risk control.
<b>W7</b>	Project closure and review – formal project close-out, final documentation, analysis of selected project cases.
<b>Class format: project</b>	
	Course content
<b>P1</b>	Formulating project objectives according to IPMA standards; preparing a project charter; identifying requirements and analysing trade-offs (constraint triangle).
<b>P2</b>	Planning the project structure using WBS (Work Breakdown Structure).
<b>P3</b>	Creating a project schedule based on a Gantt chart; planning tasks and deadlines.
<b>P4</b>	Analysis of the project environment and identification of stakeholders; creation of a stakeholder map, distinction between internal and external environment.
<b>P5</b>	Communication and leadership in a project team; identifying and resolving conflicts.
<b>P6</b>	Construction of a CPM network diagram; determination of the critical path and milestones.
<b>P7</b>	Project risk analysis; creation of a risk register and development of a response strategy.
<b>P8</b>	Quality management in projects; basic tools and procedures for quality assurance.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Guided class discussion
<b>3</b>	Work performed in groups
<b>4</b>	Case study
<b>5</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (test, with open-ended questions)	50%
<b>O2</b>	Assessment of the prepared project	50%

<b>Required textbooks and other reading</b>
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1	International Project Management Association (IPMA), Individual Competence Baseline for Project, Programme and Portfolio Management (ICB Version 4.0), 2015.
2	PMI, A Guide to the Project Management Body of Knowledge (PMBOK Guide), Fifth Edition, Project Management Institute, 2013.
3	Axelos, Managing Successful Projects with PRINCE2® (6th ed.), TSO (The Stationery Office), 2017.
4	Pritchard, C. L., Risk Management: Concepts and Guidance (5th ed.), CRC Press, 2014.

Recommended (supplementary) textbooks and other reading	
1	Kisielnicki, J., & Sobolewska, O Knowledge Management and Innovation in Network Organizations: Emerging Research and Opportunities. IGI Global, 2019.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in project classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for lectures	10
Preparation for project classes	30
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W09+++ AIBS_W16++	C1, C2	W1-W7	1, 2	O1
EK 2	AIBS_W02+ AIBS_W09+++ AIBS_W16++	C1, C2	W2, W3, W4, W5	1, 2	O1
EK 3	AIBS_W09+++ AIBS_W16++	C1, C2	W1, W2, W5	1, 2	O1
EK 4	AIBS_W09++ AIBS_W14++	C2, C4	W5, W6	1, 2	O1

<b>EK 5</b>	AIBS_U01++ AIBS_U03+++ AIBS_U18++	C3, C4	P1-P3, P6	3, 5	O2
<b>EK 6</b>	AIBS_U04+++ AIBS_U10++ AIBS_U18++	C3, C4	P3-P6, P8	3, 4, 5	O2
<b>EK 7</b>	AIBS_U06+++ AIBS_U08+ AIBS_U18++	C3	P7, P8	3, 4	O2
<b>EK 8</b>	AIBS_K02+++	C4	W3, W5; P4, P5	2, 3, 4, 5	O2
<b>EK 9</b>	AIBS_K01+++	C4	W2, W6-P8	2, 3, 4, 5	O2
<b>EK 10</b>	AIBS_K06+++	C4	W1, W5, W6; P3, P5	2, 3, 4, 5	O2

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management, Department of Organisation of Enterprise



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Project Management II</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 45 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce students to the fundamental principles and terminology of the agile approach to project management.
<b>C2</b>	To develop students' understanding of planning, estimation, monitoring, and value delivery mechanisms in iterative projects.
<b>C3</b>	To build skills in defining scope, working with requirements, prioritising, and collaborating in agile teams.
<b>C4</b>	To foster readiness to make responsible project decisions and to reflect on team practices and one's own competencies in a changing project environment.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic principles and stages of agile project delivery.
<b>EK 2</b>	knows the mechanisms of planning, estimation, and progress monitoring in iterative projects.
<b>EK 3</b>	knows techniques for identifying and prioritising requirements and for defining customer value.



	<b>In the terms of skills:</b>
<b>EK 4</b>	is able to plan and organise iterative project activities, including defining scope and staging tasks, estimating time and team workload, and monitoring progress using visual tools and metrics
<b>EK 5</b>	applies client-requirements techniques: builds and refines the product backlog, defines task entry and completion criteria (e.g., Definition of Ready/Definition of Done), and prioritises business value in the iterative process
<b>EK 6</b>	works effectively in an agile project team, participating in planning, reviews, and retrospectives, and using tools that support communication and transparency
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to recognise and leverage expert knowledge, integrating the competencies of team members from different areas of the organisation.
<b>EK 8</b>	is ready to recognise the importance of expert knowledge and consultation in solving practical project-management problems, and to critically assess their own competencies in this area.
<b>EK 9</b>	is ready to assume responsibility for delivering assigned project tasks and to make decisions under project uncertainty.

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to agile project management methodologies – definition, essence and global standards; the role of projects, programmes and portfolios within the organisational structure; business case development.
<b>W2</b>	Project success factors and criteria for selecting project management methodologies according to project characteristics.
<b>W3</b>	Overview of agile methodologies – Scrum, Extreme Programming (XP), Lean Project Management, Dynamic Systems Development Method (DSDM): characteristics and comparisons.
<b>W4</b>	Implementing agile in organisational practice – adaptability, constraints and implementation good practices; hybrid methods: PRINCE2 Agile, XPrince.
<b>W5</b>	Programme management – PMI standards and <i>Managing Successful Programmes</i> (MSP): structure, applications and supporting tools.
<b>W6</b>	Portfolio management – PMI's <i>Standard for Portfolio Management and Management of Portfolios</i> (MoP); agile approaches to programme and portfolio management.
<b>W7</b>	Project manager soft skills – managing emotions and stress in project teams; working with culturally diverse teams; psychological/ team roles (e.g., Belbin); feedback, mentoring and project coaching.
<b>Class format: project</b>	
	Course content

<b>P1</b>	Initiating an agile project – defining project goals and business value; stakeholder analysis; creating the initial product backlog; defining the MVP ( <i>Minimum Viable Product</i> ) and MLP ( <i>Minimum Lovable Product</i> ); working with epics and user stories; drafting an initial user story map.
<b>P2</b>	Requirements development and scope planning – refining backlog items; setting entry/exit criteria (Definition of Ready / Definition of Done); identifying stakeholder-critical requirements; selecting launch-critical functionality; structuring a short-term delivery plan.
<b>P3</b>	Iteration planning and estimation – estimating work using point-based techniques; determining team velocity and capacity; planning the first iteration/sprint and the kickoff; preparing to start short-cycle delivery.
<b>P4</b>	Project structure and team roles – developing a Work Breakdown Structure (WBS); creating a RASCI responsibility chart (Responsible–Accountable–Support–Consulted–Informed); assigning roles and workflow; process visualisation with a SIPOC diagram.
<b>P5</b>	Sprint execution – day-to-day teamwork – simulating Daily Scrum; updating task boards; tracking user stories; monitoring progress with burndown and burnup charts; conducting backlog refinement (grooming).
<b>P6</b>	Sprint review and retrospective – presenting completed product increments (Sprint Review); Q&A and feedback; running a Sprint Retrospective and capturing improvements.
<b>P7</b>	Risk management in agile projects – risk identification and analysis: risk map, risk register, Risk Breakdown Structure (RBS); Delphi method; response planning; linking risks to backlog items and team responsibilities.
<b>P8</b>	Quality management and project metrics – designing quality control mechanisms; working with CPI and SPI; example use of Earned Value Management (EVM) in an agile setting; assessing compliance with the Definition of Done.
<b>P9</b>	Team simulations to support project work – practical team games/exercises; identifying expected end-user value; analysing and discussing decisions taken in a simulated project environment.
<b>P10</b>	Multi-team projects and scaling – discussing and planning a scaling structure with LeSS and Nexus; identifying inter-team dependencies; drafting an overall (top-level) product backlog and an iteration/integration strategy.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Guided class discussion
<b>3</b>	Work performed in groups
<b>4</b>	Case study
<b>5</b>	Project method

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test, open-ended questions)	50%
O2	Assessment of the prepared project	50%

Required textbooks and other reading	
1	PMI (Project Management Institute), A Guide to the Project Management Body of Knowledge (PMBOK® Guide) and The Standard for Project Management, Seventh Edition, Project Management Institute, 2021. ISBN: 9781628256642.
2	Axelos, PRINCE2® 7: Managing Successful Projects, Axelos, 2023. ISBN: 9789925344602.
3	Thierry Delestre, The Illustrated Scrum Guide, Independently published, 2024. ISBN: 9798345697382.
4	Pritchard, C. L., Risk Management: Concepts and Guidance, Fifth Edition, CRC Press, 2014. ISBN: 9781482258463.
5	Rubin, K. S., Essential Scrum: A Practical Guide to the Most Popular Agile Process. Addison-Wesley Professional, 2012.

Recommended (supplementary) textbooks and other reading	
1	Pichler, R., Agile Product Management with Scrum: Creating Products that Customers Love, Addison-Wesley Professional, 2010.
2	Highsmith, J., Agile Project Management: Creating Innovative Products (2nd ed.). Addison-Wesley Professional, 2019.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in project classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for lectures	10
Preparation for project classes	30
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix
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Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W09+++ AIBS_W16++	C1	W1-W4	1, 2	O1
EK 2	AIBS_W09++ AIBS_W16++	C2	W2, W3, W6	1, 2	O1
EK 3	AIBS_W04++ AIBS_W09++ AIBS_W16++	C2	W3, W4	1, 2	O1
EK 4	AIBS_U01++ AIBS_U03++ AIBS_U18++	C3	P1-P6. P9-P10	3, 5	O2
EK 5	AIBS_U02++ AIBS_U04+++ AIBS_U18++	C3	P1-P10	3, 4, 5	O2
EK 6	AIBS_U06++ AIBS_U07++ AIBS_U18++	C3	P4-P6, P9, P10	3, 4, 5	O2
EK 7	AIBS_K02+++	C1-C4	P1-P10	3, 4	O1, O2
EK 8	AIBS_K01+++	C1-C4	W7W1-W7	2, 3, 4	O1, O2
EK 9	AIBS_K06+++	C1-C4	W1-7, P1-P10	2, 3, 4	O1, O2

<b>Author of the course syllabus:</b>	Dr Wojciech Danilczuk, dr inż. Jakub Pizoń
<b>E-mail address:</b>	w.danilczuk@pollub.pl; j.pizon@pollub.pl
<b>Organizational unit:</b>	Department of Quantitative Methods in Management, Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Modern business financing</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S06 55 00
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the possible sources of business funding required to start and grow a business.
<b>C2</b>	To familiarise students with methods of raising finance for various business ventures, including EU funds and social methods (crowdfunding).

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	characterises the basic and alternative sources of business financing, with particular emphasis on external financing, EU funds and crowdfunding
<b>EK 2</b>	explains the principles of obtaining financing for enterprises at different stages of development
<b>EK 3</b>	distinguishes between forms of financing innovative ventures, including start-ups and activities in the area of e-commerce and digital entrepreneurship
	<b>In the terms of skills:</b>
<b>EK 4</b>	analyses available sources of financing for selected business models and assesses their fit with the objectives of the enterprise

EK 5	selects appropriate economic and financial analysis tools to support decisions on financing business projects
EK 6	designs a simplified plan for financing a venture, taking into account various forms of capital (own, foreign, community, grant)
	<b>In the terms of social skills:</b>
EK 7	is ready to make responsible financial decisions in business activities, taking into account ethical and social aspects

Course content	
Class format: lectures	
	Course content
W1	Introduction to the issue of financing business activities.
W2	Financing from own and external funds – comparison and application.
W3	Financing at the start-up and growth stages of a company.
W4	Crowdfunding as a form of social financing for projects.
W5	European funds as a source of capital for companies.
W6	Venture capital and private equity – capital investors in business development.
W7	Business angels and other non-standard forms of financing.
W8	Financing e-commerce and technology start-ups.
W9	Trends in modern financing: tokenisation, crowdfunding 2.0.
W10	Steps for preparing an effective funding application.
Class format: project	
	Course content
P1	Selecting a business idea and defining its model.
P2	Diagnosis of the financial needs of the project.
P3	Selection of potential sources of funding.
P4	Preliminary schedule of activities and budget planning.
P5	Development of a simplified business plan – value proposition, market analysis, forecasts.
P6	Preparation of application documents – financial section.
P7	Risk analysis and SWOT analysis.
P8	Preparing a presentation for an investor.
P9	Pitching training: self-presentation, storytelling, voice work.

Didactic methods	
1	Informative lecture
2	Guided class discussion
3	Project method
4	Work performed in groups



Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of the prepared project	51 %

Required textbooks and other reading	
1	Lassala, C., Ribeiro-Navarrete, S. (Eds.) Financing Startups: Understanding Strategic Risks, Funding Sources, and the Impact of Emerging Technologies, Springer, Cham 2022.
2	Nielsen, N.H., The Startup Funding Book, Ventus Publishing, London 2017.
3	Shneor R., Zhao L., Flaten B.(ed.), Advances in Crowdfunding. Research and Practice, Palgrave Macmillan, London 2020.

Recommended (supplementary) textbooks and other reading	
1	Bis J., Bojar E., Żelazna A., Kiersztyn A., Bojar M., The Impact of the COVID-19 Pandemic on Startups Operating in the Lublin Region, European Research Studies Journal, 2021.
2	Klein, M., Neitzert, F., Hartmann-Wendels, T., & Kraus, S., Start-Up Financing in the Digital Age – A Systematic Review and Comparison of New Forms of Financing, The Journal of Entrepreneurial Finance, Vol. 21, No. 2, 2019.
3	Klonowski, D., Venture Capital Redefined: The Economic, Political, and Social Impact of COVID on the VC Ecosystem, Palgrave Macmillan, Cham 2021.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in project classes	30
<b>Student's own work, including:</b>	<b>30</b>
Studying the subject matter of lectures, Preparing for the examination	10
Project preparation	20
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix
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Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W01++ AIBS_W12++ AIBS_W16++	C1	W1-W4	1, 2	O1
EK 2	AIBS_W12++ AIBS_W15+ AIBS_W16++	C2	W3-W6, W10	1, 2	O1
EK 3	AIBS_W01+ AIBS_W15++ AIBS_W16++	C2	W7-W9	1, 2	O1
EK 4	AIBS_U01++ AIBS_U05+ AIBS_U18++	C1, C2	P1-P3, P7	3, 4	O2
EK 5	AIBS_U02++ AIBS_U05+ AIBS_U18++	C2	P4-P6	3, 4	O2
EK 6	AIBS_U08++ AIBS_U18++	C2	P4-P9	3, 4	O2
EK 7	AIBS_K06++	C2	P1-P9	3, 4	O2

<b>Author of the course syllabus:</b>	dr inż. Jakub Bis
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<b>Organizational unit:</b>	Department of Economics, Innovation and Social Capital



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Modern logistics systems</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 34 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Familiarize students with the principles of modern logistics systems
<b>C2</b>	Acquire students' ability to apply simulation and analytical tools in logistics
<b>C3</b>	Develop in students the basic skills of modeling, analyzing and optimizing logistics processes
<b>C4</b>	Strengthening in students an attitude oriented towards independent learning, deepening knowledge and using it to solve problems arising in their professional work.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has knowledge of the operation of modern logistics systems in enterprises of different business profiles
<b>EK 2</b>	knows the principles of modeling logistics processes and conducting simulation experiments
	<b>In the terms of skills:</b>
<b>EK 3</b>	can apply simulation methods to analyze and solve problems in logistics systems

<b>EK 4</b>	can plan and conduct simulation experiments and interpret and use their results
<b>EK 5</b>	is able to design a logistics process model and carry out its verification and validation
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically evaluate and independently expand their knowledge and use it to solve problems in their professional work

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Modern logistics systems - essence, functions and systems approach.
<b>W2</b>	Process modeling in logistics systems - fundamentals and systems approach.
<b>W3</b>	Modern simulation methods in the analysis and design of logistics systems.
<b>W4</b>	Modeling complex logistics systems - dynamic and agent-based approaches.
<b>W5</b>	Simulation modeling process - steps and tools.
<b>W6</b>	Data in logistics systems - sources, quality and processing in simulation models.
<b>W7</b>	Reliability of logistics systems models - validation, verification and testing.
<b>W8</b>	Analysis of the results of simulation experiments and mapping of organizational aspects.
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Introduction to the subject.
<b>L2</b>	Interface and structure of the logistics process modeling environment.
<b>L3</b>	Creation and parameterization of the basic process model (source, queue, server).
<b>L4</b>	Load analysis of the logistics station - single point model.
<b>L5</b>	Modeling of multi-step processes - multiple jobs.
<b>L6</b>	Construction of a logistics hub model - integration of warehouse and transport functions.
<b>L7</b>	Moving resources - operators and transporters in the logistics system.
<b>L8</b>	3D visualization and ergonomics of the model.
<b>L9</b>	Simulation experiments - design of scenarios and variables.
<b>L10</b>	Interpretation and analysis of simulation results - performance indicators.
<b>L11</b>	Modeling organizational aspects.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Guided class discussion

3	Laboratory exercises
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Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	50%
O2	Assessment of completed laboratory reports	50%

Required textbooks and other reading	
1	Banks, Jerry, Carson, John S., Nelson, Barry L., i Nicol, David M. Discrete-Event System Simulation. Pearson, Boston, 2013.
2	Law, Averill M. Simulation Modeling and Analysis. McGraw-Hill, New York, 2015.
3	Chopra, Sunil, i Meindl, Peter. Supply Chain Management: Strategy, Planning, and Operation. Pearson, Harlow, 2020.
4	Robinson, Stewart, et al. Conceptual Modeling for Discrete-Event Simulation. CRC Press, Boca Raton, 2010.

Recommended (supplementary) textbooks and other reading	
1	Ivanov, Dmitry, Tsipoulanis, Alexander, i Schönberger, Jörn. Global Supply Chain and Operations Management. Springer, Cham, 2021.
2	Gunal, Murat M., editor. Simulation for Industry 4.0: Past, Present, and Future. Springer, Cham, 2019.
3	Mujica Mota, Miguel, i Flores De La Mota, Idalia, eds. Applied Simulation and Optimization 2: New Applications in Logistics, Industrial and Aeronautical Practice. Springer, Cham, 2017.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in computer labs	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for laboratories	15
Preparation for crediting lectures	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

### Learning outcomes matrix

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03+++	C1	W1-W8	1	O1
EK 2	AIBS_W03++ AIBS_W05++	C1	W1-W8	1	O1
EK 3	AIBS_U01+++ AIBS_U05+++	C1, C2, C3	L1-L11	2, 3	O2
EK 4	AIBS_U01+++ AIBS_U03++ AIBS_U05+++	C1, C2, C3	L9-L10	2, 3	O2
EK 5	AIBS_U01+++ AIBS_U03++ AIBS_U05+++	C1, C2, C3	L3-L11	2, 3	O2
EK 6	AIBS_K01+++ AIBS_K06++	C4	W1-W8 L1-L11	1-3	O1, O2

<b>Author of the course syllabus:</b>	dr inż. Monika Kulisz, mgr inż. Michał Cioch, mgr Justyna Michaluk
<b>E-mail address:</b>	m.kulisz@pollub.pl, m.cioch@pollub.pl, j.michaluk@pollub.pl
<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Customer Relationship Management</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 35 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the principles and practical methods of analysing data describing consumer behaviour
<b>C2</b>	To develop the ability to use selected techniques of data analysis, visualisation and processing to analyse consumer processes
<b>C3</b>	To develop in students the ability to infer and interpret obtained data and analysis results

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Marketing knowledge and skills

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	identifies and describes basic CRM methods and tools.
<b>EK 2</b>	understands the concepts of brand, customer loyalty, and customer satisfaction.
<b>EK 3</b>	knows basic methods of building customer relationships (loyalty, brand awareness, satisfaction, and handling complaints/claims).
	<b>In the terms of skills:</b>
<b>EK 4</b>	uses basic CRM tools to build customer loyalty and brand awareness.
<b>EK 5</b>	designs a CRM implementation for an enterprise.

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EK 6	uses selected methods to measure customer satisfaction.
	<b>In the terms of social skills:</b>
EK 7	is ready to recognise the role of individuals and society in the creation and functioning of enterprises, particularly in building customer-company relationships

Course content	
Class format: lectures	
	Course content
W1	The concept of CRM and CRM 2.0 – theoretical foundations, origins, key concepts.
W2	Customer satisfaction and loyalty as a source of value for the company.
W3	Customer segmentation in line with the CRM philosophy.
W4	Customer relationship management in the event of complaints and claims.
W5	CRM software – types, functionalities, applications.
W6	Personal data protection in CRM systems.
W7	Methods and techniques for researching customer preferences, satisfaction and loyalty.
W8	Building brand awareness among offline and online customers.
W9	Strategies for building long-term customer relationships.
Class format: laboratory	
	Course content
L1	Implementation of a CRM system in a company.
L2	Building customer loyalty in a company.
L3	Marketing research for the purposes of the CRM system in the company.
L4	Choosing CRM software for your business.
L5	Case study of CRM system implementation for a company.
L6	A case study on the philosophy of building customer relationships in a company.
L7	Handling complaints and claims in accordance with the CRM philosophy.
L8	Building customer relationships on social media.
L9	Working with CRM software.

Didactic methods	
1	Informative lecture
2	Source text analysis and interpretation
3	Case study
4	Laboratory exercises

Evaluation methods and criteria
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Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	51 %
O2	Assessment of completed laboratory reports	51 %

Required textbooks and other reading	
1	Mathena, Justin, Aaron Yetter, and Hoss Hostetler. Success with Microsoft Dynamics CRM 4.0 : Implementing Customer Relationship Management. 1st ed. 2009. Berkeley, CA: Apress, 2009.
2	Somani, Deepesh. Mastering Microsoft Dynamics CRM 2016 : An Advance Guide for Effective Dynamics CRM Customization and Development. 1st edition. Birmingham, England ; Packt, 2017.
3	Prior, Daniel, Buttle, Francis, Maklan, Stan, Customer Relationship Management: Concepts and Technologies, Routledge, 2019.

Recommended (supplementary) textbooks and other reading	
1	Munandar, Jono Mintarto, Dewi Oktaviani, and Yenni Angraini, How Important Is CRM toward Customer's Loyalty to Conventional and Islamic Bank Marketing Strategy?: A Case Study from Indonesia, Journal of Islamic marketing 13.1, 2022, p.246–263.
2	Greenberg, Paul, CRM at the Speed of Light, Fourth Edition: Social CRM 2.0 Strategies, Tools, and Techniques for Engaging Your Customers, McGraw-Hill Education, 2009.
3	Kingsnorth, Simon, Digital Marketing Strategy, Kogan Page, 2022.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in classes	30
<b>Student's own work, including:</b>	<b>30</b>
Studying the lecture topics, Preparing for the examination	15
Preparation for classes	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix
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Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.



Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02++ AIBS_W04+++ AIBS_W10+	C1	W1, W5, W6, W9	1	O1
EK 2	AIBS_W04++ AIBS_W05+	C2, C3	W2-W4, W7, W8	1	O1
EK 3	AIBS_W04+++ AIBS_W05+ AIBS_W10++	C2, C3	W2-W4, W7, W8	1	O1
EK 4	AIBS_U01+ AIBS_U09++ AIBS_U11+	C2, C3	L2, L3, L5, L6-L8	2,3,4	O2
EK 5	AIBS_U08++ AIBS_U09++ AIBS_U14++	C1, C3	L1, L4, L5	2,3,4	O2
EK 6	AIBS_U02++ AIBS_U04++	C3	L3, L7	3,4	O2
EK 7	AIBS_K02+ AIBS_K05++	C2, C3	L1-L9	3,4	O2

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<b>Organizational unit:</b>	Department of Marketing



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Business effectiveness and risk analysis</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 25 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the fundamentals of business performance and risk.
<b>C2</b>	To introduce methods and tools for assessing the risk and performance of enterprises and investment projects.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	identifies and describes methods for evaluating business performance and risk.
<b>EK 2</b>	identifies sources of financial information used in financial analysis and specifies key details for assessing the financial condition of different types of organisations.
<b>EK 3</b>	has knowledge of the time value of money and of methods for assessing the efficiency and risk of investment projects.
	<b>In the terms of skills:</b>
<b>EK 4</b>	selects and applies financial analysis tools to monitor and assess enterprise performance and risk, and uses them in decision-making.

EK 5	optimises decision-making under informational uncertainty.
	<b>In the terms of social skills:</b>
EK 6	is ready to recognise the importance of knowledge in solving analytical and practical problems related to assessing business performance and risk.
EK7	is ready to initiate and plan investment projects and to evaluate them in terms of efficiency (effectiveness) and viability.

Course content	
Class format: lectures	
	Course content
W1	The essence and types of business efficiency and risk.
W2	Assessment of a company's financial risk.
W3	Assessment of operational efficiency.
W4	Profitability of sales.
W5	Return on capital.
W6	Analysis of profitability factors.
W7	Investment efficiency – simple methods.
W8	Operational risk of investments.
W9	The time value of money.
W10	The essence and types of business efficiency and risk.
Class format: practical classes	
	Course content
ĆW1	Financial risk assessment.
ĆW2	Assessment of financial liquidity.
ĆW3	Assessment of operational efficiency.
ĆW4	Assessment of sales profitability.
ĆW5	Assessment of capital profitability.
ĆW6	Analysis of profitability factors.
ĆW7	Assessment of the profitability of human resources.
ĆW8	Investment effectiveness assessment – simple methods.
ĆW9	Assessment of the operational risk of investments.
ĆW10	The time value of money.
ĆW11	Investment effectiveness assessment – discount methods.
ĆW12	Investment risk analysis.

Didactic methods	
1	Informative lecture
2	Calculation exercises
3	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of class participation	formative assessment without a threshold

Required textbooks and other reading	
1	Lemieux V., Financial analysis and risk management : data governance, analytics and life cycle management, Heidelberg : Springer, 2013.
2	Brammertz W., Akkizidis J., Breymann W., Entin R., Rustmann M., Unified Financial Analysis: The Missing Links of Finance, Newark: Wiley, 2011.
3	Komorowski J., Investment projects : management, analysis, evaluation, Warszawa : Szkoła Główna Handlowa w Warszawie, 2015.
4	Sherman E.H., Manager's Guide to Financial Analysis - Powerful Tools for Analyzing the Numbers and Making the Best Decisions for Your Business (6th Edition), New York: AMACOM, 2015.

Recommended (supplementary) textbooks and other reading	
1	Malhotra N. K. <i>Marketing research: an applied orientation</i> , 7 <sup>th</sup> ed. Pearson, 2019.
2	Frank, C. J., Magnone, P. F., & Netzer, O. <i>Decisions Over Decimals: Striking the Balance Between Intuition and Information</i> . John Wiley & Sons, 2022.
3	Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. <i>Multivariate data analysis</i> . In <i>Multivariate data analysis</i> , 2010.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in classes	30
<b>Student's own work, including:</b>	<b>30</b>
Studying the lecture topics, Preparing for the examination	15
Preparation for classes	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W12++ AIBS_W15+ AIBS_W16+	C1	W1-W10	1	O1
EK 2	AIBS_W09+++ AIBS_W12+ AIBS_W16+	C1	W2-W10	1	O1
EK 3	AIBS_W06+++ AIBS_W09++	C2	W7-W10	1, 2, 3	O1
EK 4	AIBS_U01++ AIBS_U02+++ AIBS_U18++	C2	ĆW1-ĆW7	2, 3	O1, O2
EK 5	AIBS_U02+++ AIBS_U19+++	C2	ĆW1-ĆW12	2, 3	O1, O2
EK 6	AIBS_K01++	C2	W7-W10, ĆW8- ĆW12	1, 2, 3	O1, O2
EK 7	AIBS_K01++ AIBS_K05+++	C2	ĆW8-ĆW12	2, 3	O1, O2

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**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Digital transformation</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 46 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To equip students with knowledge of the role and significance of digital transformation in reshaping business models, operational processes, and value creation within an organisation
<b>C2</b>	To develop students' ability to diagnose areas requiring transformation and to design and implement digital solutions using dedicated tools, taking into account customer and employee experience
<b>C3</b>	To foster a responsible and ethical approach to duties and the critical use of information sources

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	understands the essence, objectives and key areas of digital transformation in organisations, including changes in business models, operational processes, customer and employee experience; understands the ethical dilemmas associated with digital transformation

<b>EK 2</b>	knows selected methodologies for diagnosing an organisation's digital maturity, for designing transformation initiatives, and the tools that support digital transformation
	<b>In the terms of skills:</b>
<b>EK 3</b>	identifies areas of the organisation requiring digital transformation and designs the TO-BE state, taking into account the needs of customers and employees
<b>EK 4</b>	uses selected tools for prototyping and testing digital solutions, including in conditions that are not fully predictable
<b>EK 5</b>	collaborates in a team and communicates effectively with members of other teams
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically assess digital solutions from the user's perspective and the organisation's readiness to implement them.
<b>EK 7</b>	is ready to take responsibility for team tasks related to designing and implementing transformation initiatives.

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to digital transformation.
<b>W2</b>	Digital technologies and platforms.
<b>W3</b>	Transformation of business models.
<b>W4</b>	Transformation of operations and processes.
<b>W5</b>	Organisational culture transformation. Change management and digital skills.
<b>W6</b>	Digital customer and employee experience.
<b>W7</b>	The transformation process – from diagnosis to implementation.
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Forming teams, familiarising the team with the organisation's scenario.
<b>L2</b>	Analysis of an organisation's digital maturity using selected reference models and development and verification of a proprietary diagnostic tool.
<b>L3</b>	Designing the target state (TO-BE) with user experience in mind.
<b>L4</b>	Prototyping digital solutions using selected tools.
<b>L5</b>	Pilot implementation and testing of solutions.
<b>L6</b>	Developing a communication and change management plan.
<b>L7</b>	Evaluation and presentation of the effects of transformation.

<b>Didactic methods</b>
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1	Conversational lecture
2	Case study
3	Project method

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of class participation	Formative assessment without a passing threshold
O3	Assessment of completed laboratory exercises	70%
O4	Assessment of the project defence	50%

Required textbooks and other reading	
1	Dumas, M., La Rosa, M., Mendling, J., Reijers, H.A., Fundamentals of Business Process Management, Second Edition, Springer, 2018.
2	Blokdyk, G., Digital maturity: A complete guide – 2020 edition, 5STARCOOKS, 2021.
3	Lenox, M., Strategy in the digital age: Mastering digital transformation. Stanford Business Books, 2023.

Recommended (supplementary) textbooks and other reading	
1	Aalst, van der, W. M. P., & Hee, van, K. M., Workflow management : models, methods and systems (BETA publicatie : working papers; Vol. 52), Technische Universiteit Eindhoven, 2001.
2	Weske, M., Business process management: Concepts, languages, architectures (2nd ed.), Springer, 2012.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	45
Participation in lectures	15
Participation in laboratories	30
Student's own work, including:	30
Preparation for the final assessment	10
Preparation for laboratories	20
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02+++ AIBS_W11++ AIBS_W16++	C1	W1-W7	1-3	O1
EK 2	AIBS_W07++ AIBS_W16++	C1	W2 -W7	1-3	O1
EK 3	AIBS_U01++ AIBS_U03++ AIBS_U18++	C2	L2, L3, L6	2, 3	O2-O4
EK 4	AIBS_U03++ AIBS_U18++ AIBS_U19+++	C2	L4, L5	2, 3	O2-O4
EK 5	AIBS_U11+++ AIBS_U16++	C2	L1-L7	2, 3	O2-O4
EK 6	AIBS_K01+++ AIBS_K05++	C3	W1-W7, L1-L7	1-3	O1-O4
EK 7	AIBS_K06++	C3	L1-L7	3	O2-O4

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<b>Organizational unit:</b>	Department of Information and Business Processes



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Self-presentation</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 26 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	0
Exercises	45
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the principles of professional self-presentation.
<b>C2</b>	To prepare students to build a professional personal brand in diverse work contexts.
<b>C3</b>	To introduce the fundamentals of verbal and non-verbal communication.
<b>C4</b>	To explain selected methods and techniques of self-presentation and public speaking.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the elements of building a professional business image, including etiquette (savoir-vivre) principles.
<b>EK 2</b>	knows the principles of interpersonal communication, both verbal and non-verbal.
<b>EK 3</b>	knows the basic principles of self-presentation and public speaking.
	<b>In the terms of skills:</b>
<b>EK 4</b>	intentionally manages elements of their professional image in business – appearance, behaviour, and communication.

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

EK 5	performs routine office tasks, including handling business correspondence and receiving and making calls.
	<b>In the terms of social skills:</b>
EK 6	is ready to critically self-assess their competencies in self-presentation, interpersonal communication, and public speaking, and to improve them systematically in professional and digital settings.
EK 7	is ready to independently seek knowledge and expert support for conflict resolution and consensus-building, using communication and self-presentation techniques.

Course content	
Class format: practical classes	
	Course content
ĆW1	Self-presentation: what it is and the factors behind effective self-presentation; the <i>first-impression</i> effect.
ĆW2	Levels/modes of interpersonal communication: oral vs. written; direct vs. mediated; mass communication vs. everyday interpersonal communication.
ĆW3	Non-verbal communication: body language and the meaning of selected gestures.
ĆW4	Rhetoric as the foundation of contemporary presentations and public speaking.
ĆW5	Preparing a public speech: principles, key elements, and tools for designing presentations and talks.
ĆW6	Coping with stage fright and pre-speech stress.
ĆW7	Common types of business presentations.
ĆW8	The art of self-presentation and public speaking with elements of storytelling and voice work.
ĆW9	Impression-management (assertive/image-enhancing) techniques: ingratiation, self-promotion, exemplification, intimidation, <i>basking in reflected glory</i> (BIRG).
ĆW10	Defensive impression-management techniques: self-handicapping, supplication, excuses, justifications, apologies.
ĆW11	Online self-presentation and identity building (personal branding).
ĆW12	Personal and business etiquette: greetings, introductions, business cards, order of precedence.
ĆW13	Creating a professional image through appearance: women's and men's dress; dress code.

Didactic methods	
1	Informative lecture
2	Guided class discussion

3	Demonstration with explanations
4	Subject-specific practical classes

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	60%
O2	Assessment of completed course exercises	60%
O3	Assessment of the prepared presentation	60%

Required textbooks and other reading	
1	Kristi Hedges, The Power of Presence: Unlock Your Potential to Influence and Engage Others, Wydawnictwo Rowman & Littlefield; 2017.
2	Grant, Adam, Think Again: The Power of Knowing What You Don't Know, Wydawnictwo Viking, 2021.
3	Morgan, Nick, Can You Hear Me? How to Connect with People in a Virtual World. Wyd. Harvard Business Review Press, 2018.
4	Stephanie J. Coopman, James Lull, Public Speaking: The Evolving Art (5th ed.). Cengage Learning, 2023.
5,	Michael Osborn, Suzanne Osborn, Randall Osborn, Kathleen J. Turner, Public Speaking: Finding Your Voice (11th ed.), Wydawnictwo Pearson, 2017.

Recommended (supplementary) textbooks and other reading	
1	Chamorro-Premuzic, Tomas, I, Human: AI, Automation, and the Quest to Reclaim What Makes Us Unique. Wyd. Harvard Business Review Press, 2023.
2	Sylvie di Giusto, The Image of Leadership: How Leaders Package Themselves to Stand Out for the Right Reasons, Wydawnictwo Executive Image Consulting; 2024 (wyd. uzupełnione).

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	0
Participation in classes	45
<b>Student's own work, including:</b>	<b>30</b>
Preparation for passing	20
Preparation for classes	10
<b>Total student's workload</b>	<b>75</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

<b>Total number of the course ECTS credits</b>	<b>3</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U10+++	C1, C2	ĆW1-ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 2</b>	AIBS_U10+++	C1, C2, C3	ĆW1-ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 3</b>	AIBS_U10++	C4	ĆW1-ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 4</b>	AIBS_U10+++ AIBS_U11++	C2	ĆW1-ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 5</b>	AIBS_U10++	C1, C3	ĆW2, ĆW8, ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 6</b>	AIBS_K01+++ AIBS_K03++	C2	ĆW1-ĆW13	1, 2, 3, 4	O1, O2, O3
<b>EK 7</b>	AIBS_K01 +++ AIBS_K03+++	C1, C2	ĆW1-ĆW4, ĆW6-ĆW10	1, 2, 3, 4	O1, O2, O3

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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Negotiation and persuasion</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 15 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To provide knowledge of negotiation and persuasion processes and techniques.
<b>C2</b>	To develop practical skills for conducting effective negotiations and persuading others.
<b>C3</b>	To build communication, ethical, and interpersonal competences needed to act effectively as a negotiator, leader, or team member.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows negotiation theories and strategies, as well as basic techniques of persuasion.
<b>EK 2</b>	knows the importance of communication and ethics in negotiation and persuasion, including the risks of manipulation.
	<b>In the terms of skills:</b>
<b>EK 3</b>	prepares and conducts negotiations, applying interpersonal communication and self-presentation techniques.

EK 4	communicates effectively using specialised terminology, tailoring the message to the audience.
EK 5	analyses manipulative techniques and develops strategies/countermeasures to prevent or neutralise them.
	<b>In the terms of social skills:</b>
EK 6	is ready to make responsible decisions in negotiation settings, in line with ethical principles and with respect for social values.
EK 7	is ready to perform various roles in a negotiation team responsibly and ethically, and to resolve conflicts.

Course content	
Class format: lectures	
	Course content
W1	An introduction to negotiation and persuasion in the information society.
W2	Narratives surrounding data.
W3	The negotiation process – phases, strategies, techniques.
W4	Argumentation and persuasion.
W5	Conflict management in the negotiation process.
W6	Ethics, manipulation, and influence techniques.
W7	Defence against manipulation and false persuasion.
W8	Persuasion in the digital world.
Class format: laboratory classes	
	Course content
L1	Stakeholder needs analysis (assessing needs across stakeholder groups).
L2	Data storytelling (building narratives around data).
L3	Simulation games: negotiations with clients, partners, and the team.
L4	Role-playing negotiation scenarios.
L5	Active-listening training and barrier recognition.
L6	Recognising manipulation in negotiations and narratives (training).
L7	Assertiveness training in negotiations / assertiveness and resistance to social pressure.
L8	Cross-cultural simulations.
Didactic methods	
1	Conversational lecture
2	Role-playing (staging)
3	Work performed in groups

Evaluation methods and criteria
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Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51 %
O2	Assessment of completed laboratory exercises	51 %
O3	Assessment of class participation	formative assessment without a crediting threshold

Required textbooks and other reading	
1	Cialdini, R. B., Influence: The Psychology of Persuasion (rev. ed.), Harper Business, 2021.
2	Fisher, R., Ury, W., & Patton, B., Getting to Yes: Negotiating Agreement Without Giving In, Penguin, 2011.
3	Thaler, R., & Sunstein, C., Nudge: Improving Decisions About Health, Wealth, and Happiness, Penguin, 2009.
4	Pratkanis, A. & Aronson, E., Age of Propaganda: The Everyday Use and Abuse of Persuasion, Owl Books, 2001.
5	Stone, D., Patton, B., & Heen, S., Difficult Conversations: How to Discuss What Matters Most, Penguin, 2010.

Recommended (supplementary) textbooks and other reading	
1	Kahneman, D., Thinking, Fast and Slow. Farrar, Straus and Giroux, 2013.
2	Camp, J., Start with No: The Negotiating Tools that the Pros Don't Want You to Know. Crown Business, 2007.
3	Salacuse, J. W., The Global Negotiator: Making, Managing and Mending Deals Around the World in the Twenty-First Century. Palgrave Macmillan, 2003.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	45
Participation in lectures	15
Participation in laboratories	30
Student's own work, including:	30
Studying lecture topics, preparing for exams	15
Preparation for laboratories	15
Total student's workload	75
Total number of the course ECTS credits	3



### Learning outcomes matrix

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02+++ AIBS_W16+	C1	W1, W3, W4	1	O1
EK 2	AIBS_W14+++ AIBS_W16+	C1, C3	W2, W5, W6- W8	1	O1
EK 3	AIBS_U10+++ AIBS_U18++ AIBS_U19+	C2	L3, L4, L5, L7	2, 3	O2, O3
EK 4	AIBS_U11++ AIBS_U18++	C2	L1, L2, L8	2, 3	O2, O3
EK 5	AIBS_U06++ AIBS_U18+++	C2, C3	L6	2, 3	O2, O3
EK 6	AIBS_K06+++	C3	W6, L7	2, 3	O2, O3
EK 7	AIBS_K04++ AIBS_K06+	C3	L3, L4, L8	2, 3	O2, O3

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<b>Organizational unit:</b>	Department of Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Creativity in organisation</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 09 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Mastering fundamental techniques and methods of creative approach to defining and solving problems.
<b>C2</b>	Learning and practical application of contemporary techniques of individual and team creativity.
<b>C3</b>	Developing creative competencies useful in the dynamically changing world of technology and business.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	willingness to think outside conventional patterns and try unconventional solutions.
<b>EK 2</b>	basic competencies in group cooperation and interpersonal communication.
<b>EK 3</b>	desire for reflection on one's own thinking processes.
	<b>In the terms of skills:</b>
<b>EK 4</b>	understands the specificity of creative processes and their significance in problem-solving.

<b>EK 5</b>	recognizes and characterizes modern methods and techniques for stimulating individual and team creativity.
<b>EK 6</b>	knows the principles of organizing environments conducive to innovation and creative thinking.
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to initiate and support innovative processes in teams and organizations.
<b>EK 8</b>	is ready to openly share ideas and constructively co-create solutions.

<b>Course content</b>	
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	The concept of creativity: definitions, history of the concept, theories of creativity in historical perspective.
<b>L2</b>	Specificity of creative processes, creative personality, barriers to creativity.
<b>L3</b>	Individual creative thinking techniques: associations, analogies, metaphors, mind mapping.
<b>L4</b>	Creativity toolbox: task redefinition, opening questions, perspective changes.
<b>L5</b>	Heuristics: genesis, idea and application in creative processes.
<b>L6</b>	Group problem-solving methods: brainstorming and its variants, nominal group technique.
<b>L7</b>	Edward De Bono's concepts and techniques of creative thinking.
<b>L8</b>	Structural methods supporting creativity: elements of morphological analysis
<b>L9</b>	Visual techniques and storytelling in presenting ideas.
<b>L10</b>	Creative environment and creative organization: conditions fostering innovation, organizational culture.
<b>L11</b>	Creativity in the digital age: new tools and technological possibilities.
<b>L12</b>	Project workshop: team solving of a selected problem.

<b>Didactic methods</b>	
<b>1</b>	Guided class discussion
<b>2</b>	Work performed in groups
<b>3</b>	Preparing a presentation

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (test)	51%

O2	Assessment of completed course exercises	formative assessment without pass threshold
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Required textbooks and other reading	
1	De Bono, E., Serious Creativity: Using the Power of Lateral Thinking to Create New Ideas, Ebury Publishing, 2015.
2	Kelley, T., Kelley, D., Creative Confidence: Unleashing the Creative Potential Within Us All. Crown Business, 2013.

Recommended (supplementary) textbooks and other reading	
1	Pink, D. H., A Whole New Mind: Why Right-Brainers Will Rule the Future, Riverhead Books, 2006.
2	Sawyer, R. K., Explaining Creativity: The Science of Human Innovation. Oxford University Press, 2012.
3	Tharp, T., The Creative Habit: Learn It and Use It for Life. Simon & Schuster, 2006.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in laboratories	30
Student's own work, including:	20
Preparing for the laboratory	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02++ AIBS_W10+++	C1	L1 - L3	1	O1
EK 2	AIBS_W05+ AIBS_W09+++	C1, C2	L4 - L9	1, 2	O1
EK 3	AIBS_W02++ AIBS_W15+++	C3	L10 - L13	1, 2	O1
EK 4	AIBS_U01+++ AIBS_U05+ AIBS_U06++	C1, C2	L4, L5, L7 - L9, L12	2, 3	O2

	AIBS_U16++ AIBS_U18++				
EK 5	AIBS_U10++ AIBS_U15++ AIBS_U12++	C2, C3	L5, L6, L8, L10, L14, L15	1, 2, 3	O2
EK 6	AIBS_U17+++	C1, C3	L2, L11, L12, L15	1, 2, 3	O2
EK 7	AIBS_K02+ AIBS_K04++ AIBS_K05+++	C3	L10, L12 - L15	2, 3	O2
EK 8	AIBS_K05+++ AIBS_K06++	C2, C3	L5, L8, L10, L14, L15	2, 3	O2

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<b>Organizational unit:</b>	Department of Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Teamwork and Organisational Communication</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 27 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To enable students to understand complex processes and phenomena in organisations and teams.
<b>C2</b>	To develop teamwork skills across different roles.
<b>C3</b>	To build practical skills in effective organisational communication.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows theories of team functioning and organisational communication, including how communication shapes team effectiveness.
<b>EK 2</b>	knows how organisational, cultural, and psychological factors affect communication and teamwork processes.
<b>EK 3</b>	knows current challenges of working in distributed (remote/hybrid), interdisciplinary, and multicultural teams, and strategies for overcoming them.
	<b>In the terms of skills:</b>

<b>EK 4</b>	communicates effectively within a team, using active listening, clear message formulation, and constructive feedback
<b>EK 5</b>	collaborates with others in a team: plans joint actions, resolves conflicts, and makes group decisions
<b>EK 6</b>	adapts communication to audiences from diverse cultural and professional backgrounds and identifies communication barriers
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to work in teams within an organisational setting, respecting diversity and principles of collaboration, and to undertake responsible communication within the organisation

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Participation in organisations and teams; group processes; team dysfunctions.
<b>W2</b>	Group roles and organisational roles; teamwork vs. individual work.
<b>W3</b>	Contemporary concepts of effective communication.
<b>W4</b>	Communication barriers.
<b>W5</b>	Power dynamics and status games in communication.
<b>W6</b>	Challenges of distributed (remote/hybrid) teams.
<b>W7</b>	Interdisciplinarity, multicultural teamwork, and diversity management.
<b>W8</b>	Work coordination: real-time coordination and retrospective reviews.
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Teamwork vision - setting goals and rules of collaboration.
<b>L2</b>	Action strategy and workflow design.
<b>L3</b>	Needs assessment and questioning techniques.
<b>L4</b>	Effective team communication - active listening, transactional exchanges (Transactional Analysis), and I-statements.
<b>L5</b>	Training in interdisciplinary discussions.
<b>L6</b>	Building narratives to improve team performance.
<b>L7</b>	Giving and receiving feedback.
<b>L8</b>	Managing team conflicts.
<b>L9</b>	Team retrospectives (retrospective analysis of work).

<b>Didactic methods</b>	
<b>1</b>	Conversational lecture
<b>2</b>	Role-playing (simulation)
<b>3</b>	Work performed in groups

### Evaluation methods and criteria

Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of completed laboratory exercises	51%
O3	Assessment of class participation	Formative assessment with no pass threshold

### Required textbooks and other reading

1	Mastrogiacomo S., Osterwalder A., High-Impact Tools for Teams, John Wiley & Sons Inc, New York 2021.
2	Grégoire J., Conceptualizing Ego States in Transactional Analysis Three Systems in Interaction, Taylor & Francis, Abington-New York 2024.
3	Weber E.L., Nonviolent Communication [3-in-1]: 137 Techniques & Hacks to Have Difficult Conversations Without Fighting. Set Boundaries and Take Charge of your Life by Speaking Up, Saying No, and Defining Limits, Legends Books, London 2024.
4	Appelo J., Managing for Happiness, John Wiley & Sons Inc, New York 2016.
5	Lencioni P., Overcoming The Five Dysfunctions of a Team. A Field Guide for Leaders, Managers, and Facilitators, John Wiley & Sons Inc, New York 2005.

### Recommended (supplementary) textbooks and other reading

1	Dhawan E., Digital Body Language: How to Build Trust and Connection, No Matter the Distance, Griffin, New York 2023.
2	Helbig K., Norman M., The Psychological Safety Playbook: Lead More Powerfully by Being More Human, Page Two Press, Vancouver 2023.

### Student's Workload

Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in laboratories	30
<b>Student's own work, including:</b>	<b>30</b>
Studying lecture topics, preparing for exams	15
Preparation for labs	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

### Learning outcomes matrix

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02++ AIBS_W09+	C1	W1, W2	1	O1
EK 2	AIBS_W02+ AIBS_W11++	C1	W3-W5, W7,W8	1	O1
EK 3	AIBS_W09+ AIBS_W11++	C1	W6, W7, W8	1	O1
EK 4	AIBS_U10+ AIBS_U11++	C3	L3, L4, L7	2, 3	O2, O3
EK 5	AIBS_U14++ AIBS_U15++ AIBS_U16+	C2	L1, L2, L5, L8	2, 3	O2, O3
EK 6	AIBS_U11++ AIBS_U16+	C3	L3, L4, L6	2, 3	O2, O3
EK 7	AIBS_K01+++ AIBS_K04++ AIBS_K05++	C2, C3	W1, W2, W7, L1, L5, L8, L9	2, 3	O2, O3

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<b>Organizational unit:</b>	Department of Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Epistemology and the philosophy of knowledge</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 10 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with key concepts and issues in epistemology and the nature of philosophical thinking, with particular attention to its relations with the sciences – especially logic, mathematics, and computer science.
<b>C2</b>	To develop a philosophical approach to problems of knowledge in contemporary science and the use of diverse modes of reflection in the face of civilisational challenges.
<b>C3</b>	To cultivate competence in independently interpreting philosophical texts on theories of knowledge.
<b>C4</b>	To enhance the ability to conduct well-argued discussion, participate in debate, and exchange views on epistemological topics.
<b>C5</b>	To examine the epistemological foundations of dilemmas linked to digital technologies (including AI) and to foster critical analysis of their ethical and social implications.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>

<b>EK 1</b>	knows the basic problems and concepts of epistemology; understands the nature of philosophical thinking; and can indicate the historical background to the development of theories of knowledge.
<b>EK 2</b>	knows the role of knowledge in human life, its significance for interpreting reality, and its impact on the development of individuals and societies.
<b>EK 3</b>	knows and understands the fundamental dilemmas of contemporary civilisation arising from digital technologies, in particular their epistemological, ethical, and social consequences.
	<b>In the terms of skills:</b>
<b>EK 4</b>	identifies and analyses an epistemological issue, situates it in the appropriate historical-philosophical context, and uses philosophical terminology accurately.
<b>EK 5</b>	compares alternative epistemological positions and applies their underlying paradigms to analyse and evaluate information, including through participation in informed debate.
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically analyse their philosophical knowledge and understands the importance of an interdisciplinary approach to solving epistemological problems.
<b>EK 7</b>	is ready to recognise the value of philosophical reflection for personal development and its role in shaping a rational worldview and conducting scientific research.
<b>EK 8</b>	is ready to appreciate the achievements of humanity's cultural heritage, especially in philosophy, science, and technology.

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Epistemology as reflection on knowledge and the process of cognition: what knowledge is and how it is structured.
<b>W2</b>	Sources of knowledge – rationalism, empiricism, irrationalism; the roles of reason and experience.
<b>W3</b>	Limits of knowledge – between realism and idealism; the possibility of knowing a mind-independent reality.
<b>W4</b>	Theories of truth – classical (correspondence), coherence, pragmatic, deflationary.
<b>W5</b>	The problem of universals – the debate on the existence of universals and on mathematical knowledge.
<b>W6</b>	Relations between language, thought, and reality – Noam Chomsky's conceptions.
<b>W7</b>	Knowledge and faith – are religion and science reconcilable?

<b>W8</b>	Epistemology in the context of philosophy of mind and cognitive science – what do we mean by “mind”?
<b>W9</b>	Epistemological dilemmas of the digital age – knowledge, truth, and cognition in the era of technology.
<b>Class format: practical classes</b>	
	<b>Course content</b>
<b>ĆW1</b>	Epistemology as a branch of philosophy – subject matter, methods, and aims.
<b>ĆW2</b>	Major problems of contemporary epistemology.
<b>ĆW3</b>	Twentieth-century epistemological movements.
<b>ĆW4</b>	Neo-Kantianism and its significance for the theory of knowledge.
<b>ĆW5</b>	Phenomenology as a method for the philosophical study of consciousness.
<b>ĆW6</b>	Neopositivism (logical positivism) and its claims regarding scientific knowledge.
<b>ĆW7</b>	Analytic epistemology – conceptual and linguistic analysis.
<b>ĆW8</b>	Naturalised epistemology – grounding epistemology in the empirical sciences.
<b>ĆW9</b>	Neo-scholasticism and the return to classical philosophical reflection.
<b>ĆW10</b>	Epistemological themes in personalism, hermeneutics, existentialism, and pragmatism.

<b>Didactic methods</b>	
<b>1</b>	Problem-oriented lecture
<b>2</b>	Informative lecture
<b>3</b>	Conversation-based exercises
<b>4</b>	Analysis of primary texts
<b>5</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (test, with open-ended questions)	50%
<b>O2</b>	Assessment of a written paper (problem based)	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Ajdukiewicz, K., Problems and Theories of Philosophy, Cambridge University Press, 1975.
<b>2</b>	Morton, A., A Guide Through the Theory of Knowledge (3rd ed.), Wiley-Blackwell., 2002.

3	Woleński, J., Logic and Philosophy in the Lvov–Warsaw School, Springer, 1989.
4	Mercier, D. J., A Manual of Modern Scholastic Philosophy. Kegan Paul, Trench, Trübner & Co, 2013.
5	Moser, P. K. (Ed.), The Oxford Handbook of Epistemology. Oxford University Press, 2002.

Recommended (supplementary) textbooks and other reading	
1	Nagel J., Knowledge: A Very Short Introduction, Oxford University Press, 2014.
2	Audi R., Epistemology: A Contemporary Introduction to the Theory of Knowledge, Routledge, 2011.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in classes	30
<b>Student's own work, including:</b>	<b>30</b>
Self-study of lecture material	10
Preparation for classes	10
Preparation for the final assessment	10
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W10+++	C1-C5	W1, W2, W5, W8, W9	1, 2	O1
EK 2	AIBS_W10++	C1-C4	W3, W4, W6, W7	1, 2	O1
EK 3	AIBS_W11+++	C1-C5	W1-W9	1, 2	O1
EK 4	AIBS_U06++ AIBS_U01+ AIBS_U12+	C1-C3	ĆW1-ĆW5	3, 4, 5	O2
EK 5	AIBS_U06++ AIBS_U12++	C1-C3	ĆW6-ĆW10	3, 4, 5	O2

EK 6	AIBS_K01++ AIBS_K02+	C1-C4	W1, W3, W6, ĆW2-ĆW5	1-5	O1, O2
EK 7	AIBS_K01++ AIBS_K03++ AIBS_K04+	C1-C4	W2, W4, W7, ĆW6-ĆW10	1-5	O1, O2
EK 8	AIBS_K06++ AIBS_K04++ AIBS_K05+	C1-C4	W5, W8, ĆW1- ĆW10	1-5	O1, O2

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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Data Literacy</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 11 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	30
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with fundamental concepts and methods of data analysis.
<b>C2</b>	To develop the ability to critically assess data quality and reliability.
<b>C3</b>	To build competences in the ethical use of data in a data-driven world (including typical dilemmas).

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows basic concepts and can describe basic data types and data structures.
<b>EK 2</b>	knows basic methods of data aggregation, processing, storage, and analysis.
<b>EK 3</b>	knows key dilemmas in data use, including ethics and privacy principles in the context of data processing.
<b>EK 4</b>	lists common tools for data visualisation and analysis.
<b>EK 5</b>	knows criteria for assessing data and source quality and reliability.
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically evaluate their own knowledge and understands the need for further learning.
<b>EK 7</b>	is ready to acquire new competencies in databases and to seek out and consult expert opinions in this field.

<b>Course content</b>
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Class format: lectures	
	Course content
<b>W1</b>	Introduction to data literacy – definitions; significance in the information society.
<b>W2</b>	Data types – structured, semi-structured, and unstructured data.
<b>W3</b>	Data sources – databases, APIs, web scraping, IoT sensors.
<b>W4</b>	Data quality – completeness, accuracy, consistency, timeliness, ethics.
<b>W5</b>	Basics of descriptive statistics – measures of central tendency and dispersion.
<b>W6</b>	Data distributions and their properties.
<b>W7</b>	Correlation and regression – basic methods for analysing relationships.
<b>W8</b>	Introduction to data visualisation – principles and good practices.
<b>W9</b>	Chart types and their applications.
<b>W10</b>	Big Data – challenges and opportunities.
<b>W11</b>	Data ethics – privacy, GDPR compliance, data bias, societal dilemmas.
<b>W12</b>	Introduction to machine learning – core concepts.
<b>W13</b>	Data storytelling – communicating analytical findings.
<b>W14</b>	Trends and the future of data.
Class format: laboratory classes	

Didactic methods	
<b>1</b>	Informative lecture
<b>2</b>	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
<b>O1</b>	Assessment of a written paper (with open-ended questions)	60%

Required textbooks and other reading	
<b>1</b>	Morrow, J. Be Data Literate: The data literacy skills everyone needs to succeed (1st ed.). Kogan Page. 2021.
<b>2</b>	Cao, Longbing. Data Science Thinking: The Next Scientific, Technological and Economic Revolution. Springer, 2018.
<b>3</b>	Knafllic, Cole Nussbaumer. Storytelling with Data: A Data Visualization Guide for Business Professionals. Wiley, 2015.
Recommended (supplementary) textbooks and other reading	
<b>1</b>	Few, Stephen. Show Me the Numbers: Designing Tables and Graphs to Enlighten. Analytics Press, 2012.
<b>2</b>	Tufte, Edward R. The Visual Display of Quantitative Information. Graphics Press, 2001.

Student's Workload
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Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.



Form of activity	Average number of hours to complete activities
<b>Contact hours with instructor including:</b>	50
Participation in lectures	30
<b>Student's own work, including:</b>	20
Preparation for the classes	10
Preparation for the assessment	10
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Cele przedmiotu	Treści programowe	Didactic methods	Evaluation methods
EK1	AIBS_W08+++ AIBS_W01++	C1	W1-W3	1	O1
EK2	AIBS_W08+++ AIBS_W02++	C2, C3	W3-W4	1	O1
EK3	AIBS_W08+++ AIBS_W10+++ AIBS_W11++	C2, C3	W1-W14	1	O1
EK4	AIBS_W01+++ AIBS_W04++	C2, C3	W5-W14	2	O1
EK5	AIBS_W01+++ AIBS_W05++	C2, C3	W5-W14	2	O1
EK6	AIBS_K01+++	C1, C2, C3	W1 - W14	1, 2	O1
EK7	AIBS_K02+++ AIBS_K03++	C1, C2, C3	W1 - W14	1, 2	O1

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**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Market research methodology</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 28 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the nature of market research and its role in business decision-making, including dilemmas around societal impact.
<b>C2</b>	To introduce the methodological foundations of market research, including measurement models/scales, operationalisation of concepts, and sampling design.
<b>C3</b>	To develop the ability to critically evaluate research instruments and to design them properly, with attention to ethical and legal requirements.
<b>C4</b>	To build understanding of the relationship between data type and the choice of research method and analytical technique.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows basic methodological concepts in market research, including the structure of the research process and the principles of operationalising concepts.

<b>EK 2</b>	knows the principles of sampling, measurement-scale design, and research-instrument construction, taking into account validity and reliability requirements.
<b>EK 3</b>	knows and understands ethical dilemmas and societal impacts associated with market research
	<b>In the terms of skills:</b>
<b>EK 4</b>	identifies the research question and selects an appropriate method aligned with the question and data type
<b>EK 5</b>	assesses the quality and suitability of existing research instruments (e.g., questionnaires, interviews) for the measurement purpose, including validity and reliability
<b>EK 6</b>	identifies and interprets potential sources of measurement error and proposes ways to mitigate them
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to adhere to ethical principles in conducting market research, particularly with respect to protecting respondents' data and communicating results transparently

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	The nature of social research and the stages of the research process.
<b>W2</b>	Forms of measurement and data sources in research.
<b>W3</b>	Research designs, operationalisation and conceptualisation in measurement.
<b>W4</b>	Sampling and methods of sample selection.
<b>W5</b>	Experimental design/theory in social research.
<b>W6</b>	Basic data analysis in social research.
<b>W7</b>	Segmentation research: methods and techniques.
<b>W8</b>	Modelling consumer phenomena/behaviour.
<b>W9</b>	Presenting and visualising findings – principles, methods, and techniques.
<b>W10</b>	Tools for analysing online consumer behaviour.
<b>W11</b>	Legal and ethical aspects of research data collection.
<b>Class format: project</b>	
	Course content
<b>P1</b>	Scope of social research: approaches, typical instruments and conditions of use; legal and ethical standards for protecting and processing research data.
<b>P2</b>	Model building and research assumptions/hypotheses within measurement in social research.
<b>P3</b>	Sampling in practice: selection strategies and respondent recruitment.
<b>P4</b>	Practical aspects of experiments in social research.

<b>P5</b>	Designing and writing the research report.
<b>P6</b>	Data wrangling and analysis: transformations, handling/imputing missing data, dimensionality reduction.
<b>P7</b>	Conducting segmentation studies.
<b>P8</b>	Modelling consumer phenomena and processes (consumer behaviour).
<b>P9</b>	Analysing empirical data – examples from completed projects.
<b>P10</b>	Principles for presenting results and data visualisation.
<b>P11</b>	Interpreting data – discussion based on presentations of completed research projects.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Case study
<b>3</b>	Working with primary texts
<b>4</b>	Conducting field research
<b>5</b>	Project method
<b>6</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (test)	51%
<b>O2</b>	Project preparation assessment	75%
<b>O3</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Babbie, Earl. The Practice of Social Research. 15th ed., Cengage Learning, 2020.
<b>2</b>	Malhotra, Naresh K. Marketing Research: An Applied Orientation. Global Edition. Pearson, 2019.
<b>3</b>	Madsen, Erik. Understanding Consumer Behavior. Larsen & Keller Education, 2022. ISBN: 9781641726252.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Nunan, Dan, David F. Birks, and Naresh K. Malhotra. Marketing Research. Pearson Education, 2020.
<b>2</b>	Birks, David F., and Naresh K. Malhotra. Marketing Research: An Applied Approach. 3rd ed., Financial Times Prentice Hall, 2007.

<b>Student's Workload</b>
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Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in project classes	30
<b>Student's own work, including:</b>	<b>30</b>
Project preparation	20
Preparing for class	10
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
<b>EK 1</b>	AIBS_W01++ AIBS_W04++ AIBS_W05+++ AIBS_W06++ AIBS_W08++	C1-C4	W1-W11	1	O1
<b>EK 2</b>	AIBS_W05+++ AIBS_W06++	C1-C4	W3, W4, W10	1	O1
<b>EK 3</b>	AIBS_W11++	C1-C4	W1-W11	1	O1
<b>EK 4</b>	AIBS_U02++ AIBS_U04++ AIBS_U08++ AIBS_U14++ AIBS_U15++	C1-C4	P4-P10	4, 5	O2, O3
<b>EK 5</b>	AIBS_U07+++ AIBS_U10++ AIBS_U11++	C1-C4	P7-P10	2, 3, 5, 6	O2, O3
<b>EK 6</b>	AIBS_U19++	C1-C4	P1-P3, P5	2, 3, 6	O2, O3
<b>EK 7</b>	AIBS_K06+++	C1-C4	P1-P3, P9-P10	2, 3, 6	O2, O3

<b>Author of the course syllabus:</b>	Dr hab. Inż. Łukasz Skowron, prof. uczelni
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<b>Organizational unit:</b>	Department of Marketing

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**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Market Research Project</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 36 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	pass
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarize students with the areas of market and consumer research, basic problems addressed with these methods, and their applications.
<b>C2</b>	To equip students with knowledge of the theoretical and practical aspects of the research process, including ethical considerations and societal impact.
<b>C3</b>	To develop students' ability to conduct real-world social research and to prepare evidence-based reports.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Basic knowledge of statistics

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	distinguishes and characterises data sources usable in market research – especially in management studies – and the methods/ techniques for collecting, processing, analysing, and visualising empirical data, with attention to ethics and societal impact. ( <i>US: visualizing</i> )
<b>EK 2</b>	explains sampling methods applicable to measuring social phenomena and indicates the optimal method for a given situation.
	<b>In the terms of skills:</b>

EK 3	formulates research problems concerning various aspects of individual functioning or its environment and designs a research process to collect empirical data to address them.
EK 4	organises and conducts the planned research process; analyses and interprets the empirical results obtained and draws conclusions.
EK 5	prepares and presents the collected data in both an oral presentation and a written report, engaging in substantive discussion of the research process carried out.
	<b>In the terms of social skills:</b>
EK 6	is ready to recognise and understand the legal and ethical dilemmas of conducting research, and to uphold obligations regarding privacy and other participant rights – thereby building trust between the enterprise, its employees, and wider stakeholders.
EK 7	is ready to recognise the importance of knowledge in solving management and business problems and to seek out, access, and use diverse sources of knowledge.

Course content	
Class format: lectures	
	Course content
W1	The essence of market research, including social research, and the research process.
W2	Forms of measurement and data sources in the research process.
W3	Research models, operationalisation and conceptualisation in the measurement process.
W4	Research sample and methods of its selection.
W5	The theory of experimentation in social research.
W6	Basic data analysis in social research.
W7	Segmentation research methods and techniques.
W8	Modelling consumer phenomena.
W9	Assumptions, methods and techniques for presenting and visualising market research results.
W10	Legal and ethical aspects of collecting research material.
Class format: project	
	Course content
P1	Market research issues, directions, typical tools and conditions for their use.
P2	Legal standards and norms for the protection and processing of measurement data.
P3	Building models and formulating research assumptions in the measurement process.
P4	Design of measuring tools and procedures.

<b>P5</b>	Practical guidelines for selecting and recruiting research samples.
<b>P6</b>	Practical aspects of experimentation in social research.
<b>P7</b>	Design and editing of the research report.
<b>P8</b>	Rules for presenting collected data.
<b>P9</b>	Analysis of empirical material obtained from examples of completed projects.
<b>P10</b>	Data interpretation – discussion based on the presentation of completed projects research projects.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Case study
<b>3</b>	Working with primary sources
<b>4</b>	Conducting field research
<b>5</b>	Project method
<b>6</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (test)	51%
<b>O2</b>	Assessment of project preparation	75%
<b>O3</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Babbie E., Jason D. Edgerton. Fundamentals of social research. Cengage, Canada 2023.
<b>2</b>	Babbie E. R. The practice of social research. Cengage Au, 2020.
<b>3</b>	Mooi E., Sarstedt M., & Mooi-Reci I. Market research. Springer Nature Singapore Pte Ltd., Singapore 2018.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Bryman A., Social research methods. Oxford University Press, Oxford 2016.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15



Participation in project classes	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for the final assessment	10
Implementation of project tasks	20
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W04++ AIBS_W05+++ AIBS_W06++ AIBS_W08++ AIBS_W11++ AIBS_W16+	C1-C3	W1-W10	1	O1
EK 2	AIBS_W05+++	C1-C3	W3,W4,W10	1	O1
EK 3	AIBS_U01++ AIBS_U05+++ AIBS_U06+	C1-C3	P1-P5	2,3,5,6	O2,O3
EK 4	AIBS_U02++ AIBS_U04++ AIBS_U08++ AIBS_U14++ AIBS_U15++	C1-C3	P4-P10	4,5	O2,O3
EK 5	AIBS_U07+++ AIBS_U10++ AIBS_U11++ AIBS_U19++	C1-C3	P7-P10	2,3,5,6	O2,O3
EK 6	AIBS_K05++ AIBS_K06+++	C1-C3	P1-P3,P5	2,3,6	O2,O3
EK 7	AIBS_K02++ AIBS_K03++	C1-C3	P1-P3,P9-P10	2,3,6	O2,O3

<b>Author of the course syllabus:</b>	Dr hab. inż. Marcin Gąsior, prof. uczelni
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<b>Organizational unit:</b>	Department of Marketing



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Knowledge management</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 37 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	30
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarize students with the possibilities of managing and developing organizations through knowledge management.
<b>C2</b>	To introduce students to the opportunities for creating organizational success through managing intangible assets.
<b>C3</b>	To acquaint students with techniques and methods of knowledge management and organizational learning.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	explains the concepts of knowledge management, organizational learning, and intellectual capital
<b>EK 2</b>	comprehensively understands the interrelations between knowledge management, organizational learning, and intellectual capital, as well as their impact on enterprise functioning and its ability to generate market success
	<b>In the terms of skills:</b>
<b>EK 3</b>	interprets enterprise operations in terms of intangible assets at an advanced level
	<b>In the terms of social skills:</b>
<b>EK 4</b>	is ready to recognize the importance of knowledge in solving cognitive and practical problems

Course content	
Class format: lectures	
	Course content
W1	Knowledge management in enterprise as a contemporary management concept.
W2	The concept of knowledge, structure and typology of knowledge; data – information – knowledge – wisdom.
W3	Structure and dynamics of knowledge processes in enterprise.
W4	Core competencies of enterprise.
W5	Organizational learning and learning organizations.
W6	Intellectual capital and knowledge processes.
W7	Leadership and organizational culture in knowledge management.
W8	Selected knowledge management techniques.
W9	Practical solutions in knowledge management.

Didactic methods	
1	Conversational lecture
2	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	60%

Required textbooks and other reading	
1	O'Dell, C., Hubert, C., The new edge in knowledge: How knowledge management is changing the way we do business, Wiley, 2011.
2	Little, S., Ray, T., Managing knowledge, SAGE Publications, 2005.
Recommended (supplementary) textbooks and other reading	
1	Lancaster, A., Organizational learning communities: Empowering Social Learning and Collaboration to Improve Performance, Kogan Page, 2024.
2	Milton, N., & Lambe, P., The Knowledge Manager's Handbook: A Step-by-Step Guide to Embedding Effective Knowledge Management in your Organization. Kogan Page, 2019.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in lectures	30
Student's own work, including:	15
Preparation for classes	5
Preparation for assessment	15

<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
EK 1	AIBS_W02+++ AIBS_W10+++	C1, C3	W1, W2, W5, W6	1, 2	O1
EK 2	AIBS_W02+++ AIBS_W15+++	C1, C2	W1, W3, W4, W6, W7	1, 2	O1
EK 3	AIBS_U01++ AIBS_U06++	C2, C3	W3, W4, W8, W9	1, 2	O1
EK 4	AIBS_K01+++ AIBS_K02++	C1, C3	W1, W5, W8, W9	1, 2	O1

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<b>Organizational unit:</b>	Department of Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Fundamentals of Mathematics</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S01 12 00
<b>Year:</b>	I
<b>Term:</b>	1
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	examin
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with mathematical tools used in modelling and in applications of machine learning and artificial intelligence
<b>C2</b>	To introduce the mathematical concepts needed to understand selected subjects in applied ML/AI
<b>C3</b>	To develop understanding of quantitative relationships occurring in the real world
<b>C4</b>	To foster a habit of systematically upgrading one's knowledge and skills and acquiring new competences

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	defines fundamental concepts and states basic theorems in the analysis of single- and multivariable functions (numeric sequences and series; limits and continuity; differential and integral calculus)
	<b>In the terms of skills:</b>
<b>EK 2</b>	applies differential calculus to single- and multivariable functions and uses it to solve optimisation problems (including unconstrained and constrained cases).

EK 3	applies integral calculus methods to single- and multivariable functions.
	<b>In the terms of social skills:</b>
EK 4	is ready to critically assess their skills in formulating and solving problems using mathematical tools, and to develop these skills in response to evolving technological challenges

Course content	
Class format: lectures	
	Course content
W1	Elements of logic and set theory
W2	Set operations (set algebra)
W3	Elementary functions
W4	Numerical sequences
W5	Limits and continuity of real-valued functions
W6	Derivative of a real-valued function
W7	Applications of differential calculus for one variable
W8	Indefinite integral
W9	Riemann definite integral
W10	Improper integrals and their relation to infinite series
W11	Limits and continuity of functions of two variables
W12	Extrema of functions of two variables; constrained extrema
W13	Multiple integrals (functions of several variables)
Class format: practical classes	
	Course content
ĆW1	Elements of logic and set theory.
ĆW2	Set algebra/operations.
ĆW3	Elementary functions.
ĆW4	Limits of sequences.
ĆW5	Limits and continuity of real-valued functions.
ĆW6	Derivatives and applications of differential calculus (one variable).
ĆW7	Analysing function behaviour: monotonicity, extrema, convexity/concavity, inflection points, asymptotes.
ĆW8	Indefinite integrals.
ĆW9	Definite integrals and their applications.
ĆW10	Improper integrals: evaluation and convergence.
ĆW11	Limits and continuity of functions of two variables.
ĆW12	Partial derivatives (two variables).
ĆW13	Extrema of functions of two variables; constrained extrema (e.g., Lagrange multipliers).

<b>ĆW14</b>	Multiple integrals (double, triple).
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<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Calculation exercises

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of an oral response	50%
<b>O2</b>	Assessment of a written paper (problem-solving)	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Brokate, Martin, Pammy Manchanda, and Abul Hasan Siddiqi. Calculus for Scientists and Engineers. 1st ed. 2019. Singapore: Springer Singapore, 2019.
<b>2</b>	Zorich V. A., Mathematical Analysis I, Springer, 2015.
<b>3</b>	Garling D. J. H., A course in Mathematical Analysis, Volume 1, Foundations and Elementary Real Analysis, Cambridge University Press, 2013.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Radożycki T., Solving Problems in Mathematical Analysis, Part I-III, Springer, 2020.
<b>2</b>	Polanco C., Advanced Calculus - Fundamentals of Mathematics, Bentham Books, 2019.
<b>3</b>	Łobos E., Macura J., Sikora B., Calculus and linear algebra in exercises. Part 1, Politechnika Śląska, 2020.
<b>4</b>	Stewart J., Calculus: Early Transcendentals, 6th ed., Thomson, 2008.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for classes	20
Preparing for the examination	20
<b>Total student's workload</b>	<b>100</b>



Total number of the course ECTS credits	4
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Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W06++	C1-C3	W1-W13	1	O1
EK 2	AIBS_U02++	C1-C3	ĆW1-ĆW7, ĆW11-ĆW13	2	O2
EK 3	AIBS_U02++	C1-C3	ĆW8-ĆW10, ĆW14	2	O2
EK 4	AIBS_K01++	C1-C4	W1-W13 ĆW1- ĆW14	1, 2	O1, O2

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Organizational unit:	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Probability theory</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 16 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	examin
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the fundamental concepts of probability theory
<b>C2</b>	To develop understanding of quantitative relationships in the real world through probabilistic reasoning
<b>C3</b>	To foster a habit of systematically upgrading one's knowledge and skills and acquiring new competences

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic concepts and theorems of probability theory.
<b>EK 2</b>	knows the domains in which probability theory is applied.
	<b>In the terms of skills:</b>
<b>EK 3</b>	applies methods of probability theory to analyse random (stochastic) problems
	<b>In the terms of social skills:</b>
<b>EK 4</b>	is ready to critically assess their skills in formulating and solving problems using probability theory, and to develop these skills in response to evolving technological challenges

Course content	
Class format: lectures	
	Course content
W1	Elementary concepts of combinatorics.
W2	Sample space and events; definition of probability; probability spaces; basic theorems and properties.
W3	Conditional probability, independence, law of total probability, Bayes' formula.
W4	Random variables: definition, probability distributions, cumulative distribution functions.
W5	Examples of discrete random variables.
W6	Examples of continuous random variables.
W7	Numerical characteristics: expectation, variance, moments, central moments.
W8	Characteristic functions and their properties.
W9	Multivariate random variables: examples and basic properties.
W10	Marginal and conditional distributions (multivariate case).
W11	Limit theorems: Lindeberg-Levy, De Moivre-Laplace.
W12	Laws of large numbers.
Class format: practical classes	
	Course content
ĆW1	Elementary concepts of combinatorics
ĆW2	Sample space and events; definition of probability; probability space; basic theorems and properties
ĆW3	Conditional probability, independence, law of total probability, Bayes' theorem
ĆW4	Random variables: definition, probability distributions, cumulative distribution function (CDF)
ĆW5	Examples of discrete random variables
ĆW6	Examples of continuous random variables
ĆW7	Numerical characteristics: expectation (mean), variance, moments, central moments
ĆW8	Characteristic functions and their properties
ĆW9	Multivariate random variables: examples and basic properties
ĆW10	Marginal and conditional distributions (multivariate case)
ĆW11	Limit theorems: Lindeberg-Levy; De Moivre-Laplace
ĆW12	Laws of large numbers

Didactic methods	
1	Informative lecture
2	Calculation exercises

Evaluation methods and criteria
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Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of an oral response	50%
O2	Assessment of a written paper (problem solving)	50%

Required textbooks and other reading	
1	Roussas, George G. Introduction to Probability. 2nd ed. San Diego: Elsevier Science & Technology, 2014.
2	DasGupta, Anirban. Probability for Statistics and Machine Learning: Fundamentals and Advanced Topics. 1st ed. New York, NY: Springer Nature, 2011.
3	Schay, Géza. Introduction to Probability with Statistical Applications. 1st ed. 2007. Boston, MA: Birkhäuser Boston, 2007.
4	Rao, Malempati Madhusudana. Probability Theory with Applications. Orlando: Academic Press, Inc., 1984.
5	Lefebvre, Mario. Basic Probability Theory with Applications. 1st ed. 2009. New York, NY: Springer New York, 2009.

Recommended (supplementary) textbooks and other reading	
1	Kobayashi, Hisashi, Brian L. Mark, and William Turin, Probability, Random Processes, and Statistical Analysis. 1st ed. Cambridge: Cambridge University Press, 2012.
2	Dekking, F.M et al. A Modern Introduction to Probability and Statistics: Understanding Why and How. 1st ed. London: Springer Nature, 2006.
3	Bertsekas D. P., Tsitsiklis J. N., Introduction to Probability, 2nd Edition, Athena Scientific, Nashua 2008.
4	Klenke, Achim, Probability Theory: A Comprehensive Course. 1st ed. 2008. London: Springer London, 2008.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for classes	20
Preparing for the examination	20
<b>Total student's workload</b>	<b>100</b>

<b>Total number of the course ECTS credits</b>	<b>4</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W06++	C1, C2	W1-W12	1	O1
<b>EK 2</b>	AIBS_W06++	C1, C2	W1-W12	1	O1
<b>EK 3</b>	AIBS_U02++	C1, C2	ĆW1-ĆW12	2	O2
<b>EK 4</b>	AIBS_K01++	C1-C3	W1-W12 ĆW1- ĆW12	1, 2	O1, O2

<b>Author of the course syllabus:</b>	dr Piotr Oleszczuk
<b>E-mail address:</b>	p.oleszczuk@pollub.pl;
<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Mathematical foundations of UM</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 17 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	pass
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the core concepts of linear algebra
<b>C2</b>	To develop the ability to solve problems using linear-algebra concepts in modelling for machine learning and artificial intelligence

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic concepts of linear algebra
<b>EK 2</b>	knows the areas in which linear algebra is applied
	<b>In the terms of skills:</b>
<b>EK 3</b>	applies linear-algebra concepts and methods to solve problems
	<b>In the terms of social skills:</b>
<b>EK 4</b>	is ready to critically assess their skills in formulating and solving problems using linear-algebra tools, and to develop these skills in response to evolving technological challenges

<b>Course content</b>
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Class format: lectures	
	Course content
W1	Vector space: linear independence, basis, dimension, subspace, convex set.
W2	Linear transformations.
W3	Matrix space; matrix algebra.
W4	Matrix rank, determinant, transpose, trace, inverse.
W5	Matrix of a linear transformation; change of basis.
W6	Systems of linear equations.
W7	Inner-product (unitary) space: inner product, orthogonality, norm, orthonormal basis.
W8	Euclidean space.
W9	Gram-Schmidt orthogonalisation; orthogonal complement; orthogonal projection.
W10	Complex numbers.
W11	Linear functionals; quadratic forms.
W12	Eigenvalues and eigenvectors; diagonalisation of a matrix.
W13	Matrix decomposition methods.
Class format: practical classes	
	Course content
ĆW1	Vector spaces and subspaces; testing linear independence; finding a basis.
ĆW2	Linear transformations.
ĆW3	Matrix algebra.
ĆW4	Matrix rank; inverse matrix.
ĆW5	Matrix of a linear transformation; change of basis.
ĆW6	Solving systems of linear equations.
ĆW7	Inner-product (unitary) space: inner product, orthogonality, norm, orthonormal basis.
ĆW8	Euclidean space.
ĆW9	Gram-Schmidt orthogonalisation; orthogonal complement; orthogonal projection.
ĆW10	Complex numbers.
ĆW11	Eigenvalues and eigenvectors; matrix diagonalisation.
ĆW12	Linear functionals; quadratic forms.
ĆW13	Matrix decomposition methods
Didactic methods	
1	Informative lecture
2	Calculation exercises

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of an oral response	50%
O2	Assessment of a written paper (problem solving)	50%

Required textbooks and other reading	
1	Axler S., Linear Algebra Done Right, Springer, 2015.
2	Liesen, J., Mehrmann V., Linear Algebra, Springer, 2015.
3	Deisenroth M. P., Faisal A. A., Ong Ch. S., Mathematics For Machine Learning, Cambridge University Press, 2019.
4	Edwards H. M., Linear Algebra, Springer, 1995.

Recommended (supplementary) textbooks and other reading	
1	Harville, D. A., Matrix Algebra: Exercises and Solutions, Springer, 2001.
2	Aggarwal Ch. C., Linear Algebra and Optimization for Machine Learning: A Textbook, Springer, 2020.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in classes	30
<b>Student's own work, including:</b>	<b>40</b>
Preparation for classes	20
Preparing for the examination	20
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W06++	C1	W1-W13	1, 2	O1
EK 2	AIBS_W06++	C1	W1 -W13	1, 2	O1



	AIBS_W16+++				
EK 3	AIBS_U02++	C2	ĆW1-ĆW13	2	O2
EK 4	AIBS_K01++	C1, C2	W1-W13, ĆW1-ĆW13	1, 2	O1, O2

<b>Author of the course syllabus:</b>	dr Piotr Oleszczuk; dr Agnieszka Gergont
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Management statistics</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 39 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	examin
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce statistical methods used in management and business decision-making.
<b>C2</b>	To develop skills in analysing data with statistical tools.
<b>C3</b>	To build competence in interpreting statistical results in a managerial context.
<b>C4</b>	To foster the practical application of statistics to real business problems.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the basic concepts and methods of descriptive statistics and their applications in business data analysis
<b>EK 2</b>	understands probability concepts and statistical distributions and their role in modelling business processes
<b>EK 3</b>	knows methods of statistical inference, hypothesis testing, regression analysis, and quality control in business
	<b>In the terms of skills:</b>
<b>EK 4</b>	conducts statistical analysis of business data using appropriate methods and tools

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EK 5	interprets statistical results and formulates insights/conclusions for managerial decision-making
EK 6	builds regression models and uses them for forecasting
	<b>In the terms of social skills:</b>
EK 7	Is ready to critically evaluate the results of statistical analyses and present them to diverse stakeholder groups

Course content	
Class format: lectures	
	Course content
W1	Introduction to managerial statistics – the role of statistics in business decision-making.
W2	Data collection and organisation – data types, sampling, representativeness.
W3	Descriptive statistics – measures of central tendency, variability, and skewness.
W4	Data presentation – tables and charts.
W5	Elements of probability – events, conditional probability.
W6	Probability distributions – normal, Student's <i>t</i> , chi-square.
W7	Discrete distributions – binomial, Poisson; business applications.
W8	Parameter estimation – point and interval estimators.
W9	Hypothesis testing – procedures; Type I and Type II errors.
W10	Tests for one and two populations.
W11	Analysis of variance (ANOVA) – comparing means across multiple groups.
W12	Correlation and simple linear regression – relationships between variables.
W13	Multiple regression – modelling complex business relationships.
W14	Statistical quality control – control charts; Six Sigma.
W15	Time series and forecasting – trends, seasonality, forecasting models.
Class format: laboratory	
	Course content
L1	Introduction to statistical tools
L2	Importing and cleaning business data
L3	Descriptive statistics in practice – analysing sales and financial data
L4	Business data visualisation – producing professional charts
L5	Modelling uncertainty in business
L6	Distribution analysis – fitting distributions to empirical data
L7	Interval estimation – confidence intervals
L8	Hypothesis testing
L9	Comparing groups
L10	ANOVA in practice – evaluating the effectiveness of business strategies

<b>L11</b>	Correlation analysis – relationships between financial indicators
<b>L12</b>	Linear regression – forecasting sales and demand
<b>L13</b>	Multiple regression – modelling drivers of business performance
<b>L14</b>	Statistical quality control – implementing control charts in production processes
<b>L15</b>	Final project – comprehensive statistical analysis

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises
<b>3</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper	50%
<b>O2</b>	Assessment of the prepared project	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Newbold, Paul, William L. Carlson, and Betty M. Thorne. Statistics for business and economics. Pearson, 2023.
<b>2</b>	Aczel, Amir D., and Jayavel Sounderpandian. Complete Business Statistics, Wohl Publishing, 2012.
<b>3</b>	Hastie, Trevor; Tibshirani, Robert and Friedman, Jerome. The Elements of Statistical Learning. Data Mining, Inference, and Prediction. 2nd ed., Springer, 2017.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Bruce, Peter, Andrew Bruce, and Peter Gedeck. Practical statistics for data scientists: 50+ essential concepts using R and Python. O'Reilly Media, 2020.
<b>2</b>	James, Gareth; Witten, Daniela; Hastie, Trevor and Tibshirani, Robert. An Introduction to Statistical Learning with Applications in R. 2nd ed., Springer, 2021.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in laboratories	30

<b>Student's own work, including:</b>	<b>40</b>
Studying lecture topics, project implementation	30
Preparation for laboratory classes	10
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W06+++ AIBS_W05++	C1	W1-W4	1	O1
<b>EK 2</b>	AIBS_W06+++ AIBS_W07++	C1	W5-W7, W15	1	O1
<b>EK 3</b>	AIBS_W06+++ AIBS_W05++ AIBS_W02++ AIBS_W16+++	C1, C4	W8-W15	1	O1
<b>EK 4</b>	AIBS_U02+++ AIBS_U05++	C2	L1-L15	2, 3	O2
<b>EK 5</b>	AIBS_U05+++ AIBS_U06++ AIBS_U02++ AIBS_U18+++	C2, C3	L7-L10, L15	2, 3	O2
<b>EK 6</b>	AIBS_U02+++ AIBS_U04++ AIBS_U08++	C2, C4	L11-L14	2, 3	O2
<b>EK 7</b>	AIBS_K02+++ AIBS_K03++ AIBS_K01++	C3	W1-W15, L1-L15	1, 2, 3	O1, O2

<b>Author of the course syllabus:</b>	dr hab. Edward Kozłowski, prof. uczelni
<b>E-mail address:</b>	e.kozlovski@pollub.pl
<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Editing and working with documents</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 18 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To provide students with knowledge of the principles and conventions that ensure proper text editing – covering aesthetics, structure, and effective language use
<b>C2</b>	To develop proficiency in using word processors and desktop-publishing software, with particular emphasis on preparing publications for print - pre-press

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	lists, defines, and characterises the principles of typography, typesetting (text layout), and publishing-industry terminology
	<b>In the terms of skills:</b>
<b>EK 2</b>	creates and modifies a variety of print and digital documents using desktop-publishing software.
<b>EK 3</b>	integrates vector and raster graphics with text to produce visually compelling documents.
	<b>In the terms of social skills:</b>

<b>EK 4</b>	is ready to critically assess their own knowledge and to engage in discussion of presented documents, analysing their quality and anticipating how different stakeholder groups are likely to receive them
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<b>Course content</b>	
<b>Class format: laboratory</b>	
	Course content
<b>L1</b>	Linguistic preparation/editing of text.
<b>L2</b>	Word-processor basics – font and paragraph formatting.
<b>L3</b>	Basics of composition aesthetics.
<b>L4</b>	Typesetting and page-layout rules (text composition/line breaking).
<b>L5</b>	Working with tables.
<b>L6</b>	Combining text and graphics – inserting and formatting graphic objects.
<b>L7</b>	Creating simple graphics in a word processor.
<b>L8</b>	Formatting long documents – layout principles and pagination.
<b>L9</b>	Formatting long documents – working with styles.
<b>L10</b>	Formatting long documents – inserting footnotes and generating tables of contents/lists.
<b>L11</b>	Working with electronic documents – export, accessibility, sharing.

<b>Didactic methods</b>	
<b>1</b>	Guided class discussion
<b>2</b>	Laboratory exercises

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed laboratory exercises	51%

<b>Required textbooks and other reading</b>	
<b>1</b>	Felici J., Complete Manual of Typography: A Guide to Setting Perfect Type, Adobe Press, Berkeley 2012.
<b>2</b>	Microsoft Office Home & Student 2019 User Manual, Microsoft, <a href="https://www.manua.ls/microsoft/office-2019/manual">https://www.manua.ls/microsoft/office-2019/manual</a>
<b>3</b>	Lupton E., Thinking with Type: A Critical Guide for Designers, Writers, Editors & Students, Princeton Architectural Press, 2024.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Williams R., TheNon-Designer's Design Book, Peachpit Press, 2014.

2 | Heller S., Talatico L., Typography Sketchbooks, Thames & Hudson, 2011.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in laboratories	30
Student's own work, including:	20
Studying the literature on the subject	15
Preparation for classes	5
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W10+	C1	L1-L11	1, 2	O1
EK 2	AIBS_U07+++ AIBS_U09+	C1	L1-L11	1, 2	O1
EK 3	AIBS_U07+++ AIBS_U09+	C2	L1-L11	1, 2	O1
EK 4	AIBS_K01++ AIBS_K06+	C2	L1-L11	1, 2	O1

Author of the course syllabus:	dr inż. Mariusz Sobka, prof. uczelni, mgr inż. Beata Sobka
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Organizational unit:	Department of Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Data processing in spreadsheets</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 19 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To familiarise students with the capabilities and limitations of spreadsheets for processing numerical and text data.
<b>C2</b>	To introduce the use of AI to support data processing in spreadsheets.
<b>C3</b>	To familiarise students with principles of clear, visually effective formatting of analysis outputs.
<b>C4</b>	To foster a habit of systematically upgrading one's knowledge and skills and acquiring new

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	identifies data-processing problems (numerical and text) that can be effectively addressed with spreadsheets
<b>EK 2</b>	identifies spreadsheet tasks whose complexity warrants support from AI tools
<b>EK 3</b>	knows the feasibility limits of solutions stemming from spreadsheet characteristics and from numerical inaccuracies due to internal number representation
	<b>In the terms of skills:</b>

<b>EK 4</b>	creates spreadsheets with formulas for a wide range of data-processing tasks and visualises the data.
<b>EK 5</b>	uses advanced spreadsheet modules (statistical, optimisation/ optimization, database) and imports/ exports data in various formats.
<b>EK 6</b>	formats analysis outputs clearly and in a visually appealing way.
<b>EK 7</b>	leverages AI to generate formulas, charts, and other spreadsheet data-processing operations.
	<b>In the terms of social skills:</b>
<b>EK 8</b>	is ready to critically evaluate their own knowledge and to systematically acquire new professional competencies – both independently and by seeking expert advice

<b>Course content</b>	
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Introduction to spreadsheet fundamentals – cell/range addressing; regular and spilled (array) formulas; copying and moving formulas.
<b>L2</b>	Advanced data structures – tables; filtering and sorting; importing data from external files.
<b>L3</b>	Data lookup by criteria – database-style functions and features.
<b>L4</b>	Visualising numerical data – chart types, uses, properties; conditional formatting.
<b>L5</b>	Statistical calculations with visuals – histograms, trend lines.
<b>L6</b>	Scenario analysis and optimisation.
<b>L7</b>	Integrating AI with spreadsheets – assisted formula creation, trend analysis, and report generation.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises
<b>3</b>	Modelling

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed laboratory exercises	51%
<b>O2</b>	Assessment of class participation	Formative assessment without a passing threshold
<b>O3</b>	Assessment of a written paper	50%

Required textbooks and other reading	
1	Ragsdale C., Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics (MindTap Course List) 9th Edition, Cengage Learning, 2021.
2	Goldmeier, J., Advanced Excel Essentials, Apress, Berkeley, 2014.
3	Alexander M., Kusleika D., Microsoft Excel 365 Bible 2nd Edition, 2025.

Recommended (supplementary) textbooks and other reading	
1	Wayne W., Microsoft Excel Data Analysis and Business Modeling (Office 2021 and Microsoft 365) (Business Skills) 7th Edition, Microsoft Press, 2021.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in laboratory classes	30
Student's own work, including:	20
Preparation for assessment	5
Preparation for classes	15
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W05++ AIBS_W06+++ AIBS_W11+	C1	L1-L6	1,2,3	O3
EK 2	AIBS_W05++ AIBS_W06+++ AIBS_W11+ AIBS_W14+	C2	L7	1,2,3	O3
EK 3	AIBS_W05++ AIBS_W06+++	C1	L1-L6	1,2,3	O3
EK 4	AIBS_U01+++	C1	L1-L6	1,2,3	O1

	AIBS_U02+++ AIBS_U14+				
EK 5	AIBS_U01+++ AIBS_U02+++ AIBS_U14+	C1	L1-L6	1,2,3	O1
EK 6	AIBS_U01+++ AIBS_U02+++ AIBS_U07+++ AIBS_U14+	C3	L1-L6	1,2,3	O1
EK 7	AIBS_U01+++ AIBS_U03++ AIBS_U05++ AIBS_U14+	C1,C2	L7	1,2,3	O1
EK 8	AIBS_K01+++	C4	L1-L7	1,2	O1, O2

<b>Author of the course syllabus:</b>	dr Przemysław Kowalik
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Fundamentals of algorithmics and programming</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 20 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce fundamental concepts of algorithms and data structures.
<b>C2</b>	To develop programming skills in Python with an emphasis on business applications.
<b>C3</b>	To build abilities in problem analysis and the design of algorithmic solutions.
<b>C4</b>	To foster habits of systematic learning and continual improvement in programming.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows basic algorithms for sorting, searching, and data processing.
<b>EK 2</b>	understands fundamental data structures and the principles of their implementation.
<b>EK 3</b>	knows the syntax and semantics of Python and its applications in data analysis.
	<b>In the terms of skills:</b>
<b>EK 4</b>	designs and implements algorithms to solve business problems

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EK 5	selects and applies appropriate data structures to optimise solutions
EK 6	builds Python programs that use data-analysis libraries
EK 7	debugs and tests code and analyses its computational complexity
	<b>In the terms of social skills:</b>
EK 8	is ready to systematically improve their programming skills
EK 9	is ready to perform professional roles and duties responsibly

Course content	
Class format: lectures	
	Course content
W1	Introduction to algorithms – basic concepts; Big-O notation.
W2	Python fundamentals – syntax, data types, operators.
W3	Control structures – conditionals and loops.
W4	Functions in Python – definitions, parameters, recursion.
W5	Data structures – lists, tuples, dictionaries, sets.
W6	Sorting algorithms – bubble sort, selection sort, quicksort.
W7	Searching algorithms – linear and binary search.
W8	Advanced data structures – stacks, queues, trees.
W9	File processing and error handling.
W10	Intro to libraries – NumPy, pandas.
W11	Graph algorithms – representation and traversal.
W12	Code optimisation and programming best practices.
W13	Object-oriented programming in Python – classes and objects.
W14	Applications of algorithms in business data analysis.
W15	Introduction to computational complexity and performance.
Class format: laboratory classes	
	Course content
L1	Installing the Python environment; first programs
L2	Implementing basic data operations
L3	Programming control structures and functions
L4	Working with lists and dictionaries – practical exercises
L5	Implementing sorting algorithms
L6	Implementing searching algorithms
L7	Creating and manipulating data structures
L8	File handling – reading, writing, and processing CSV data
L9	Using NumPy for numerical computing
L10	Data analysis with pandas
L11	Implementing graph algorithms
L12	Debugging and testing programs

<b>L13</b>	Object-oriented programming – class project
<b>L14</b>	Final project – business data analysis

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Programming method
<b>3</b>	Laboratory exercises
<b>4</b>	Project method
<b>5</b>	Case study

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper	60%
<b>O2</b>	Assessment of the prepared project	60%
<b>O3</b>	Assessment of completed laboratory exercises	60%

<b>Required textbooks and other reading</b>	
<b>1</b>	Grus, J., Data science from scratch: First principles with Python (2nd ed.), O'Reilly Media., 2019.
<b>2</b>	Matthes, E., Python crash course: A hands-on, project-based introduction to programming (3rd ed.), No Starch Press., 2023.
<b>3</b>	Ramalho, L., Fluent Python: Clear, concise, and effective programming (2nd ed.), O'Reilly Media, 2021.
<b>4</b>	Sweigart, A., Automate the boring stuff with Python: Practical programming for total beginners (2nd ed.), No Starch Press, 2019.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Skiena, Steven S., The Algorithm Design Manual. 3rd ed., Springer, 2020.
<b>2</b>	VanderPlas, J., Python Data Science Handbook. O'Reilly Media, 2016.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in laboratories	30
<b>Student's own work, including:</b>	<b>40</b>

Implementation of programming projects	15
Preparation for laboratories	15
Preparation for passing	10
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W07+++	C1	W1, W6-W8, W11	1, 2	O1
EK 2	AIBS_W07+++	C1	W5, W8	1, 2	O1
EK 3	AIBS_W07+++	C2	W2-W4, W9-W10, W13	1, 2	O1
EK 4	AIBS_U03+++ AIBS_U01++	C2, C3	L1-L8, L11-L14	3, 4, 5	O2
EK 5	AIBS_U03+++ AIBS_U02++	C3	L4-L7, L11	3, 4	O3
EK 6	AIBS_U03+++ AIBS_U07++	C2	L8-L10, L13-L14	3, 4, 5	O2
EK 7	AIBS_U01++ AIBS_U06++	C3	L12	3, 4	O3
EK 8	AIBS_K01+++	C4	W1-W15, L1-L14	1, 2, 3, 4	O1-O3
EK 9	AIBS_K06++	C4	L1-L14	4, 5	O2, O3

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Python for business data analysis</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S03 30 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	0
Exercises	0
Laboratory	45
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce the basics of Python syntax and core mechanisms
<b>C2</b>	To familiarise students with fundamentals of data processing and visualisation
<b>C3</b>	To strengthen students' ability to formulate and solve data-driven problems
<b>C4</b>	To foster a habit of continuous upskilling and lifelong learning

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Foundations of programming

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	recognises different kinds and types of data and knows the Python syntax required to process them
<b>EK 2</b>	understands the principles of Python control-flow mechanisms – conditional statements and loops
<b>EK 3</b>	knows core Python libraries, their uses, and techniques for acquiring and processing data
	<b>In the terms of skills:</b>
<b>EK 4</b>	can develop simple programs in Python
<b>EK 5</b>	independently debugs their own code – analyses programming errors and fixes them

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EK 6	performs data analysis: cleans, transforms, and visualises available data
	<b>In the terms of social skills:</b>
EK 7	is ready to critically assess their knowledge, recognising the breadth of programming and data processing

Course content	
Class format: laboratory	
	Course content
L1	Introduction to Jupyter and creating environments with Anaconda/Pyenv; overview of IDEs and bash terminal basics.
L2	Variables and data types – sequences, lists, tuples, dictionaries.
L3	Control flow – conditional statements and loops.
L4	Functions – arguments and type hints.
L5	intro to object-oriented programming.
L6	NumPy – array/ matrix operations; pseudorandom numbers and sampling from probability distributions.
L7	Pandas – DataFrames and the basics of tabular data processing.
L8	Advanced data processing – grouping, applying functions, and parallelisation with pandarallel.
L9	Data visualisation – fundamentals with matplotlib. ( <i>US: visualization</i> )
L10	Further visualisation – seaborn and Plotly.
L11	Spatial data – GeoJSON, GeoDataFrame, and map plotting.
L12	External data sources – databases, external APIs, cloud services/ storage, and web scraping.
L13	Streamlit data-science apps – basics.
L14	Streamlit – building an app and overview of widgets.

Didactic methods	
1	Programming method
2	Laboratory exercises
3	Project method

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of the prepared project	51%
O2	Assessment of class participation	Formative assessment without a passing threshold

Required textbooks and other reading	
1	McKinney, W., Python for data analysis: Data wrangling with pandas, NumPy, and Jupyter (3rd ed.), O'Reilly Media, 2022. ISBN: 9781098104030.
2	VanderPlas, J., Python data science handbook: Essential tools for working with data. O'Reilly Media., 2016.
3	Python Software Foundation. (n.d.). Python documentation (Version 3.x). Retrieved from <a href="https://docs.python.org/3/">https://docs.python.org/3/</a>
4	Gutman, A. J., & Goldmeier, J., Becoming a data head: How to think, speak, and understand data science, statistics, and machine learning, Wiley, 2021.

Recommended (supplementary) textbooks and other reading	
1	Provost, F., & Fawcett, T., Data science for business: What you need to know about data mining and data-analytic thinking, O'Reilly Media, 2013.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	45
Participation in laboratories	45
Student's own work, including:	30
Preparation for laboratory classes	10
Project preparation	20
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W07+++ AIBS_W05+	C1, C4	L1-L2, L6-L7	1, 2	O1, O2
EK 2	AIBS_W07+++	C1, C2	L3	1, 2	O1, O2
EK 3	AIBS_W07++ AIBS_W08+++	C2, C3	L6-L8, L12	1, 2, 3	O1, O2
EK 4	AIBS_U03+++ AIBS_U09++	C1, C4	L1-L5, L13, L14	1, 2, 3	O1, O2
EK 5	AIBS_U17+++ AIBS_U03++	C1, C3	L1-L14	1, 2, 3	O1, O2

EK 6	AIBS_U01++ AIBS_U02+++ AIBS_U04+++	C2, C3	L7-L11	1, 2, 3	O1, O2
EK 7	AIBS_K01+++	C4	L1-L14	1, 2, 3	O1, O2

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Databases and SQL for analysts</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 21 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce core concepts and issues related to commercially used database models, their application areas, advantages, and limitations
<b>C2</b>	To develop the ability to design a correct structure (schema) for a selected database model, using a range of modelling and implementation tools
<b>C3</b>	To acquire skills in integrating databases with external systems and in building simple applications in a chosen programming language that use a database

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows fundamental database concepts and models, including relational, graph, and document-oriented models
<b>EK 2</b>	knows database query language constructs
<b>EK 3</b>	knows principles of database schema design
	<b>In the terms of skills:</b>
<b>EK 4</b>	uses software tools relevant to database systems
<b>EK 5</b>	uses the appropriate database query language at a basic level
<b>EK 6</b>	designs, implements, and administers a relational database, taking into account the solution's system, organisational, and economic constraints
	<b>In the terms of social skills:</b>

<b>EK 7</b>	is ready to critically evaluate their own knowledge and understands the need for further learning
<b>EK 8</b>	is ready to acquire new competencies in databases and to seek expert opinions in this field.

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to databases – data models: hierarchical, network, relational, object-oriented.
<b>W2</b>	Database Management Systems (DBMS) – database system architecture.
<b>W3</b>	Relational model – relations, attributes, domains, keys.
<b>W4</b>	Relational algebra – operations on relations.
<b>W5</b>	SQL – introduction – history, standards, dialects.
<b>W6</b>	DDL – creating and modifying database structures.
<b>W7</b>	DML – basic operations: INSERT, UPDATE, DELETE.
<b>W8</b>	SELECT queries – basic syntax; WHERE, ORDER BY.
<b>W9</b>	Aggregate functions and grouping – GROUP BY, HAVING.
<b>W10</b>	Joins – INNER, LEFT, RIGHT, FULL OUTER.
<b>W11</b>	Subqueries and correlated queries.
<b>W12</b>	Window functions for data analysis.
<b>W13</b>	Query optimisation – indexes; execution plans.
<b>W14</b>	Database design – normalisation: 1NF, 2NF, 3NF, BCNF.
<b>W15</b>	Data warehousing and analytics – OLAP vs. OLTP.

<b>Forma zajęć – laboratoria</b>	
	Course content
<b>L1</b>	Preparing the development environment – installing database tools and client UIs; system requirements and economic considerations of database solutions.
<b>L2</b>	ERD design – entity-relationship diagrams.
<b>L3</b>	Creating data structures in a relational DB using SQL.
<b>L4</b>	Relationship patterns – one-to-one, one-to-many, many-to-many.
<b>L5</b>	T-SQL DDL – create/alter/drop objects; constraints, keys, indexes.
<b>L6</b>	T-SQL DML – INSERT, UPDATE, DELETE, MERGE.
<b>L7</b>	T-SQL DCL & security – users, roles, permissions (GRANT, REVOKE, DENY).
<b>L8</b>	Advanced T-SQL query elements – CTEs, derived/temporary tables, set operations (UNION/INTERSECT/EXCEPT), PIVOT/UNPIVOT, APPLY.
<b>L9</b>	Subqueries in data analysis.
<b>L10</b>	Window functions – ROW_NUMBER, RANK, LAG, LEAD.
<b>L11</b>	Temporal data analysis – date/time functions.
<b>L12</b>	Advanced analytical functions – percentiles and moving averages (window frames).

<b>L13</b>	Report automation – stored procedures.
<b>L14</b>	Query performance – monitoring and optimisation (execution plans, indexing).
<b>L15</b>	Integration with BI tools – Power BI, Tableau.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (with open-ended questions)	60%
<b>O2</b>	Assessment of completed laboratory reports	60%

<b>Required textbooks and other reading</b>	
	Kline, Kevin, i Daniel Kline. SQL in a Nutshell: A Desktop Quick Reference. 4th ed., O'Reilly Media, 2022.
<b>1</b>	Beaulieu, Alan. Learning SQL: Master SQL Fundamentals. 3rd ed., O'Reilly Media, 2020.
<b>2</b>	Coronel, Carlos, i Steven Morris. Database Systems: Design, Implementation, and Management. 13th ed., Cengage Learning, 2018.
<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Churcher, Clare. Beginning Database Design: From Novice to Professional. 2nd ed., Apress, 2012.
<b>2</b>	Molinaro, Anthony. SQL Cookbook: Query Solutions and Techniques for Database Developers. O'Reilly Media, 2006.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete activities</b>
<b>Contact hours with instructor including:</b>	45
Participation in lectures.	15
Participation in laboratories	30
<b>Student's own work, including:</b>	30
Preparation for classes	15
Preparation for assessment	15
<b>Total student's workload</b>	75
<b>Total number of the course ECTS credits</b>	3

<b>Learning outcomes matrix</b>
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Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK1	AIBS_W07+++	C1	W1, W2	1	O1
EK2	AIBS_W07+++ AIBS_W08+	C2, C3	W3, W4	1	O1
EK3	AIBS_W07+++ AIBS_W16+++	C2, C3	W5 – W15	1	O1
EK4	AIBS_U01+++ AIBS_U18++	C2, C3	L1 – L8	2	O2
EK5	AIBS_U04+++	C2, C3	L9 – L12	2	O2
EK6	AIBS_U08++ AIBS_U17+++ AIBS_U18+++	C2, C3	L13 – L15	2	O2
EK7	AIBS_K01+++	C1, C2, C3	W1 – W15 L1 – L15	1, 2	O1, O2
EK8	AIBS_K01+++ AIBS_K02++ AIBS_K03+	C1, C2, C3	W1 – W15 L1 – L15	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Low-code/No-code platforms</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 38 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To provide knowledge of low-code/no-code (LCNC) concepts and methodologies, and to understand the capabilities and limitations of LCNC technologies in software development
<b>C2</b>	To develop the ability to design and implement applications using LCNC platforms
<b>C3</b>	To build skills in prototyping, developing, and deploying solutions for acquiring and using information (data capture, integration, automation, reporting) with LCNC platforms

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Fundamentals of databases and information systems design.
<b>2</b>	Programming fundamentals.
<b>3</b>	Foundations of computer science and mathematics.

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has knowledge of the architecture and operating principles of low-code/no-code platforms
<b>EK 2</b>	knows the different types of low-code/no-code platforms and their applications
<b>EK 3</b>	has knowledge of the capabilities and limitations of low-code/no-code technologies across various business scenarios
	<b>In the terms of skills:</b>

<b>EK 4</b>	designs and implements business applications using low-code/no-code platforms
<b>EK 5</b>	selects appropriate low-code/no-code platforms for specific project requirements
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically self-assess their capacity to plan and deliver project tasks, including setting realistic goals and priorities in a dynamic technological environment
<b>EK 7</b>	is ready to think and act entrepreneurially and to independently recognise when expert support is required – especially when solving complex project problems using low-code/no-code platforms

<b>Course content</b>	
<b>Forma zajęć – laboratoria</b>	
	Course content
<b>L1</b>	Overview of leading platforms: Microsoft Power Platform, OutSystems, Mendix.
<b>L2</b>	No-code platforms: Webflow, Bubble, Airtable, Zapier.
<b>L3</b>	Installation and configuration; first steps with a chosen platform.
<b>L4</b>	Building simple business apps – forms and lists.
<b>L5</b>	User-interface design – responsive design.
<b>L6</b>	Data management – creating and configuring databases.
<b>L7</b>	Business logic implementation – workflows and process automation.
<b>L8</b>	Integration with external APIs and services.
<b>L9</b>	Reporting and dashboards.
<b>L10</b>	Testing and debugging of low-code/no-code apps.
<b>L11</b>	Requirements analysis and platform selection for a chosen project.
<b>L12</b>	Application architecture and UI design.
<b>L13</b>	Functionality implementation.
<b>L14</b>	Project testing and documentation.

<b>Didactic methods</b>	
<b>1</b>	Guided class discussion
<b>2</b>	Laboratory exercises

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed laboratory reports	60%
<b>O2</b>	Assessment of the prepared project	60%

<b>Required textbooks and other reading</b>
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1	Sahay, A., Indamutsa, A., Di Ruscio, D., Pierantonio, A. Supporting the understanding and comparison of low-code development platforms. IEEE Software, 2020.
2	Stripling G., Abel M., Low-Code AI, O'Reilly Media, 2023.
3	Waszkowski R., Low-code platform for automating business processes in manufacturing, IFAC-PapersOnLine, Volume 52, Issue 10, 2019.
4	Microsoft Power Platform Documentation. <a href="https://docs.microsoft.com/en-us/power-platform/">https://docs.microsoft.com/en-us/power-platform/</a>
<b>Recommended (supplementary) textbooks and other reading</b>	
1	Kenneweg B., Building Low-Code Applications with Mendix : Discover Best Practices and Expert Techniques to Simplify Enterprise Web Development. Packt Publishing, 2021.
2	Martinez E., Pfister L., Benefits and limitations of using low-code development to support digitalization in the construction industry, Automation in Construction, Volume 152, August 2023.
3	OutSystems Platform Documentation. <a href="https://success.outsystems.com/Documentation">https://success.outsystems.com/Documentation</a>
4	Bubble Manual. <a href="https://manual.bubble.io/">https://manual.bubble.io/</a>

<b>Student's Workload</b>	
Form of activity	Average number of hours to complete activities
<b>Contact hours with instructor including:</b>	30
Participation in laboratories	30
<b>Student's own work, including:</b>	20
Preparing for class	10
Preparation for the final assessment	10
<b>Total student's workload</b>	50
<b>Total number of the course ECTS credits</b>	2

<b>Learning outcomes matrix</b>					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
<b>EK 1</b>	AIBS_W07+++	C1, C2	L1 – L4	1, 2	O1, O2
<b>EK 2</b>	AIBS_W07+++ AIBS_W02++	C1, C2, C3	L1 – L4	1, 2	O1, O2
<b>EK 3</b>	AIBS_W07+++ AIBS_W12++ AIBS_W16+++	C1, C2, C3	L1 – L4	1, 2	O1, O2
<b>EK 4</b>	AIBS_U03+++	C1, C2, C3	L5 – L14	1, 2	O1, O2

	AIBS_U08++ AIBS_U18+++				
<b>EK 5</b>	AIBS_U01++ AIBS_U03+++ AIBS_U18+++	C1, C2, C3	L5 – L14	1, 2	O1, O2
<b>EK 6</b>	AIBS_K01+++	C1, C2, C3	L1 – L14	1, 2	O1, O2
<b>EK 7</b>	AIBS_K03+++	C1, C2, C3	L1 – L14	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Cyber security</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 47 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To provide knowledge of threats, risks, and protection mechanisms in cyberspace
<b>C2</b>	To introduce core technologies, tools, and practices for securing information systems and data
<b>C3</b>	To develop skills in identifying and countering digital threats through hands-on security analysis, system hardening/configuration, and incident response exercises
<b>C4</b>	To foster ethical and responsible attitudes to information management and the protection of personal data and privacy in the digital environment, with attention to dilemmas of the digital age

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows and understands, at an advanced level, the operating principles of information systems – including databases and development tools – used in cybersecurity.
<b>EK 2</b>	understands the ethical and social implications of digital technologies, with particular emphasis on privacy, personal data protection, and automated decision-making.
<b>EK 3</b>	knows the legal regulations on personal data protection, information security,

	and legal liability in the digital environment.
<b>EK 4</b>	knows the principles of ethical conduct in information management and in the use of digital tools – including artificial intelligence – in the context of cybersecurity.
	<b>In the terms of skills:</b>
<b>EK 5</b>	analyses information-security problems and identifies threats in the digital environment using data-analysis methods and AI tools.
<b>EK 6</b>	designs and implements technological solutions that support the security of data and information systems, using programming tools and low-code/no-code platforms.
<b>EK 7</b>	critically evaluates methods of acquiring, processing, and safeguarding data, taking into account ethical, legal, and technological aspects.
<b>EK 8</b>	uses specialised terminology in digital technologies and information security and communicates effectively with stakeholders in professional settings.
<b>EK 9</b>	participates in discussions on risks stemming from digital technologies and artificial intelligence, formulating arguments on their ethical and social dimensions.
	<b>In the terms of social skills:</b>
<b>EK 10</b>	is ready to critically evaluate their own cybersecurity knowledge and actions in a rapidly changing technological environment
<b>EK 11</b>	is ready to draw on expert knowledge and seek reliable sources to solve complex digital-security problems
<b>EK 12</b>	is ready to act ethically and lawfully in data protection and privacy, adhering to professional codes of conduct

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to cybersecurity – definitions, domains, common threats; cyberspace as a space for business activity and crime.
<b>W2</b>	Information security fundamentals – confidentiality, integrity, availability (CIA); risk and vulnerability.
<b>W3</b>	Network threats and attacks – malware, phishing, DDoS, ransomware, social engineering, and cybercrime.
<b>W4</b>	Operating-system and application security – software vulnerabilities, patching/updates, access-control mechanisms.
<b>W5</b>	Data protection and privacy – legal frameworks (GDPR, Polish Data Protection Act), digital privacy and user tracking.
<b>W6</b>	Basics of cryptography and authentication – symmetric/asymmetric encryption, digital signatures, certificates, TLS.
<b>W7</b>	Incident management and response – incident lifecycle; roles of CSIRT/SOC.
<b>W8</b>	Organisational security – security policies, audits, and secure remote work.
<b>Class format: laboratory</b>	
	Course content

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L1	Threat analysis and security testing basics – port scanning; open-source tooling.
L2	Secure OS configuration – accounts and permissions; firewalls; patch/updates; log management.
L3	Network traffic analysis – spotting suspicious packets; attack detection.
L4	Attack-defence simulations – practical attack scenarios and defensive responses (firewall rules, account lockouts).
L5	Identity and access management (IAM) – passwords, role/permission configuration, two-factor authentication (2FA).
L6	Applied cryptography – file and communications encryption.
L7	Security policy and incident response – case study with preparation and simulation of response procedures; incident reporting.

Didactic methods	
1	Informative lecture
2	Conversational lecture
3	Case study
4	Subject-specific practical classes

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written test paper	51%
O2	Assessment of completed course exercises	51%
O3	Assessment of class participation	Formative assessment without a passing threshold

Required textbooks and other reading	
1	Jay Gonzalez III; Roger L. Kemp, Cybersecurity: Current Writings on Threats and Protection, McFarland, 2019.
2	C. P. Gupta; K. K. Goyal, Cybersecurity : A Self-Teaching Introduction, Mercury Learning and Information, 2020.
3	Nick Ioannou, Internet Security Fundamentals - 10th Anniversary Edition, Boolean Logical, 2025.

Recommended (supplementary) textbooks and other reading	
1	Jacob G. Oakley, Professional Red Teaming, Conducting Successful Cybersecurity Engagements, Apress Berkeley, CA, 2019.

Student's Workload	
Form of activity	Average number of hours to complete the activity



<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in laboratories	30
<b>Student's own work, including:</b>	<b>30</b>
Studying lecture topics, preparing for exams	10
Preparation for laboratories	20
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W07+++ AIBS_W16+++	C1, C2, C4	W1, W4, W6	1, 3	O1
<b>EK 2</b>	AIBS_W11+++	C1, C4	W3, W5, W8	2, 3	O1
<b>EK 3</b>	AIBS_W12+++ AIBS_W13++	C1, C4	W5, W7	1, 3	O1
<b>EK 4</b>	AIBS_W14+++	C1	W5, W8	2, 3	O1
<b>EK 5</b>	AIBS_U01+++ AIBS_U05+++	C2, C3	L1, L4	3, 4	O2, O3
<b>EK 6</b>	AIBS_U03+++ AIBS_U18+++	C2, C3	L2, L5	2, 4	O2, O3
<b>EK 7</b>	AIBS_U06+++	C2, C3	L1, L7	3, 4	O2, O3
<b>EK 8</b>	AIBS_U11++	C3	L6, L7	1, 2, 4	O2, O3
<b>EK 9</b>	AIBS_U12+++	C4	L4	2, 3	O2, O3
<b>EK 10</b>	AIBS_K01+++	C4	L7	3	O2, O3
<b>EK 11</b>	AIBS_K02+++ AIBS_K03+++	C4	L1, L7	2, 3	O2, O3
<b>EK 12</b>	AIBS_K06+++	C4	L4, L5	3	O2, O3

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<b>Organizational unit:</b>	Department of Computational Intelligence



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Robotic Process Automation</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S03 31 00
<b>Year:</b>	II
<b>Term:</b>	3
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduction to the significance, needs, opportunities, and limitations of robotic process automation (RPA) in an enterprise context.
<b>C2</b>	Familiarization with selected aspects of implementing robotic process automation in an organization.
<b>C3</b>	Building a simple bot using a selected RPA tool.
<b>C4</b>	Developing in students an ethical and responsible attitude, as well as openness to knowledge, including active engagement in seeking out its sources.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the areas of software robots' application, their conditions, limitations, and benefits, as well as implementation dilemmas, including ethical considerations
<b>EK 2</b>	understands the key aspects of implementing robotic process automation (RPA) in organizations, including the development of organizational structures, robotic operation models, and the execution of the bot development process

	<b>In the terms of skills:</b>
EK 3	can build a simple bot using a selected RPA tool
EK 4	is able to identify a process suitable for automation, and then design and implement an algorithm for its execution
EK 5	is able to collaborate effectively within a team implementing process automation using a selected RPA-class tool
	<b>In the terms of social skills:</b>
EK 6	is prepared to continuously seek and update knowledge and skills in the area of RPA technologies
EK 7	is prepared to take responsibility for the completion of team tasks related to the design and implementation of automation solutions
EK 8	is prepared to consider ethical aspects when planning the implementation of RPA in an organization

Course content	
Class format: lectures	
	Course content
W1	Introduction to automation, business processes, and robotic process automation (RPA).
W2	Application of software robots in the context of organizations and employees: benefits, risks, and dilemmas.
W3	Stages of the implementation process, models, strategies, structures, and resources in RPA deployment.
W4	Pipeline development.
W5	Project implementation.
W6	The human aspect: change management.
Forma zajęć – laboratoria	
	Course content
L1	Introduction. Environment configuration.
L2	Creating a simple process using a variable.
L3	Creating process branches. Operations on numbers, texts, and dates. Functions.
L4	Creating branching nodes, building and using complex data structures and loops.
L5	Working with layers.
L6	Performing operations on an external application.
L7	Building solutions for communication with an external application.
L8	Implementing automation of selected processes in teams.

Didactic methods
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1	Conversational lecture
2	Laboratory exercises
3	Project method

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	51%
O2	Assessment of class participation	Formative assessment without a passing threshold
O3	Assessment of completed laboratory exercises	70%
O4	Assessment of the project defence	50%

Required textbooks and other reading	
1	Langmann, C., Turi, D., Robotic Process Automation (RPA) - Digitization and Automation of Processes Prerequisites, functionality and implementation using accounting as an example, Springer, 2022.
2	Czarnecki, C., & Fettke, P. (Eds.), Robotic Process Automation: Management, Technology, Applications, De Gruyter Oldenbourg, 2021.

Recommended (supplementary) textbooks and other reading	
1	Platforma e-learningowa <a href="https://university.blueprism.com/">https://university.blueprism.com/</a> ,

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	45
Participation in lectures	15
Participation in laboratories	30
Student's own work, including:	30
Preparation for the final assessment	10
Project preparation	20
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix
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Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W02+++ AIBS_W11+++ AIBS_W14++ AIBS_W16+++	C1	W1-W6	1, 3	O1
EK 2	AIBS_W07++ AIBS_W16+++	C2	W2-W6	1	O1
EK 3	AIBS_U01++ AIBS_U03++	C3	L1-L8	2, 3	O2-O4
EK 4	AIBS_U01++ AIBS_U07++ AIBS_U18+++	C1, C3	L8	3	O2, O4
EK 5	AIBS_U11+++	C3	L1-L8	2, 3	O2- O4
EK 6	AIBS_K01+++ AIBS_K03+++	C4	W1-W6, L1-L8	1-3	O1-O4
EK 7	AIBS_K06++	C4	L1-L8	2, 3	O2-O4
EK 8	AIBS_K06++	C4	W2, W6	1	O1

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<b>Organizational unit:</b>	Department of Information and Business Processes

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Business analysis and analytical thinking</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 39 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To develop knowledge and skills in the core concepts of business analysis and its role in organisations, including contemporary challenges and dilemmas
<b>C2</b>	To build analytical thinking, business problem-solving, and a systematic approach to analysing business problems
<b>C3</b>	To acquire and apply techniques for aggregating, analysing, and interpreting business data
<b>C4</b>	To develop the ability to participate in debate – communicating to stakeholders and critically assessing positions on the use of artificial intelligence

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Fundamental knowledge of business processes and how organisations operate
<b>2</b>	Foundations of computer science and information systems

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has advanced knowledge of business analysis methods and techniques.
<b>EK 2</b>	knows methods, techniques, and tools for eliciting and specifying business requirements, including ethical considerations.
<b>EK 3</b>	has knowledge of key business processes and their interactions within an organisation.
	<b>In the terms of skills:</b>
<b>EK 4</b>	formulates problems and applies techniques for eliciting and analysing business requirements

EK 5	analyses business problems and proposes solutions, critically evaluating positions on the use of artificial intelligence
EK 6	documents business requirements in accordance with accepted standards
	<b>In the terms of social skills:</b>
EK 7	is ready to critically self-assess their business-analysis competencies, including setting realistic goals and prioritising actions in a complex project environment
EK 8	is ready to think and act entrepreneurially and to seek expert advice when independent resolution of work-related problems proves difficult
<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
W1	Introduction to business analysis – definitions, roles, application areas.
W2	Analytical thinking – core principles and techniques.
W3	Stakeholder analysis and needs identification.
W4	Types of requirements – business, functional, non-functional.
W5	Requirements elicitation techniques – interviews, workshops, observation.
W6	Business process analysis – identification and modelling; critical evaluation.
W7	Process-modelling tools – UML, BPMN.
W8	Gap analysis and problem identification.
W9	Requirements prioritisation techniques.
W10	Requirements documentation – standards and good practices.
W11	Requirements change management.
W12	Risk analysis in business projects.
W13	Success measures and KPIs in business analysis.
W14	Presenting business-analysis results – stakeholder communication.
W15	The future of business analysis – trends, emerging technologies, dilemmas.
<b>Class format: laboratory</b>	
	Course content
L1	Identifying stakeholders in a sample AI project.
L2	Conducting stakeholder interviews.
L3	Analysing and categorising business requirements.
L4	Creating business process maps.
L5	Modelling processes in BPMN.
L6	Gap analysis between the current and target states.
L7	Prioritising requirements with MoSCoW.
L8	Preparing a Business Requirements Specification (BRS).
L9	Case study analysis – comprehensive business problem.
L10	Identifying and assessing project risk.
L11	Defining success measures and KPIs for the project.
L12	Preparing and delivering the analysis presentation.
L13	Design thinking workshop – problem solving.
L14	Team project – analysis of a real business case.

Didactic methods	
1	Informative lecture
2	Laboratory exercises
3	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	60%
O2	Assessment of completed laboratory reports	80%

Required textbooks and other reading	
1	IIBA, A Guide to the Business Analysis Body of Knowledge (BABOK Guide):3, International Institute of Business Analysis, 2015.
2	Pohl, Klaus, Rupp, Chris. Requirements Engineering Fundamentals. Rocky Nook, 2015.
3	Cadle, J., Paul, D., & Turner, P. (2014). Business analysis techniques: 99 essential tools for success (2nd ed.). BCS, The Chartered Institute for IT.
Recommended (supplementary) textbooks and other reading	
1	Cadle, James, et al. Business Analysis Techniques: 72 Essential Tools for Success. BCS, 2010.
2	Leffingwell, Dean, Widrig Don. Managing Software Requirements: A Use Case Approach. Addison-Wesley, 2003.
3	Young, Ralph R. The Requirements Engineering Handbook. Artech House, 2003.

Student's Workload	
Form of activity	Average number of hours to complete activities
<b>Contact hours with instructor including:</b>	45
Participation in lectures.	15
Participation in laboratory	30
<b>Student's own work, including:</b>	30
Preparation for classes	15
Preparation for assessment	15
<b>Total student's workload</b>	75
<b>Total number of the course ECTS credits</b>	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined	Course objectives	Course content	Didactic methods	Evaluation methods



	for the field of study				
EK 1	AIBS_W01+ AIBS_W05++ AIBS_W11+++	C1, C2	W1-W5	1	O1
EK 2	AIBS_W08++ AIBS_W11+++ AIBS_W16+++	C1, C2	W6-W10	1	O1
EK 3	AIBS_W05+ AIBS_W08+++	C1, C2	W11-W15	1	O1
EK 4	AIBS_U01+ AIBS_U02++ AIBS_U05+++ AIBS_U18++	C1, C2, C3, C4	L1-L4	2, 3	O2
EK 5	AIBS_U05+++ AIBS_U11+ AIBS_U12++ AIBS_U18++	C1, C2, C3, C4	L5-L9	2, 3	O2
EK 6	AIBS_U05+++ AIBS_U07++	C1, C2, C3	L10-L14	2	O2
EK 7	AIBS_K01+++	C1, C2, C3	W1-W15 L1-L14	1, 2	O1, O2
EK 8	AIBS_K03+++ AIBS_K02++	C1, C2, C3	W1-W15 L1-L14	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>BI i storytelling</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 48 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To develop knowledge and skills in Business Intelligence (BI) concepts and methodologies
<b>C2</b>	To develop knowledge and skills in data visualisation techniques and business storytelling
<b>C3</b>	To develop knowledge and skills in designing and implementing BI solutions
<b>C4</b>	To build the ability to critically evaluate positions on the use of AI and BI in business

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of database and SQL fundamentals.

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has knowledge of the concept of Business Intelligence
<b>EK 2</b>	knows methods, techniques, and tools for building BI system architectures and data warehouses
<b>EK 3</b>	knows the principles of effective business storytelling, including ethical considerations
	<b>In the terms of skills:</b>
<b>EK 4</b>	designs and implements BI solutions, critically evaluating their use cases
<b>EK 5</b>	creates effective data visualisations using BI tools
<b>EK 6</b>	prepares analytical reports and dashboards and presents findings clearly to business audiences

	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to critically self-assess their competencies in BI and storytelling, including setting realistic goals and prioritising actions in the workplace
<b>EK 8</b>	is ready to think and act entrepreneurially and to seek expert advice when independent resolution of work-related problems proves difficult
<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to Business Intelligence – definitions, history, and business impact.
<b>W2</b>	BI system architecture – components, models, standards.
<b>W3</b>	Data warehousing – multidimensional modelling; star and snowflake schemas.
<b>W4</b>	ETL/ELT processes – methodologies and tools.
<b>W5</b>	OLAP analysis – concepts, operations, implementations.
<b>W6</b>	Data mining – methods, algorithms, business applications.
<b>W7</b>	Reporting systems – report types and automation.
<b>W8</b>	Dashboards and executive cockpits – design and best practices.
<b>W9</b>	Storytelling fundamentals – narrative in data presentations.
<b>W10</b>	Data visualisation – principles, chart types, perception psychology, ethics.
<b>W11</b>	Communicating results – presentations and executive reports.
<b>W12</b>	BI trends – self-service BI, augmented analytics, AI in BI.
<b>Class format: laboratory</b>	
	Course content
<b>L1</b>	Installing and configuring BI tools
<b>L2</b>	Business case analysis – identifying BI needs
<b>L3</b>	Designing multidimensional models
<b>L4</b>	Building simple ETL processes
<b>L5</b>	Developing analytical reports
<b>L6</b>	Designing dashboards
<b>L7</b>	Working with databases – connections and SQL queries
<b>L8</b>	Creating data models in BI tools
<b>L9</b>	Building interactive dashboards
<b>L10</b>	Implementing data-mining solutions
<b>L11</b>	Creating business presentations using data storytelling

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>
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Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	60%
O2	Assessment of completed laboratory reports	60%

Required textbooks and other reading	
1	Knafllic, C. N. Storytelling with Data: A Data Visualization Guide for Business Professionals. Wiley, 2015.
2	Turban, E., Sharda, R., Delen, D. Business Intelligence and Analytics: Systems for Decision Support. Pearson, 2014.
3	Kimball, R., Ross, M. The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling. Wiley, 2013.
1	Cairo, A. The Truthful Art: Data, Charts, and Maps for Communication. New Riders, 2016.
2	Provost, F., Fawcett, T. Data Science for Business. O'Reilly Media, 2013.

Student's Workload	
Form of activity	Average number of hours to complete activities
Contact hours with instructor including:	45
Participation in lectures.	15
Participation in laboratory classes	30
Student's own work, including:	30
Preparation for classess	15
Preparation for the final assessment	15
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W08+++ AIBS_W05++	C1, C2	W1-W4	1	O1
EK 2	AIBS_W08+++ AIBS_W06++ AIBS_W16++	C1, C2	W5-W8	1	O1
EK 3	AIBS_W08+++	C1, C2	W8-W12	1, 3	O1

	AIBS_W10++ AIBS_W11+ AIBS_W16++				
<b>EK 4</b>	AIBS_U04+++ AIBS_U01++ AIBS_U12++ AIBS_U18++	C2, C3	L1-L2	2, 3	O2
<b>EK 5</b>	AIBS_U04+++ AIBS_U08++ AIBS_U18++	C1, C2, C3	L3-L11	2	O2
<b>EK 6</b>	AIBS_U04+++ AIBS_U07++	C1, C2, C3	L3-L11	2	O2
<b>EK 7</b>	AIBS_K01+++	C1, C2, C3	W1 – W12 L1 – L11	1, 2	O1, O2
<b>EK 8</b>	AIBS_K03+++ AIBS_K02++	C1, C2, C3	W1 – W12 L1 – L11	1, 2	O1, O2

<b>Author of the course syllabus:</b>	dr inż. Jakub Pizoń, mgr inż. Michał Cioch, mgr Justyna Michaluk
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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Exploratory Data Analysis and Visualisation</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 49 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To introduce core concepts, techniques, and tools of Exploratory Data Analysis (EDA) and visualisation, their role in knowledge discovery from data, and typical application areas
<b>C2</b>	To develop the ability to conduct EDA using appropriate statistical methods and data-visualisation tools
<b>C3</b>	To build competence in interpreting EDA results and presenting them effectively, supporting decision-making and further modelling, with attention to the ethical aspects of reporting analyses

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows selected methods of exploratory data analysis (EDA) and data-visualisation techniques
<b>EK 2</b>	knows tools that support EDA and data visualisation
<b>EK 3</b>	knows the types of visualisations used in EDA and understands how to choose them by data type and analytic purpose, including ethical considerations

	<b>In the terms of skills:</b>
EK 4	performs preliminary data analysis and prepares data for exploration and visualisation.
EK 5	creates a range of data visualisations that support discovering patterns and relationships.
	<b>In the terms of social skills:</b>
EK 6	is ready to communicate EDA results clearly and responsibly – including their visual presentation – tailored to the audience and decision context
EK 7	is ready to consider the ethical aspects of analysing and presenting data, taking responsibility for the accuracy and transparency of visualisations

Course content	
Class format: lectures	
	Course content
W1	Basics of visualisation and data acquisition methods.
W2	Advanced data-preparation techniques for visualisation.
W3	Graphical representation of categorical data and statistical distributions.
W4	Visualising relationships between variables.
W5	Advanced visualisations of networks and flows.
W6	Visualisation and analysis of time-series data.
W7	Advanced techniques for spatial-data visualisation.
W8	From data acquisition to visualisation – principles for choosing methods and reporting techniques, including ethical aspects of data presentation.
Class format: laboratory	
	Course content
L1	Course introduction: diversity, uncertainty, and context in graphical data representation; sources on data-visualisation methods.
L2	Data acquisition and preparation: collection, organisation, and initial assessment for analysis.
L3	Visual exploratory techniques (EDA).
L4	Data quality & preprocessing: imputation, outlier detection, factorisation/encoding, dimensionality reduction.
L5	Categorical data & proportions: bar/column charts, pie and radial charts, treemaps.
L6	Descriptive statistics & distributions: histograms, box plots, population pyramids.
L7	Relationships between variables: scatter and bubble charts; matrix-based plots – heatmaps, mosaic plots, bubble tables.
L8	Network/flow visualisation: network diagrams (undirected/directed), chord diagrams, Sankey diagrams, relational heatmaps.

<b>L9</b>	Time-series visualisation: column/stacked, scatter, line and step charts, trend plots, Gantt charts, bump charts (rank changes).
<b>L10</b>	Detail in scatter/distribution plots: shading chart regions, highlighting outliers/specific areas, marking clusters, connecting points.
<b>L11</b>	Spatial data (I): using existing maps; loading & basic processing; coordinate reference systems (CRS); map types.
<b>L12</b>	Spatial data (II): raster basemaps; placing points, charts, and symbols; drawing flows on maps.
<b>L13</b>	Building dynamic, interactive visualisations.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper (with open-ended questions)	50%
<b>O2</b>	Assessment of completed laboratory exercises	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Kabacoff R., Modern Data Visualization with R. 1 st ed. Chapman & Hall, 2024.
<b>2</b>	Mailund T., Beginning Data Science in R 4. Apress Berkeley, CA, 2022.
<b>3</b>	Mailund, Thomas. Beginning Data Science in R: Data Analysis, Visualization, and Modelling for the Data Scientist. 1st ed. edition. Berkeley, CA: Apress L. P, 2017.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Maindonald J., Braun J. W., Data Analysis and Graphics Using R – an Example-Based Approach, Third Edition, Cambridge University Press, Cambridge 2010.
<b>2</b>	Rahlf T., Data Visualisation with R. 111 Examples, Second Edition, Springer, Germany, Bonn 2019.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in laboratory classes	30

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<b>Student's own work, including:</b>	<b>30</b>
Preparation for the laboratory	15
Preparation for the final assessment	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W08+++ AIBS_W07++ AIBS_W06+	C1	W1, W3-W7	1	O1
<b>EK 2</b>	AIBS_W08 ++ AIBS_W07 ++ AIBS_W05 +	C1, C2	W1, W2	1	O1
<b>EK 3</b>	AIBS_W08++ AIBS_W11++ AIBS_W13+ AIBS_W16+++	C1, C2, C3	W3-W7,	1	O1
<b>EK 4</b>	AIBS_U04++ AIBS_U02++ AIBS_U18+++	C2	W2, L2, L4	2	O2
<b>EK 5</b>	AIBS_U04 +++ AIBS_U03 + AIBS_U02 ++ AIBS_U18+	C2, C3	L5-L13	2	O2
<b>EK 6</b>	AIBS_U04 +++ AIBS_U03 + AIBS_U02 ++	C3	W1-W7, L1-L13	1, 2	O1, O2
<b>EK 7</b>	AIBS_K06+++	C3	W1-W7, L1-L13	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Financial Modelling</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 50 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introducing students to the applications of financial models in decision-making related to corporate financial management
<b>C2</b>	Introducing students to the methods used in financial modeling
<b>C3</b>	Teaching students how to create a financial model for a company
<b>C4</b>	Developing financial analysis skills and applying them to the verification and optimization of a financial model

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Has knowledge and skills in financial analysis

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows selected methods and tools for financial modelling of a firm's operations, including forecasting techniques for preparing projections of financial-statement items, leveraging statistical methods and IT/analytics tools.
<b>EK 2</b>	understands the nature of a financial model and its importance for managerial decision-making in the enterprise.
<b>EK 3</b>	has advanced knowledge of preparing the components of financial statements and their interrelationships, and understands the foundations of financial modelling based on the structure of selected reporting elements.

<b>EK 4</b>	knows and understands the principles of building dynamic financial models and their application in financial planning.
	<b>In the terms of skills:</b>
<b>EK 5</b>	selects and applies descriptive statistics and financial-analysis methods to properly develop a financial model.
<b>EK 6</b>	builds a dynamic financial model that incorporates key drivers and data sources and links the three statements – income statement (P&L), cash-flow statement, and balance sheet.
<b>EK 7</b>	applies financial-forecasting techniques when constructing the firm's financial model and uses them to plan/shape financial performance.
	<b>In the terms of social skills:</b>
<b>EK 8</b>	is ready to build financial models to better understand a firm's financial processes and to analyse the impact of decisions on the company's financial position

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to financial modelling – the nature of a financial model; model-based financial planning; model structure; model variables; data sources; principles for building dynamic models.
<b>W2</b>	Forecasting in financial modelling – financial forecasting techniques: naïve methods, moving averages, exponential smoothing, trend models, and time-series decomposition for forecasting sales revenues.
<b>W3</b>	Revenue planning based on market analysis.
<b>W4</b>	Planning sources of finance, including loan amortisation/repayment schedules.
<b>W5</b>	Modelling operating activities of the enterprise.
<b>W6</b>	Modelling operating costs, including depreciation planning.
<b>W7</b>	Model components – modelling the profit and loss account (income statement), cash-flow statement, and balance-sheet projection.
<b>W8</b>	Model verification, analysis, and optimisation – ratio analysis; scenario and sensitivity analysis; risk and profitability assessment.
<b>Class format: laboratory</b>	
	Course content
<b>L1</b>	Introduction to modelling – stages of building a financial model; case study of an enterprise financial model
<b>L2</b>	Forecasting and modelling revenues using naïve methods, moving averages, and exponential smoothing
<b>L3</b>	Forecasting and modelling revenues using trend (growth) models
<b>L4</b>	Revenue planning based on market analysis
<b>L5</b>	Modelling enterprise resources – fixed assets and depreciation planning

<b>L6</b>	Modelling operating costs of the enterprise
<b>L7</b>	Forecasting finance costs – loan repayment scheduling
<b>L8</b>	Modelling the income statement (P&L)
<b>L9</b>	Modelling working-capital requirements
<b>L10</b>	Projecting and modelling the cash-flow statement – operating cash flows
<b>L11</b>	Projecting and modelling the cash-flow statement – investing and financing cash flows
<b>L12</b>	Projecting and modelling the pro forma balance sheet – fixed and current assets
<b>L13</b>	Projecting and modelling the pro forma balance sheet – capital structure planning and equity/liabilities projection
<b>L14</b>	Model verification and optimisation

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Case study
<b>3</b>	Laboratory exercises
<b>4</b>	Modelling

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper	51%
<b>O2</b>	Assessment of completed laboratory exercises	51%
<b>O3</b>	Assessment of the prepared project	51%

<b>Required textbooks and other reading</b>	
<b>1</b>	Rees M., Essentials of Financial Modeling in Excel: A Concise Guide to Concepts and Methods, John Wiley & Son Inc, New Jersey 2023.
<b>2</b>	Avon J., The Handbook of Financial Modeling: A Practical Approach to Creating and Implementing Valuation Projection Models, Apress, New York, 2020.
<b>3</b>	Tija J. S., Building Financial Models, Third Edition: The Complete Guide to Designing, Building, and Applying Projection Models, 3rd Edition, McGraw Hill, New York, 2018.
<b>4</b>	Samonas M., Financial Forecasting, Analysis, and Modelling: A Framework for Long-Term, John Wiley & Son Inc, New Jersey 2015.

<b>Recommended (supplementary) textbooks and other reading</b>
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1	Jack A., Financial Planning & Analysis and Performance Management, John Wiley & Son Inc, New Jersey 2018.
2	Lee J., Lee C., Financial Analysis, Planning and Forecasting: Theory and Application (Third Edition), World Scientific Publishing Company, 2016.
3	Pignataro P., Financial Modeling and Valuation: A Practical Guide to Investment Banking and Private Equity, Second Edition, John Wiley & Sons Inc, 2022.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in laboratory classes	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for the lecture assessment	10
Preparation for the laboratory	5
Work on the financial model project	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W01++ AIBS_W06++ AIBS_W07+ AIBS_W08+	C2	W2, W7, W8	1	O1
EK 2	AIBS_W01++ AIBS_W05+ AIBS_W06++ AIBS_W09+ AIBS_W16+	C1	W1, W5	1	O1
EK 3	AIBS_W01++ AIBS_W05+ AIBS_W06+ AIBS_W07+ AIBS_W08++ AIBS_W16+	C2	W3, W6, W7	1	O1

<b>EK 4</b>	AIBS_W06++ AIBS_W02+ AIBS_W06+ AIBS_W07++ AIBS_W08++	C2, C3	W1, W4, W8	1	O1
<b>EK 5</b>	AIBS_U02+++ AIBS_U04++	C2, C3	L2-L3, L6 -L7	3, 4	O2, O3
<b>EK 6</b>	AIBS_U01+ AIBS_U02++ AIBS_U18+++	C2, C3, C4	L1, L5, L8-L13	3, 4	O2, O3
<b>EK 7</b>	AIBS_U02++ AIBS_U05++ AIBS_U17+ AIBS_U18+	C1, C2, C3	L2-L4, L7, L14	3, 4	O2, O3
<b>EK 8</b>	AIBS_K01+	C1, C2, C3, C4	W1-W8 L1-L14	1, 2, 3, 4	O1, O2, O3

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<b>Organizational unit:</b>	Department of Finance and Accounting

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Foundations of BI Ops and MLOps</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 51 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	To develop knowledge and skills in Machine Learning Operations (MLOps) and the lifecycle of ML models
<b>C2</b>	To develop knowledge and skills in implementing CI/CD processes for analytical systems and ML models
<b>C3</b>	To develop knowledge and skills in tools for monitoring, versioning, and managing ML models in production

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Foundations of programming in Python
<b>2</b>	Introductory machine learning knowledge
<b>3</b>	Knowledge of database and SQL fundamentals

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has advanced knowledge of Business Intelligence Operations concepts and their role in the organization
<b>EK 2</b>	knows MLOps methods, techniques, and tools, and the lifecycle of ML models in business applications
<b>EK 3</b>	has knowledge of modern technologies for ML model versioning, monitoring, and deployment
<b>EK 4</b>	has knowledge of techniques for automating analytical processes and CI/CD for ML
	<b>In the terms of skills:</b>

EK 5	applies software tools to design and implement MLOps pipelines for machine-learning models.
EK 6	designs and deploys basic BI Ops processes in a business environment and implements CI/CD for analytical systems.
EK 7	uses tools for ML model versioning and monitoring.
	<b>In the terms of social skills:</b>
EK 8	is ready to set realistic goals and prioritise actions in BI Ops and MLOps analytics/engineering projects, taking into account personal capabilities, technological constraints, and production-environment requirements
EK 9	is ready to think and act entrepreneurially and to seek expert advice when independent resolution of work-related problems proves difficult

Course content	
Class format: lectures	
	Course content
W1	Introduction to Business Intelligence Operations – definitions, scope, and organizational significance.
W2	BI system architecture – data warehouse, data lake, ETL/ELT.
W3	Introduction to MLOps – definition, importance, and differences vs. DevOps.
W4	ML model lifecycle – from experimentation to production.
W5	Data & model versioning – Git LFS, DVC, MLflow.
W6	Containerization & orchestration – Docker, Kubernetes for ML.
W7	CI/CD for analytics systems – Jenkins, GitHub Actions, GitLab CI.
W8	Model monitoring – drift detection and performance monitoring.
W9	Model deployment – REST APIs, batch processing, real-time inference.
W10	Security in MLOps – secrets management and auditability.
W11	Scaling ML systems – load balancing and auto-scaling.
W12	Best practices & case studies – enterprise implementation examples.

Class format: laboratory	
	Course content
L1	<b>BI environment setup</b> – analytics tools, database connections.
L2	<b>Build simple ETL pipelines</b> using Apache Airflow.
L3	<b>Set up an MLOps environment</b> – MLflow, DVC, Docker.
L4	<b>Version ML experiments</b> with MLflow.
L5	<b>Implement a CI/CD pipeline</b> for an ML model using GitHub Actions.
L6	<b>Deploy an ML model as a REST API</b> with FastAPI.
L7	<b>Monitor ML models in production.</b>
L8	<b>Build a monitoring system</b> for a classification model.
L9	<b>Automate BI processes</b> – create reports and dashboards.
L10	<b>Implement A/B testing</b> for ML models.
L11	<b>Scale and optimize ML pipelines.</b>
L12	<b>Security &amp; compliance</b> in analytics systems.



Didactic methods	
1	Informative lecture
2	Laboratory exercises

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper	60%
O2	Assessment of completed laboratory reports	80%

Required textbooks and other reading	
1	Gift, Noah, et al. Practical MLOps. O'Reilly Media, 2021.
2	Alla, Sridhar, et al. Beginning MLOps with MLFlow. Apress, 2021.
3	Treveil, Mark, et al. Introducing MLOps. O'Reilly Media, 2020.
1	Huyen, Chip. Designing Machine Learning Systems. O'Reilly Media, 2022.
2	Dokumentacja MLflow: <a href="https://mlflow.org/docs/latest/index.html">https://mlflow.org/docs/latest/index.html</a>
3	Dokumentacja Apache Airflow: <a href="https://airflow.apache.org/docs/">https://airflow.apache.org/docs/</a>

Student's Workload	
Form of activity	Average number of hours to complete activities
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures.	15
Participation in laboratory classes	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for classes	15
Preparation for the assessment	15
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W07+++ AIBS_W02++	C1, C2	W1-W3	1	O1



	AIBS_W16++				
EK 2	AIBS_W07+++ AIBS_W01+ AIBS_W16++	C1, C2	W1-W3	1	O1
EK 3	AIBS_W07+++ AIBS_W03++	C1, C2	W4-W12	1	O1
EK 4	AIBS_W07+++ AIBS_W10+	C2, C3	W4-W12	1	O1
EK 5	AIBS_U03+++ AIBS_U08++	C2, C3	L1-L3	2	O2
EK 6	AIBS_U03+++ AIBS_U09++ AIBS_U18+++	C1, C2, C3	L4-L12	2	O2
EK 7	AIBS_U03+++ AIBS_U04++	C1, C2, C3	L4-L12	2	O2
EK 8	AIBS_K01+++	C1, C2, C3	W1 - W12 L1 - L15	1, 2	O1, O2
EK9	AIBS_K05+++, AIBS_K02++	C1, C2, C3	W1 - W12 L1 - L15	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Ethical and Philosophical Aspects of Artificial Intelligence</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S02 22 00
<b>Year:</b>	I
<b>Term:</b>	2
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	30
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Raise students' awareness of the ethical and philosophical challenges involved in deploying AI in the business sector
<b>C2</b>	Analyze moral and ontological problems posed by autonomous systems implemented within organizations
<b>C3</b>	Develop the ability to critically evaluate positions on the use of AI in business and to make decisions aligned with organizational values and corporate social responsibility
<b>C4</b>	Build skills to identify and assess ethical risks in AI projects

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	know key ethical and philosophical dilemmas in AI applications
<b>EK 2</b>	is familiar with ethical frameworks – deontology, utilitarianism, and virtue ethics – and can apply them to business cases
<b>EK 3</b>	knows major ethical guidelines and regulatory frameworks and can assess their impact on AI projects

	<b>In the terms of skills:</b>
EK 4	applies selected normative ethical frameworks to analyze AI use cases.
EK 5	independently assesses ethical risks and algorithmic/ data bias in ML models.
EK 6	critically evaluates positions on the use of AI in business and proposes Responsible AI recommendations and guidelines for AI projects and products.
	<b>In the terms of social skills:</b>
EK 7	is ready to understand and critically analyze ethical and metaethical disputes related to AI, apply philosophical frameworks to assess business practices, and formulate normative arguments for the design and deployment of intelligent systems.

Course content	
Class format: lectures	
	Course content
W1	The ontological status of programs and data – an introduction to the philosophy of AI.
W2	The Aristotelian ethos of <i>technē</i> in the open-source era – classical and contemporary ethical theories applied to AI.
W3	Algorithmic decision-making and moral responsibility – models of blame, accountability, and agency.
W4	Implementing ethical principles in AI-driven organizations – practical risk-management strategies.
W5	AI system autonomy and human freedom – typologies of human-machine relations.
W6	Limits of the artificial mind: machine consciousness, the problem of qualia, and the simulation of experience.
W7	The moral personhood/ status of AI – can artificial systems be full moral subjects?
W8	Transparency and explainability of algorithms – the role of Explainable AI (XAI).
W9	Regulatory challenges and ethical codes for AI – current landscape and future directions.
W10	Transhumanism and posthumanism – the role of AI in the evolution of the human species.
W11	AI's impact on the labor market and social transformation – scenarios of adaptation and exclusion.
W12	Information manipulation and algorithmic power – Foucauldian panopticism, deepfakes, and the epistemic crisis.
W13	Superintelligence – potential existential risks to humanity.
W14	Futures of AI – from utopian visions to dystopian risks.

<b>W15</b>	Meta-reflection and the role of AI professionals – the responsibilities of researchers, engineers, and decision-makers.
<b>Class format: practical classes</b>	
Course content	
<b>ĆW1</b>	Case studies – ethical challenges of deploying AI in companies.
<b>ĆW2</b>	Critical analysis of philosophical texts on consciousness, mind, and machine intelligence.
<b>ĆW3</b>	Can AI be a partner in strategic decision-making?
<b>ĆW4</b>	Automation of society – progress or threat? Argumentation, analysis, and evaluation of positions.
<b>ĆW5</b>	Ethics-committee simulation assessing an AI project: drafting ethical guidelines for AI use.
<b>ĆW6</b>	Team project presentations – discussion on the future of AI and the ethical challenges of its development.
<b>ĆW7</b>	Final reflection, evaluation, and guidance for further developing Responsible AI competencies.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Conversational lecture
<b>3</b>	Working with the primary source text
<b>4</b>	Case study

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed course exercises	60%
<b>O2</b>	Assessment of class participation	Formative assessment without a passing threshold
<b>O3</b>	Assessment of a written paper (test)	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Anderson, M., & Anderson, S. L., Machine ethics, Cambridge University Press, 2011. <a href="https://doi.org/10.1017/CBO9780511978036">https://doi.org/10.1017/CBO9780511978036</a> .
<b>2</b>	Anscombe, G. E. M., Modern moral philosophy. In M. Geach & L. Gormally (Eds.), Human life, action and ethics: Essays by G. E. M. Anscombe, Academic Press, 2005.
<b>3</b>	Aristotle, Nicomachean ethics (T. Irwin, Trans.), Hackett Publishing, 1999.
<b>4</b>	Bostrom, N., Superintelligence: Paths, dangers, strategies. Oxford University Press, 2014.

5	Floridi, L., The ethics of artificial intelligence: Principles, challenges, and opportunities, Oxford University Press, 2023.
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Recommended (supplementary) textbooks and other reading	
1	Annas, J., Virtue ethics. In D. Copp (Ed.), The Oxford handbook of ethical theory, Oxford University Press, 2006.
2	Brynolfsson, E., & McAfee, A., The second machine age: Work, progress, and prosperity in a time of brilliant technologies, W. W. Norton, 2014.
3	Bryson, J. J., Robots should be slaves. In Y. Wilks (Ed.), Close engagements with artificial companions: Key social, psychological, ethical and design issues (pp. 63–74). John Benjamins Publishing Company, 2010. <a href="https://doi.org/10.1075/nlp.8.11bry">https://doi.org/10.1075/nlp.8.11bry</a>
4	Bryson, J. J., Patiency is not a virtue: AI and the design of ethical systems. In Ethical and moral considerations in non-human agents: Papers from the 2016 AAAI Spring Symposium (Tech. Rep. SS-16-04), AAAI Press, 2016.
5	Burton, E., Goldsmith, J., & Mattei, N., Teaching AI ethics using science fiction. In Artificial intelligence and ethics: Papers from the 2015 AAAI Workshop (pp. 33–37), AAAI Press, 2015.
6	Russell, S., Dewey, D., & Tegmark, M., Research priorities for robust and beneficial artificial intelligence. AI Magazine, 36(4), 105–114, 2015.
7	Russell, S., & Norvig, P., Artificial intelligence: A modern approach (3rd ed.). Pearson, 2009.
8	Trappl, R. (Ed.), A construction manual for robots' ethical systems. Springer, 2015.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	45
Participation in lectures	15
Participation in classes	30
Student's own work, including:	30
Preparation for the assessment	20
Preparation for classes	10
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects	Course objectives	Course content	Didactic methods	Evaluation methods

	defined for the field of study				
EK 1	AIBS_W01+++ AIBS_W11+++	C1	W1-W3, W5, W7, W11, W12	1, 2	O3
EK 2	AIBS_W01+++ AIBS_W11++	C2	W2, W6, W7, W10, W13	1, 2	O3
EK 3	AIBS_W01+++ AIBS_W11+++	C3	W4, W8, W9, W15, W14	1, 2	O3
EK 4	AIBS_U01+++	C1	ĆW1, ĆW3, ĆW4, ĆW7	3	O1, O2
EK 5	AIBS_U01+++ AIBS_U12+++	C2	ĆW2, ĆW5, ĆW7	3	O1, O2
EK 6	AIBS_U01+++ AIBS_U12+++	C3	ĆW5, ĆW6, ĆW7	3	O1, O2
EK 7	AIBS_K01+++ AIBS_K05++	C4	ĆW1-ĆW7, W1-W15	1, 2, 3	O1, O2

<b>Author of the course syllabus:</b>	Dr hab. inż. Marcin Gąsior, prof. Uczelni, Mgr inż. Weronika Wilczewska
<b>E-mail address:</b>	m.gasior@pollub.pl, w.wilczewska@pollub.pl
<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Machine Learning and Artificial Intelligence Models in Business</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 40 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Understanding regression and classification methods used in machine learning and artificial intelligence
<b>C2</b>	Ability to build AI models with programming tools (Python, R, TensorFlow, Keras)
<b>C3</b>	Understanding how to evaluate model quality and critically analyze results
<b>C4</b>	Ability to identify problems and critically assess the use of AI/ML approaches to solve them
<b>C5</b>	Developing habits of systematic learning and project-based work

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can build and train AI/ML models using appropriate libraries and programming languages
<b>EK 2</b>	can compare models for quality and efficiency, and critically evaluate viewpoints on their use in business



<b>EK 3</b>	can select a model suited to the problem – even under incomplete information – taking into account its system-level and epistemic assumptions
	<b>In the terms of social skills:</b>
<b>EK 4</b>	is prepared to independently and systematically broaden their AI/ML knowledge, drawing on professional literature and expert consultations – especially amid rapidly evolving technologies
<b>EK 5</b>	is prepared to independently define and solve practical problems using AI/ML tools, demonstrating technological responsibility, an entrepreneurial mindset, and the ability to collaborate with experts in digital environments

<b>Course content</b>	
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Implementation of linear regression and regularization (ridge, lasso) in Python/R.
<b>L2</b>	Data transformation and dimensionality reduction (PCA, ICA); PCR/PLS regression.
<b>L3</b>	Building classification models: logistic and probit regression, LDA, QDA.
<b>L4</b>	Decision trees, random forests, k-NN, Naive Bayes.
<b>L5</b>	Introduction to SVM; comparison with other classifiers.
<b>L6</b>	Designing and training simple neural networks: perceptron, MLP.
<b>L7</b>	Convolutional and recurrent models (CNN, RNN) – architecture and applications.
<b>L8</b>	Model evaluation and comparison: ROC curves, confusion matrix, hyperparameter tuning – assessing applicability.

<b>Didactic methods</b>	
<b>1</b>	Guided class discussion
<b>2</b>	Laboratory classes

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of completed laboratory exercises	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Wickham H., Golemund G. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, O'Reilly Media, 2017.
<b>2</b>	Chollet F., Allaire J. J. Deep Learning with R, 2nd Edition, Manning Publications, 2022.



3	Chollet F. Deep Learning with Python, 2nd Edition, Manning Publications, 2021.
4	Keras documentation: <a href="https://keras.io">https://keras.io</a> – Official documentation (in English by default).
5	Stevens E., Antiga L., Viehmann T. – Deep Learning with PyTorch, Manning Publications, Shelter Island 2020.

<b>Recommended (supplementary) textbooks and other reading</b>	
1	Chatterjee S., Hadi A. S., Regression Analysis by Example, Wiley, 2012.
2	Fox J., Weisberg S., An R Companion to Applied Regression, Sage Publications Inc., New York 2018.
3	James G., Witten D., Hastie T., Tibshirani R. An Introduction to Statistical Learning with Applications in R, Second Edition, Springer, 2021.
4	Kuhn M., Johnson K., Applied Predictive Modeling, Springer, Berlin 2013.
5	Géron A., Hands-On Machine Learning with Scikit-Learn, Keras, and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media, Sebastopol 2019.
6	Ravichandiran S., Hands-On Deep Learning Algorithms with Python, Packt Publishing, Birmingham 2019.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>30</b>
Participation in laboratory classes	30
<b>Student's own work, including:</b>	<b>20</b>
Preparation for classes	10
Preparation of laboratory reports	20
<b>Total student's workload</b>	<b>50</b>
<b>Total number of the course ECTS credits</b>	<b>2</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U03+++ AIBS_U07++	C2, C3	L1-L4	2, 3	O1
<b>EK 2</b>	AIBS_U01++ AIBS_U12++	C3	L5, L8	2, 3	O1

	AIBS_U15+++				
<b>EK 3</b>	AIBS_U03++ AIBS_U15+++ AIBS_U14+ AIBS_U18+++ AIBS_U19+++	C4	L4-L7	2, 3	O1
<b>EK 4</b>	AIBS_K01+++ AIBS_K03++ AIBS_K05+++	C5	L1-L8	1, 2, 3	O1
<b>EK 5</b>	AIBS_K01++ AIBS_K03+++ AIBS_K04++ AIBS_K05++	C4, C5	L1-L8	2, 3	O1

<b>Author of the course syllabus:</b>	Dr Piotr Oleszczuk
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>AI for Business Optimization</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S06 56 00
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	60
Lecture	30
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduction to the theory and practice of mathematical optimization in the context of business problems
<b>C2</b>	Acquisition of skills to model and solve optimization problems using AI tools
<b>C3</b>	Development of competencies for implementing optimization algorithms for real-world business applications, including under conditions of incomplete information
<b>C4</b>	Building the ability to analyse and interpret optimization results for business decision-making, with attention to ethical considerations

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	the fundamental concepts of mathematical optimization and its applications to business problems
<b>EK 2</b>	types of optimization problems: linear programming, integer/mixed-integer programming, and nonlinear programming
<b>EK 3</b>	advanced optimization techniques that leverage artificial intelligence and machine learning

<b>EK 4</b>	methods for evaluating the quality of optimization solutions and interpreting them in a business context, including ethical considerations
	<b>In the terms of skills:</b>
<b>EK 5</b>	formulate and model business problems as optimization tasks
<b>EK 6</b>	implement optimization solutions using Python libraries
<b>EK 7</b>	analyze and interpret optimization results in the context of business decision-making
<b>EK 8</b>	apply optimization techniques to logistics, financial, and operational problems, including under conditions of incomplete information
	<b>In the terms of social skills:</b>
<b>EK 9</b>	critically evaluate the quality and practicality of their own optimization solutions and their impact on business decisions, including under changing conditions and with ethical considerations in mind
<b>EK 10</b>	collaborate effectively within analytics teams on optimization problems, demonstrating responsibility, openness to feedback, and a willingness to co-create solutions

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to business optimization – core concepts, problem classes, and the ethics of optimization in business.
<b>W2</b>	Linear programming – theory, the simplex method, graphical interpretation.
<b>W3</b>	Duality in linear programming and sensitivity analysis.
<b>W4</b>	Integer and mixed-integer programming (MIP).
<b>W5</b>	Transportation and assignment problems.
<b>W6</b>	Network optimization – flow problems, shortest path.
<b>W7</b>	Nonlinear programming – gradient-based and heuristic methods.
<b>W8</b>	Multi-objective optimization and Pareto methods.
<b>W9</b>	Stochastic optimization and programming under uncertainty.
<b>W10</b>	Portfolio optimization and risk management.
<b>W11</b>	Supply chain and logistics optimization.
<b>W12</b>	Revenue management and price optimization.
<b>W13</b>	Machine learning in optimization – reinforcement learning, neural networks.
<b>W14</b>	Trends in AI-driven optimization – AutoML, hyperparameter tuning.
<b>Class format: laboratory</b>	
	Course content
<b>L1</b>	Installation and overview of Python libraries for optimization tasks.
<b>L2</b>	Modeling constraints and objective functions.
<b>L3</b>	Production optimization.

<b>L4</b>	Diet problem.
<b>L5</b>	Transportation problem – delivery cost optimization.
<b>L6</b>	Resource allocation – employee scheduling.
<b>L7</b>	Integer programming.
<b>L8</b>	Facility location optimization (warehouse siting).
<b>L9</b>	Network flow optimization.
<b>L10</b>	Delivery route optimization (vehicle routing).
<b>L11</b>	Production planning with constraints.
<b>L12</b>	Inventory level optimization.
<b>L13</b>	Supply chain optimization.
<b>L14</b>	Portfolio optimization.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Laboratory exercises
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of an oral response	50%
<b>O2</b>	Assessment of completed laboratory reports	80%

<b>Required textbooks and other reading</b>	
<b>1</b>	Hillier, Frederick S., and Gerald J. Lieberman. Introduction to Operations Research. 11th ed., McGraw-Hill, 2021.
<b>2</b>	Winston, Wayne L. Operations Research: Applications and Algorithms. 4th ed., Cengage Learning, 2003.
<b>3</b>	Prostek Krzysztof, Zocca Alessandro, Gromicho Joaquim A.S. and Kantor Jeffrey C., Hands-on mathematical optimization with Python, Cambridge University Press, 2025.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Nocedal, Jorge, and Stephen J. Wright. Numerical Optimization. 2nd ed., Springer, 2006.
<b>2</b>	Bynum Michael L., and Hackebeit Gabriel A., Puomo- Optimization Modelling in Python, Springer Optimization and Its Applications, 2022.

<b>Student's Workload</b>
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Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>60</b>
Participation in lectures	30
Participation in laboratories	30
<b>Student's own work, including:</b>	<b>40</b>
Studying the lecture topics, group project implementation	30
Preparation for laboratory classes	10
<b>Total student's workload</b>	<b>100</b>
<b>Total number of the course ECTS credits</b>	<b>4</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
<b>EK 1</b>	AIBS_W06+++ AIBS_W01++ AIBS_W16+++	C1	W1-W2, W5, W12-W14	1	O1
<b>EK 2</b>	AIBS_W06+++ AIBS_W07++	C1	W2-W4, W6-W8	1	O1
<b>EK 3</b>	AIBS_W03+++ AIBS_W07++ AIBS_W08++	C1, C3	W9-W11, W14	1	O1
<b>EK 4</b>	AIBS_W05+++ AIBS_W06++ AIBS_W11+	C4	W1-W14	1	O1
<b>EK 5</b>	AIBS_U01+++ AIBS_U02++	C2	L2-L4, L6-L8	2	O2
<b>EK 6</b>	AIBS_U03+++ AIBS_U07++	C3	L1-L14	2	O2
<b>EK 7</b>	AIBS_U02+++ AIBS_U05++ AIBS_U12++	C4	L9, L11-L14	2, 3	O2
<b>EK 8</b>	AIBS_U08+++ AIBS_U09++ AIBS_U18+++ AIBS_U19+++	C3, C4	L4-L5, L7, L10-L14	2, 3	O2

EK 9	AIBS_K01+++ AIBS_K02++	C4	W1-W14, L1- L14	1,2	O1, O2
EK 10	AIBS_K01++	C4	W1-W14, L1- L14	1,2	O1, O2

<b>Author of the course syllabus:</b>	dr hab. Edward Kozłowski, prof. uczelni
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Natural Language Processing (NLP)</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 52 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduction to the theory and practice of Natural Language Processing (NLP) in business applications
<b>C2</b>	Acquiring skills to implement NLP solutions using modern libraries and models
<b>C3</b>	Developing competencies in analysing business texts and automating language-intensive processes
<b>C4</b>	Building the ability to critically assess and select appropriate NLP techniques for specific business problems, with attention to ethical aspects – including under partially unpredictable operating conditions

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Foundational skills in Python programming
<b>2</b>	Introductory knowledge of machine learning and artificial intelligence
<b>3</b>	Ability to work with data-analysis libraries (NumPy, pandas)
<b>4</b>	Foundational mathematics and statistics

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	has knowledge of the fundamental concepts of natural language processing and its business applications



<b>EK 2</b>	understands the architecture and operation of modern language models (Transformers, BERT, GPT)
<b>EK 3</b>	knows text pre-processing techniques, language-representation methods, and the ethical dilemmas of using NLP
	<b>In the terms of skills:</b>
<b>EK 4</b>	implements NLP solutions for sentiment analysis, text classification, and named entity recognition
<b>EK 5</b>	designs and deploys chatbots and applies generative models to automate creation of business content
<b>EK 6</b>	analyzes large-scale text datasets with NLP techniques and evaluates model quality and performance, including in partially unpredictable, real-world settings
	<b>In the terms of social skills:</b>
<b>EK 7</b>	is ready to use NLP technologies responsibly, taking ethical considerations into account and collaborating effectively within interdisciplinary teams

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to NLP: history, business applications, and challenges
<b>W2</b>	Basics of computational linguistics: tokenization, lemmatization, part-of-speech (POS) tagging
<b>W3</b>	Text representations: Bag-of-Words, TF-IDF, Word2Vec, GloVe
<b>W4</b>	Neural networks in NLP: RNN, LSTM, GRU
<b>W5</b>	Attention mechanism and the Transformer architecture
<b>W6</b>	Language models: BERT, GPT, T5 and their applications
<b>W7</b>	Sentiment analysis and text classification in business
<b>W8</b>	Named Entity Recognition (NER) and information extraction
<b>W9</b>	Automatic text summarization and text generation
<b>W10</b>	Chatbots and dialogue systems
<b>W11</b>	Multilingual and cross-lingual NLP
<b>W12</b>	Ethical considerations in NLP: bias, privacy, accountability
<b>W13</b>	Evaluating NLP models: metrics and A/B testing
<b>W14</b>	NLP in the cloud: Azure Cognitive Services, Amazon Comprehend, Google Cloud AI
<b>W15</b>	Trends in NLP: Large Language Models (LLMs), few-shot learning
<b>Class format: laboratory classes</b>	
	Course content
<b>L1</b>	Environment setup: NLTK, spaCy, Transformers
<b>L2</b>	Text preprocessing: cleaning, normalization, tokenization

L3	Exploratory analysis of text data
L4	Implementing text classifiers with TF-IDF
L5	Word embeddings: Word2Vec and FastText in practice
L6	Sentiment analysis using VADER and TextBlob
L7	Fine-tuning BERT models for classification
L8	Named Entity Recognition with spaCy
L9	Automatic summarization with Transformers
L10	Building a chatbot with Rasa / DialoGPT
L11	Customer review analysis: an e-commerce case study
L12	Generating marketing content with GPT
L13	Competitor analysis via social-media monitoring
L14	Deploying NLP models: FastAPI, Docker
L15	Final project: presentation of an NLP solution for business

Didactic methods	
1	Informative lecture
2	Laboratory exercises
3	Case studies
4	Project method
5	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of a written paper (test)	60%
O2	Assessment of completed laboratory exercises	60%
O3	Assessment of the prepared project	60%
O4	Assessment of the project defence	60%

Required textbooks and other reading	
1	Tunstall, Lewis, et al. Natural Language Processing with Transformers: Building Language Applications with Hugging Face. 2nd ed., O'Reilly Media, 2022.
2	Raschka S., Mirjalili V., <i>Python. Machine learning i deep learning. Biblioteki scikit-learn i TensorFlow 2</i> , Wydawnictwo Helion, Gliwice 2021.
3	Vajjala, Sowmya, et al. Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems. O'Reilly Media, 2020.

Recommended (supplementary) textbooks and other reading
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1	Khurana, Diksha, et al. Natural language processing: state of the art, current trends and challenges, <i>Multimedia Tools and Applications</i> 82.3, 2023: 3713-3744.
2	Géron A., <i>Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. Concepts, Tools, and Techniques to Build Intelligent Systems</i> , 3rd ed., O'Reilly Media, Sebastopol 2022.
3	Rogers, Anna, et al., A primer on neural network models for natural language processing, <i>Journal of Artificial Intelligence Research</i> 57 (2021): 345-420.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in laboratories	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for the laboratory classes	10
Realisation of group project	15
Preparation for the assessment	5
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03+++ AIBS_W07++ AIBS_W16+++	C1	W1, W7-W10, W14-W15	1, 3	O1
EK 2	AIBS_W03+++ AIBS_W07+++	C1	W4-W6, W15	1, 3	O1
EK 3	AIBS_W07+++ AIBS_W08++ AIBS_W11+++ AIBS_W14++	C1, C4	W2-W3, W11- W13	1, 5	O1
EK 4	AIBS_U03+++ AIBS_U04++	C2, C3	L2-L8, L11	2, 4	O2, O3
EK 5	AIBS_U03+++ AIBS_U09++ AIBS_U04+++	C2, C3	L9-L10, L12, L14	2, 4	O2, O3

EK 6	AIBS_U01+++ AIBS_U04++ AIBS_U05+++ AIBS_U06++ AIBS_U18+++ AIBS_U19+++	C3, C4	L3, L11, L13- L15	2, 3, 4,	O2, O3, O4
EK 7	AIBS_K04+++ AIBS_K06++ AIBS_K01++	C4	W12, L15	4, 5,	O1, O3, O4

<b>Author of the course syllabus:</b>	Dr inż. Korneliusz Pylak; dr Tomasz Cieplak; mgr inż. Mateusz Traczyński
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Object-oriented programming</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 41 01
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Acquisition of skills in programming focused on web applications
<b>C2</b>	Introduction to the JavaScript language and the Node.js runtime environment
<b>C3</b>	Introduction to project management methodologies
<b>C4</b>	Development of habits of systematic work and self-directed learning

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of programming and algorithms
<b>2</b>	Basic knowledge of HTML and CSS

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows DevOps, Agile, and Scrum methodologies.
<b>EK 2</b>	knows programming techniques for developing the frontend and backend with JavaScript.
	<b>In the terms of skills:</b>
<b>EK 3</b>	can work in Agile environments.
<b>EK 4</b>	can design both the frontend and backend of an application
<b>EK 5</b>	can read, interpret, and use technical documentation
	<b>In the terms of social skills:</b>

<b>EK 6</b>	is ready to engage in independent, critical thinking throughout application design, and to formulate problems and seek solutions by drawing on expert knowledge
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<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	DevOps methodology, Agile development, and Scrum
<b>W2</b>	Introduction to JavaScript
<b>W3</b>	Node.js environment
<b>W4</b>	Vue framework (Vue.js)
<b>W5</b>	Frontend and backend
<b>W6</b>	Containerization

<b>Class format: project</b>	
	Course content
<b>P1</b>	Team formation and role assignment; define the application concept
<b>P2</b>	Define baseline requirements and plan sprints
<b>P3</b>	Application requirements and use-case scenarios
<b>P4</b>	Prepare the microservices architecture concept
<b>P5</b>	Back-end design
<b>P6</b>	Back-end implementation
<b>P7</b>	Front-end design
<b>P8</b>	Front-end implementation
<b>P9</b>	Application testing
<b>P10</b>	Prepare the project's technical documentation

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of a written paper	51%
<b>O2</b>	Assessment of the prepared project	51%

<b>Required textbooks and other reading</b>
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1	Brikman Y., Fundamentals of Devops and Software Delivery. O'Reilly, 2025.
2	Garaguso P., Vue.js 3 Design Patterns and Best Practices: Develop scalable and robust applications with Vite, Pinia, and Vue Router. Packt Publishing, 2023.

Recommended (supplementary) textbooks and other reading	
1	Flanagan D., JavaScript: The Definitive Guide. Master the World's Most-Used Programming Language. 7th Edition. O'Reilly, 2020.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in the project	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for the project	20
Preparation for the assessment	10
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W13++ AIBS_W14+	C3, C4	W1	1	O1
EK 2	AIBS_W07+++ AIBS_W12 ++ AIBS_W16++	C1, C2	W1-W6	1	O1
EK 3	AIBS_U15++ AIBS_U07++	C3, C4	P1-P5, P10	2	O2
EK 4	AIBS_U03+++ AIBS_U18+++	C1, C2	P5-P8	2	O2
EK 5	AIBS_U01+	C4	P5-P9	2	O2
EK 6	AIBS_K01+++ AIBS_K03++ AIBS_K04+ AIBS_K05+	C4	W1-W6, P1-P10	1, 2	O1, O2

<b>Author of the course syllabus:</b>	dr inż. Piotr Oleszczuk; mgr inż. Michał Cioch
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management, Department of Organisation of Enterprise



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Signal Processing</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 41 02
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduce students to methods of digital signal processing
<b>C2</b>	Develop the ability to apply signal-analysis techniques, interpret results, process signals, and critically evaluate outcomes
<b>C3</b>	Cultivate habits of systematic project work, planning, and self-directed learning
<b>C4</b>	Build proficiency with programming tools and analytical environments for signal processing

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows digital signal processing techniques, including time- and frequency-domain analysis methods
<b>EK 2</b>	knows programming methods used in digital signal processing and their applications
	<b>In the terms of skills:</b>

<b>EK 3</b>	can use digital signal analysis tools to process and interpret data from measurement devices, monitoring systems, and the organizational environment to support decision-making and operations
<b>EK 4</b>	can select and apply appropriate signal-processing methods (e.g., filtering, transforms, correlation) to fit the business or technical problem – such as anomaly detection, process optimization, or event prediction
<b>EK 5</b>	can plan and execute a signal analysis & processing project – from data acquisition through transformation and interpretation to preparing a report or presentation – aligned with organizational needs and business stakeholders
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to think independently and critically in signal analysis and processing, and to formulate problems and seek solutions by drawing on expert knowledge and digital tools

<b>Course content</b>	
<b>Class format: lectures</b>	
	Course content
<b>W1</b>	Introduction to signals and their classification.
<b>W2</b>	Complex numbers.
<b>W3</b>	Number sequences and series.
<b>W4</b>	Deterministic signals and their parameters.
<b>W5</b>	Correlation, convolution, and basics of transforms.
<b>W6</b>	Fourier series.
<b>W7</b>	Signal sampling and quantization.
<b>W8</b>	Fourier transform.
<b>W9</b>	Systems and operator transforms.
<b>W10</b>	Analog and digital filters.
<b>W11</b>	Discrete-time systems and signals.
<b>Class format: project</b>	
	Course content
<b>P1</b>	Signal preparation and classification – selecting the project topic, acquiring the signal, and performing an initial analysis and classification by type (continuous/discrete, deterministic/stochastic, etc.).
<b>P2</b>	Time-domain analysis – computing basic signal parameters (power, energy, mean value), performing correlation analysis, and carrying out convolution – all in the time domain.
<b>P3</b>	Discretization and spectral analysis – sampling and quantization of the signal, plus frequency-domain analysis using Fourier series and the Fourier Transform (FFT).

<b>P4</b>	System modeling and digital signal processing – applying the Laplace and Z transforms to model systems, and designing digital filters and discrete-time processing structures.
<b>P5</b>	Summarizing the entire process, drawing conclusions, and analyzing the results.

<b>Didactic methods</b>	
<b>1</b>	Project method
<b>2</b>	Informative lecture
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	50%
<b>O2</b>	Assessment of a written paper	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Lyons R. G., Understanding digital signal processing, Addison Wesley Pub Co Inc., 2010.
<b>2</b>	Proakis, J. G., Manolakis, D. G. Digital Signal Processing: Principles, Algorithms, and Applications (4th ed.). Pearson Prentice Hall. 2006.
<b>3</b>	Weeks, M. Digital Signal Processing Using MATLAB and Wavelets (2nd ed.). Jones & Bartlett Learning, 2010.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Franklin G. F., Powell J. D., Emami-Naeini A., Feedback Control of Dynamic Systems Pearson, London, 2019.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in the project classes	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for project	20
Preparation for the assessment	10
<b>Total student's workload</b>	<b>75</b>

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

<b>Total number of the course ECTS credits</b>	<b>3</b>
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<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W13++ AIBS_W14+	C1	W1, W3-W8, W10, W11	2, 3	O2
<b>EK 2</b>	AIBS_W07+++ AIBS_W12++ AIBS_W16++	C1, C4	W2, W9, W10, W11	2, 3	O2
<b>EK 3</b>	AIBS_U03+++ AIBS_U07++	C2, C4	P1, P2, P3	1, 3	O1
<b>EK 4</b>	AIBS_U15++	C2, C4	P2, P3, P4	1, 3	O1
<b>EK 5</b>	AIBS_U01+ AIBS_U18+++	C3, C4	P1, P5	1	O1
<b>EK 6</b>	AIBS_K01++ AIBS_K03++ AIBS_K04+ AIBS_K05+	C2, C4	W1-W11, P1-P5	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>AI/ML Systems Engineering</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 41 03
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Provide knowledge of the architecture and lifecycle of systems that support machine learning and artificial intelligence, including their components and interdependencies
<b>C2</b>	Familiarize students with the tools, platforms, and practices (including MLOps and DevOps) used to design, deploy, and operate AI/ML systems
<b>C3</b>	Develop the ability to design the architecture of systems that support machine-learning processes in the context of solving business problems
<b>C4</b>	Foster a responsible engineering mindset under technological uncertainty, along with ethical and organizational awareness for deploying AI systems

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the fundamental components of AI/ML-supporting systems and understands their interdependencies
<b>EK 2</b>	knows and understands lifecycle models of systems that support machine learning and their application, including data infrastructure, MLOps, and model management

	<b>In the terms of skills:</b>
<b>EK 3</b>	can design the architecture of a machine-learning-supporting system and identify key dependencies and requirements
<b>EK 4</b>	can identify organizational and technological issues in the design and operation of ML/ AI systems
<b>EK 5</b>	can present and justify system solutions in the context of a specific business problem
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to make responsible design decisions under technological uncertainty and to account for ethical, organizational, and social aspects when implementing AI/ML-supporting systems

Course content	
Class format: lectures	
	Course content
<b>W1</b>	Introduction to systems theory – core concepts, classifications, and models of information systems.
<b>W2</b>	Architectures for machine learning and artificial intelligence systems.
<b>W3</b>	Hardware and software components – servers, accelerators, and the data layer.
<b>W4</b>	Lifecycle of AI-supporting systems – data, model, deployment, and monitoring.
<b>W5</b>	MLOps and DevOps – organizing machine-learning processes in production environments.
<b>W6</b>	Data storage, processing, and analytics systems – data warehouses, data lakes, and streams.
<b>W7</b>	Tooling and platforms overview (e.g., MLflow, Kubeflow, Vertex AI, AWS SageMaker).
<b>W8</b>	Security, reliability, and resilience of AI-supporting systems.
<b>W9</b>	Ethics and sustainability in designing AI/ML systems.
<b>W10</b>	Future directions – edge AI, federated learning, and green AI.
Class format: project	
	Course content
<b>P1</b>	Requirements analysis for a system supporting machine-learning processes.
<b>P2</b>	System architecture design (functional layers).
<b>P3</b>	Selection of tools and components (hardware and software).
<b>P4</b>	Documentation of the model lifecycle within the ML system.
<b>P5</b>	Monitoring and automation (CI/CD, MLOps).
<b>P6</b>	Security and ethical considerations.
<b>P7</b>	Visualization of the architecture and data.

Didactic methods	
1	Project method
2	Informative lecture
3	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of the prepared project	50%
O2	Assessment of a written paper	50%

Required textbooks and other reading	
1	Huyen, C., Designing Machine Learning Systems: An Iterative Process for Production-Ready Applications, O'Reilly, 2022.
2	Gift, N., & Deza, A., Practical MLOps: Operationalizing Machine Learning Models, O'Reilly, 2021.
3	Aminian, A., & Xu, A., Machine Learning System Design Interview, ByteByteGo, 2023.

Recommended (supplementary) textbooks and other reading	
1	Indrasiri, K., & Suhothayan, S. (2022). Design Patterns for Cloud Native Applications: Patterns in Practice Using APIs, Data, Events, and Streams (1st ed.). O'Reilly Media.

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>45</b>
Participation in lectures	15
Participation in project classes	30
<b>Student's own work, including:</b>	<b>30</b>
Preparation for the project classes	20
Preparation for assessment	10
<b>Total student's workload</b>	<b>75</b>
<b>Total number of the course ECTS credits</b>	<b>3</b>

Learning outcomes matrix
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Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W07+++ AIBS_W13++	C1, C2	W1-W3	2, 3	O2
EK 2	AIBS_W12++ AIBS_W14++ AIBS_W16++	C1, C2	W4-W7	2, 3	O2
EK 3	AIBS_U01+++ AIBS_U07++	C3, C4	P1-P3	1, 3	O1
EK 4	AIBS_U03++	C3, C4	P4-P6	1, 3	O1
EK 5	AIBS_U15++ AIBS_U18+++	C3, C4	P7	1, 3	O1
EK 6	AIBS_K01++ AIBS_K03++ AIBS_K04++ AIBS_K05+	C3, C4	W9-W10, P6-P7	1, 3	O1, O2

<b>Author of the course syllabus:</b>	Dr Piotr Oleszczuk
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Internet of Things (IoT)</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 41 04
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	45
Lecture	15
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Acquire knowledge of Internet of Things (IoT) concepts and technologies
<b>C2</b>	Acquire skills in designing and implementing IoT systems
<b>C3</b>	Acquire knowledge and skills in IoT hardware platforms and communication protocols

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Know the basics of databases and information systems design.
<b>2</b>	Know basic programming.
<b>3</b>	Know the basics of computer science and mathematics.

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	know the architecture of Internet of Things (IoT) systems and their components
<b>EK 2</b>	know the different types of communication protocols used in IoT
<b>EK 3</b>	know and understand the capabilities and limitations of IoT hardware platforms and their applications
	<b>In the terms of skills:</b>
<b>EK 4</b>	designs, implements, and configures simple IoT systems
<b>EK 5</b>	integrates different components of an IoT system into a working project
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to independently set goals in IoT projects and to responsibly prioritize and solve problems, taking into account technological and organizational aspects

<b>EK 7</b>	is ready to think and act in an entrepreneurial way and to seek expert support in situations that require deeper expertise when working on IoT systems
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<b>Course content</b>	
<b>Class format: lectures</b>	
Course content	
<b>W1</b>	Introduction to the Internet of Things (IoT) – definitions, history, applications.
<b>W2</b>	IoT system architecture – perception layer, network layer, application layer.
<b>W3</b>	IoT hardware platforms – Arduino, Raspberry Pi, ESP32.
<b>W4</b>	Communication protocols – MQTT, CoAP, HTTP/HTTPS, LoRaWAN.
<b>W5</b>	Cloud computing in IoT – AWS IoT, Azure IoT, Google Cloud IoT.
<b>W6</b>	Security in IoT systems.
<b>W7</b>	IoT data analytics and edge machine learning.
<b>W8</b>	Trends and the future of IoT technology.

<b>Class format: project</b>	
Course content	
<b>P1</b>	Setting up the development environment for IoT platforms; microcontroller programming; wireless communication.
<b>P2</b>	Sensors and actuators – data reading and device control.
<b>P3</b>	IoT protocols – implementing MQTT and HTTP.
<b>P4</b>	Cloud integration – sending data to cloud platforms.
<b>P5</b>	IoT data visualization – dashboards and user interfaces.
<b>P6</b>	Testing and debugging IoT systems.
<b>P7</b>	Requirements analysis and IoT project planning.
<b>P8</b>	System architecture design.
<b>P9</b>	Hardware layer implementation.
<b>P10</b>	Network communication implementation.
<b>P11</b>	Application layer implementation.
<b>P12</b>	System components integration.
<b>P13</b>	Solution testing and optimization.
<b>P14</b>	Project documentation.

<b>Didactic methods</b>	
<b>1</b>	Informative lecture
<b>2</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>

<b>O1</b>	Assessment of the prepared project	60%
<b>O2</b>	Assessment of the project defence	60%
<b>O3</b>	Assessment of a written paper	60%

Required textbooks and other reading	
1	Greengard, Samuel. Internet of Things. MIT Press Essential Knowledge, 2021.
2	Buyya, Rajkumar, Amir Vahid Dastjerdi. Internet of Things: Principles and Paradigms. Morgan Kaufmann, 2016.
3	Hwaiyu, Geng. Internet of Things and Data Analytics Handbook. Wiley, 2017.
4	McEwen, Adrian, Hakim Cassimally. Designing the Internet of Things. Wiley, 2013.
Recommended (supplementary) textbooks and other reading	
1	Poslad, Stefan. Ubiquitous Computing: Smart Devices, Environments and Interactions. Wiley, 2009.
2	Technical documentation of platforms Arduino, Raspberry Pi, ESP32.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete activities</b>
<b>Contact hours with instructor including:</b>	45
Participation in lectures.	15
Participation in the project	30
<b>Student's own work, including:</b>	30
Preparation for the project classes	10
Preparation for the assessment	20
<b>Total student's workload</b>	75
<b>Total number of the course ECTS credits</b>	3

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_W07++ AIBS_W13+	C1, C2	W1, W2, W6, W8	1	O3
<b>EK 2</b>	AIBS_W12++ AIBS_W14+	C1, C2, C3	W4	1	O3
<b>EK 3</b>	AIBS_W07+ AIBS_W12+ AIBS_W16++	C1, C2, C3	W3, W5, W6, W7	1	O3

EK 4	AIBS_U03++ AIBS_U15++	C1, C2, C3	P1, P2, P6, P9, P13, P14	2	O1, O2
EK 5	AIBS_U01+++ AIBS_U07++ AIBS_U18+++	C1, C2, C3	P3, P4, P5, P7-P12, P14	2	O1, O2
EK 6	AIBS_K01++ AIBS_K04++	C1, C2, C3	W1-W8 P1-P14	1, 2	O1, O2
EK 7	AIBS_K03++ AIBS_K05+	C1, C2, C3	W1-W8 P1-P14	1, 2	O1, O2

<b>Author of the course syllabus:</b>	dr inż. Jakub Pizoń, mgr inż. Konrad Kania
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<b>Organizational unit:</b>	Department of Organisation of Enterprise, Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Virtual Business Accelerator</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 42 01
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Students acquire knowledge of how to design business projects
<b>C2</b>	Students acquire knowledge of how to create business plans and justify the rationale for specific market actions
<b>C3</b>	Students acquire skills in the market evaluation of business ideas

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of the fundamentals of market research methodology
<b>2</b>	Knowledge of the fundamentals of statistics and market research

	<b>In the terms of skills:</b>
<b>EK 1</b>	correctly defines market needs and problems
<b>EK 2</b>	can conduct a variety of market analyses
<b>EK 3</b>	can accurately define the target group for a business solution and select effective marketing communication for it
<b>EK 4</b>	can build a business plan and present the market concept in a compelling way
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to develop a business concept using diverse sources and forms of expert knowledge

<b>EK 6</b>	is ready to uphold ethical principles when developing a business idea, including in formulating the main market assumptions and areas of activity
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<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Defining the market problem / market needs.
<b>P2</b>	Assessing the level of market innovativeness.
<b>P3</b>	Market analyses (TAM, SAM, SOM).
<b>P4</b>	Analysis of market niches and the unique value proposition.
<b>P5</b>	Characterising target customer groups.
<b>P6</b>	Developing research assumptions for the business plan.
<b>P7</b>	Market attractiveness indicators for the business idea.
<b>P8</b>	Basics of go-to-market communication strategy.
<b>P9</b>	Developing the business plan.

<b>Didactic methods</b>	
<b>1</b>	Project method
<b>2</b>	Case study

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Carl J. Schramm, Burn the Business Plan: What Great Entrepreneurs Really Do, Simon & Schuster Publisher, 2019.
<b>2</b>	Brian Finch, How to Write a Business Plan (Creating Success), Kogan Page, 2016.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	David Ronick, Hit the Deck: Create a Business Plan in Half the Time, With Twice the Impact, UpStart Bootcamp LLC Publishing, 2010.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>

<b>Contact hours with instructor including:</b>	<b>50</b>
Participation in project classes	30
<b>Student's own work, including:</b>	<b>20</b>
Project preparation	20
<b>Total student's workload</b>	<b>50</b>
<b>Total number of the course ECTS credits</b>	<b>2</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U07++, AIBS_U08+++	C1, C2	P1	1, 2	O1, O2
<b>EK 2</b>	AIBS_U03+++ AIBS_U09+++ AIBS_U14+++ AIBS_U16+++	C1, C2	P2, P3, P4	1, 2	O1, O2
<b>EK 3</b>	AIBS_U09+++ AIBS_U14+++ AIBS_U16+++ AIBS_U18++	C1, C2, C3	P5, P8	1, 2	O1, O2
<b>EK 4</b>	AIBS_U03+++ AIBS_U09+++ AIBS_U14+++ AIBS_U16+++ AIBS_U18+++	C1, C2, C3	P6, P7, P9	1, 2	O1, O2
<b>EK 5</b>	AIBS_K02++ AIBS_K03+++ AIBS_K05+++	C1, C2, C3	P1 – P9	1, 2	O1, O2
<b>EK 6</b>	AIBS_K03+++ AIBS_K05+++	C1, C2, C3	P1 – P9	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Virtual VC Studio</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 42 02
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Understand how venture capital (VC) funds operate and the investment process
<b>C2</b>	Acquire the skills to assess startups' potential from an investor's perspective
<b>C3</b>	Master the fundamentals of valuing early-stage companies
<b>C4</b>	Learn due-diligence tools and investment criteria

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Know basic concepts of entrepreneurship and business models
<b>2</b>	Be able to analyze market data and use decision-support tools for business decisions
<b>3</b>	Know financial concepts such as revenue, cost, margin, and profitability

<b>In the terms of skills:</b>	
<b>EK 1</b>	can identify growth-potential startups and perform an initial screening
<b>EK 2</b>	can produce a preliminary valuation using selected methods (e.g., DCF, comparables)
<b>EK 3</b>	can prepare an investment pitch and present findings to an expert panel
<b>EK 4</b>	can carry out a simplified due diligence for a business project
<b>In the terms of social skills:</b>	



<b>EK 5</b>	is ready to work in teams under uncertainty and time pressure, in compliance with ethical principles
<b>EK 6</b>	is ready to make investment decisions with regard for social responsibility and the impact of those decisions on the development of startups and their socio-economic environment

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Introduction to how VC funds operate – startup information sources and deal flow.
<b>P2</b>	Methods for identifying promising startups.
<b>P3</b>	Review of investment documentation – pitch deck, teaser, one-pager.
<b>P4</b>	Startup valuation models – multiples, DCF, scorecard.
<b>P5</b>	Risk analysis and scenario modeling.
<b>P6</b>	Introduction to due diligence – legal, financial, and organizational aspects.
<b>P7</b>	Assessment of the founding team and market potential.
<b>P8</b>	Preparation of an investment memo and presentation to the “investment committee.”

<b>Didactic methods</b>	
<b>1</b>	Project method
<b>2</b>	Case study

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Feld, B., & Mendelson, J., Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist, Wiley, 2019.
<b>2</b>	Kupor, S., Secrets of Sand Hill Road: Venture Capital and How to Get It, Portfolio, 2019.
<b>3</b>	Gompers, P., & Lerner, J., The Money of Invention: How Venture Capital Creates New Wealth, Harvard Business School Press, 2001.
<b>4</b>	Ries, E., The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Crown Business, 2011.

<b>Recommended (supplementary) textbooks and other reading</b>	
<b>1</b>	Lerner, J., Leamon, A., & Hardyman, F., Venture Capital, Private Equity, and the Financing of Entrepreneurship, Wiley, 2012.
<b>2</b>	Hunter, D. S., Saini, A., & Zaman, T., Picking Winners: A Data Driven Approach to Evaluating the Quality of Startup Companies, 2017. arXiv preprint arXiv:1706.04229.
<b>3</b>	Wang, X., & Ihlamur, Y., An Automated Startup Evaluation Pipeline: Startup Success Forecasting Framework (SSFF), 2024, arXiv preprint arXiv:2405.19456.

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>50</b>
Participation in the project classes	30
<b>Student's own work, including:</b>	<b>20</b>
Preparation the project	20
<b>Total student's workload</b>	<b>50</b>
<b>Total number of the course ECTS credits</b>	<b>2</b>

<b>Learning outcomes matrix</b>					
<b>Learning outcome symbol</b>	<b>Reference of the given learning outcome to effects defined for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Didactic methods</b>	<b>Evaluation methods</b>
<b>EK 1</b>	AIBS_U03+++ AIBS_U09++ AIBS_U18+	C2	P2, P3, P7	1, 2	O1, O2
<b>EK 2</b>	AIBS_U14+++ AIBS_U16+++ AIBS_U18+	C3	P4, P5	1, 2	O1, O2
<b>EK 3</b>	AIBS_U07++ AIBS_U08+++ AIBS_U18+++	C2	P8	1, 2	O1, O2
<b>EK 4</b>	AIBS_U09+++ AIBS_U14++ AIBS_U18+++	C4	P6, P7	1, 2	O1, O2
<b>EK 5</b>	AIBS_K03+++ AIBS_K05++	C1-C4	P1-P8	1, 2	O1, O2
<b>EK 6</b>	AIBS_K02++ AIBS_K05+++	C1-C4	P1-P8	1, 2	O1, O2

<b>Author of the course syllabus:</b>	Dr hab. inż. Łukasz Skowron, prof. uczelni
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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>E-commerce development</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S04 42 03
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Familiarize students with the principles of conducting online commercial activity and the rules that govern consumer purchasing behavior
<b>C2</b>	Develop the ability to design, organize, and operate an e-commerce system
<b>C3</b>	Present the key digital tools used in running e-commerce operations

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	prepares the assumptions and business model for an e-commerce venture
<b>EK 2</b>	designs the customer journey along with marketing and sales activities
<b>EK 3</b>	builds a working store prototype using a selected software solution
<b>EK 4</b>	implements selected analytics and optimization tools to improve store performance
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to independently and actively seek the knowledge needed to complete tasks, including consulting subject-matter experts
<b>EK 6</b>	is ready to co-create innovative business initiatives in a way that accounts for the ethical and social aspects of promotional and commercial activities

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Course content	
Class format: project	
	Course content
<b>P1</b>	Designing an e-commerce business model.
<b>P2</b>	E-commerce platforms and their implementation.
<b>P3</b>	Shaping the product offering and store content.
<b>P4</b>	Purchase journeys and user experience in e-commerce.
<b>P5</b>	Analytics and optimization in e-commerce.
<b>P6</b>	Integration with external solutions.
<b>P7</b>	Online marketing and sales.

Didactic methods	
<b>1</b>	Case study
<b>2</b>	Project method

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

Required textbooks and other reading	
<b>1</b>	Qin Z., Wang G., Deng W., & Hao, Y., Introduction to E-commerce, Springer Nature, Singapore, 2025.
<b>2</b>	Larsson T., eCommerce evolved, Createspace Independent Publishing Platform, 2016.
<b>3</b>	Materials and manuals for e-commerce platforms

Recommended (supplementary) textbooks and other reading	
<b>1</b>	Bawack, R. E., Wamba, S. F., Carillo, K. D. A., & Akter, S. (2022), Artificial intelligence in E-Commerce: a bibliometric study and literature review, Electronic markets, 32 (1), 297-338.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30

Participation in project classes	30
<b>Student's own work, including:</b>	<b>20</b>
Realisation of the e-commerce project	20
<b>Total student's workload</b>	<b>50</b>
<b>Total number of the course ECTS credits</b>	<b>2</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U07++ AIBS_U08+++ AIBS_U14+++ AIBS_U16+++	C1, C2	P1, P7	1,2	O1,O2
EK 2	AIBS_U09+++ AIBS_U14+++ AIBS_U16+++	C1, C2	P1, P2, P4, P7	1,2	O1,O2
EK 3	AIBS_U03+++ AIBS_U09+++ AIBS_U14+++ AIBS_U16+++ AIBS_U18+++	C2, C3	P2, P3	1,2	O1,O2
EK 4	AIBS_U03+++ AIBS_U09+++ AIBS_U14+++ AIBS_U16+++ AIBS_U18+++	C2, C3	P1, P2, P4, P5, P6, P7	1,2	O1,O2
EK 5	AIBS_K02++ AIBS_K03+++	C2	P1-P7	1,2	O1,O2
EK 6	AIBS_K05+++	C1,C2,C3	P1, P7	1,2	O1,O2

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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Implementation of the e-commerce project</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 01
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	30
Project	0
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Develop students' ability to design a logistics system with AI components
<b>C2</b>	Build project-based skills using data and digital tools
<b>C3</b>	Develop key teamwork skills and the ability to present engineering solutions as a project, using data and visualization tools

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can design a logistics system using input data and digital tools that support design and analysis
<b>EK 2</b>	can apply selected analytical and/or AI tools to support decision-making in the designed logistics system and critically evaluate positions related to their use
<b>EK 3</b>	can work in a project team, taking on different roles, including coordinating a selected part of the project
<b>EK 4</b>	can present engineering project results in a business-friendly way, using appropriate data visualization
	<b>In the terms of social skills:</b>

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<b>EK 5</b>	is ready to critically evaluate their own work and contribution within the project team, and open to receiving feedback
<b>EK 6</b>	is ready to perform project tasks responsibly and adhere to ethical standards in teamwork and in documenting results

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Project kickoff – project assumptions, team formation, overview of input data.
<b>P2</b>	Analysis of logistics needs and characteristics of the selected product/assortment.
<b>P3</b>	Development of a simplified bill of materials (BOM) and an inventory list.
<b>P4</b>	Packaging selection, definition of warehouse zones, and key space parameters.
<b>P5</b>	Warehouse space organization with consideration of infrastructure enabling AI-supported solutions.
<b>P6</b>	Material flow diagram.
<b>P7</b>	Preparation and visualization of project results.

<b>Didactic methods</b>	
<b>1</b>	Project method
<b>2</b>	Work performed in groups
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	50%
<b>O2</b>	Assessment of the project defence	50%

<b>Required textbooks and other reading</b>	
<b>1</b>	Bartholdi, John J., & Hackman, Steven T. Warehouse & Distribution Science. The Supply Chain and Logistics Institute, Georgia Tech, 2019.
<b>2</b>	Simchi-Levi, David, Kaminsky, Philip, & Simchi-Levi, Edith. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill Education, 4th edition, New York, 2021.
<b>3</b>	Richards, Gwynne. Warehouse Management: A Complete Guide to Improving Efficiency and Minimizing Costs in the Modern Warehouse. Kogan Page, London, 3rd edition, 2017.



4	Ten Hompel, Michael, & Schmidt, Thorsten. Warehouse Management: Automation and Organisation of Warehouse and Order Picking Systems. Springer, Berlin – New York, 1st edition, 2007.
5	3145-2024 – IEEE Standard for General Technical Requirements of Auxiliary Warehouse in a Smart Factory. IEEE, 2024.

Recommended (supplementary) textbooks and other reading	
1	Waller, Matthew A., & Fawcett, Stanley E. Data Science, Predictive Analytics, and Big Data: A Revolution That Will Transform Supply Chain Design and Management. Journal of Business Logistics, Tom 34, Nr 2, 2013
2	Yau, Nathan. Data Points: Visualization That Means Something. Wiley, Indianapolis, 2013.
3	Provost, Foster, & Fawcett, Tom. Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly Media, 2nd edition, Sebastopol, 2023.
4	Kulisz, Monika. Evaluation of SAP System Implementation in an Enterprise of the Automotive Industry – Case Study. Applied Computer Science, vol. 14, no. 4, 2018, pp. 81-92.
5	Delfanti, Alessandro. The Warehouse: Workers and Robots at Amazon. Pluto Press, London, 2021.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in project classes	30
Student's own work, including:	20
Project preparation	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01+++ AIBS_U06++ AIBS_U04++	C1, C2	P1-P6	1, 2	O1, O2
EK 2	AIBS_U01++	C1, C2	P1-P7	1, 2, 3	O1, O2

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	AIBS_U02+++ AIBS_U04+++ AIBS_U09++ AIBS_U12++ AIBS_U18++				
EK 3	AIBS_U14+++ AIBS_U15++ AIBS_U16+++	C2, C3	P1-P7	1, 2	O1, O2
EK 4	AIBS_U04++ AIBS_U09++ AIBS_U10+ AIBS_U18++	C3	P1-P7	1, 2	O1, O2
EK 5	AIBS_K01+++ AIBS_K02++	C3	P1-P7	1, 2	O1, O2
EK 6	AIBS_K02++ AIBS_K03++	C3	P1-P7	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Marketing Analytics and Marketing Intelligence</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 02
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Acquire knowledge of the principles and practical methods of marketing data analysis
<b>C2</b>	Develop skills in using selected tools for data analysis, visualization, and processing
<b>C3</b>	Develop the ability to draw inferences and interpret collected data and analysis results, including the critical evaluation of positions on the use of AI in marketing

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can access selected data sources generated by marketing activities and integrate data from different areas of the company's operations
<b>EK 2</b>	can perform standard marketing analytics tasks by proposing and applying appropriate data-processing and analysis methods, then presenting the results and interpreting them

<b>EK 3</b>	can design and build dashboards that present selected information from marketing and sales
<b>EK 4</b>	can design and build marketing analytics solutions in a team, allocating tasks, collaborating with teammates, and discussing/ analyzing the team's outputs
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to evaluate data and information obtained through marketing analytics in terms of their relevance, reliability, and fitness for the stated goals
<b>EK 6</b>	is ready to independently and proactively seek the knowledge needed to complete tasks, including consulting experts when appropriate

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	The nature, types, and sources of marketing data; typical marketing data-generating areas.
<b>P2</b>	Acquisition of marketing data and integration of sources.
<b>P3</b>	Data exploration: cleaning/organizing, filtering, and visualization.
<b>P4</b>	Market research: trend analysis and competitive offering analysis.
<b>P5</b>	Classification studies: customer segmentation, evaluation of solution quality, and interpretation.
<b>P6</b>	Marketing campaign analysis: KPIs, tracking, and results aggregation.
<b>P7</b>	Market Basket Analysis (MBA).
<b>P8</b>	Predictive models in customer research.
<b>P9</b>	Dashboards: designing a decision-making dashboard.

<b>Didactic methods</b>	
<b>1</b>	Case study
<b>2</b>	Project method
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defense	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Brown I., Mastering marketing data science: a comprehensive guide for today's marketers, John Wiley & Sons, 2024.

2	Goncalves M., Market Research and Analysis: Methods, Design and Data, Walter de Gruyter GmbH & Co KG, 2024.
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Recommended (supplementary) textbooks and other reading	
1	Jung D., The Modern Business Data Analyst, Springer Nature, 2024.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in the project classes	30
Student's own work, including:	20
Preparation of the project	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01++ AIBS_U06++	C1	P1-P3	1,2	O1, O2
EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04++ AIBS_U09++ AIBS_U12++	C1-C3	P1-P9	1,2,3	O1, O2
EK 3	AIBS_U04+++ AIBS_U09++ AIBS_U10+ AIBS_U18++	C1-C3	P1, P3, P9	1,2	O1, O2
EK 4	AIBS_U14+++ AIBS_U15+++ AIBS_U16+++	C2,C3	P5-P9	1,2	O1, O2
EK 5	AIBS_K01+++	C1, C3	P1-P9	1,2	O1, O2
EK 6	AIBS_K02++ AIBS_K03++	C2,C3	P1-P9	1,2	O1, O2

<b>Author of the course syllabus:</b>	Dr hab. inż. Marcin Gąsior, prof. uczelni
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<b>Organizational unit:</b>	Department of Marketing

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Customer Research and Behaviour Modeling</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 03
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Familiarizing students with the principles and practical methods of analyzing data that describe consumer behavior
<b>C2</b>	Developing the skills to use selected techniques in data analysis, visualization, and processing to analyze consumer processes
<b>C3</b>	Developing students' ability to draw inferences and interpret acquired data and analysis results, including the critical evaluation of positions on the use of artificial intelligence (AI) in consumer research

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	know market research methodology

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can draw on selected data sources about market trends, purchasing activity, and other dimensions of consumer behavior, assessing their quality and suitability for solving a given problem
<b>EK 2</b>	can use various methods for consumer data analysis, matching them to the problem and available data; visualizes, discusses, and interprets the results obtained

<b>EK 3</b>	can design and carry out a consumer-data analysis process in a team, dividing tasks, collaborating with team members, and discussing and analyzing the team's outputs
<b>In the terms of social skills:</b>	
<b>EK 4</b>	is ready to evaluate data, information, and the results of consumer analyses in terms of their validity, reliability, and usefulness for the stated objectives
<b>EK 5</b>	is ready to independently and actively seek the knowledge needed to complete tasks, including drawing on expert knowledge

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Sources and types of consumer-behavior data and their integration.
<b>P2</b>	Data quality and usefulness in consumer-behavior analysis.
<b>P3</b>	Data exploration in consumer studies: constructs, latent variables, and factor analysis.
<b>P4</b>	Customer segmentation using unsupervised methods.
<b>P5</b>	Modeling consumer preferences: market basket analysis and association rules.
<b>P6</b>	Modeling satisfaction, loyalty, and churn propensity.
<b>P7</b>	Analysis of behavioral sequential data and customer purchase paths.

<b>Didactic methods</b>	
<b>1</b>	Case study
<b>2</b>	Project method
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>	
<b>1</b>	Malhotra N. K., Marketing research: an applied orientation, 7 <sup>th</sup> ed. Pearson, 2019.
<b>2</b>	Frank, C. J., Magnone, P. F., & Netzer, O., Decisions Over Decimals: Striking the Balance Between Intuition and Information, John Wiley & Sons, 2022.
<b>3</b>	Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. Multivariate data analysis. In Multivariate data analysis, 2010.



Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in project classes	30
Student's own work, including:	20
Preparation the project	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01+++ AIBS_U02++ AIBS_U06++ AIBS_U18++	C1, C2	P1-P3	1,2	O1, O2
EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04+++ AIBS_U09++ AIBS_U10+ AIBS_U12++ AIBS_U18++	C1-C3	P1-P7	1,2	O1, O2
EK 3	AIBS_U14+++ AIBS_U15++ AIBS_U16+++	C1-C3	P3-P7	1,2	O1, O2
EK 4	AIBS_K01+++ AIBS_K02++	C1, C3	P1-P9	1,2	O1, O2
EK 5	AIBS_K02++ AIBS_K03++	C2,C3	P1-P9	1,2	O1, O2

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Organizational unit:	Department of Marketing, Department of Quantitative Methods in Management



**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>AI-based Diagnostics</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 04
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduce students to the use of AI models in technical diagnostics, particularly for classification, anomaly detection, and time-series analysis.
<b>C2</b>	Develop practical skills in implementing and using AI algorithms to detect faults and irregularities in technical data.
<b>C3</b>	Build competencies in creating and validating synthetic (engineered) diagnostic features/parameters and in interpreting results using machine-learning and AI models.

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can acquire, pre-process, and assess the suitability of diagnostic data (e.g., machine signals, time series) for further analysis, taking into account data quality and the application context.
<b>EK 2</b>	uses and selects appropriate anomaly-detection and diagnostic-classification methods (e.g., Isolation Forests, SVM, autoencoders) to match the data characteristics and the problem at hand.

<b>EK 3</b>	designs and executes the diagnostic process in a project team – planning tasks, testing various fault-detection methods, and communicating results in presentations or reports – including critically evaluating positions on the use of AI/ML in diagnostics.
	<b>In the terms of social skills:</b>
<b>EK 4</b>	is ready to evaluate diagnostic data, methods, and results for their reliability, validity, and applicability in a specific engineering or business context
<b>EK 5</b>	is ready to independently and proactively seek the knowledge and tools needed to solve diagnostic problems, including consulting results with experts and using technical documentation

Course content	
Class format: project	
	Course content
<b>P1</b>	Classifier models as a core diagnostic tool.
<b>P2</b>	Scarcity of faulty-machine data: dataset balancing methods.
<b>P3</b>	Anomaly detection with Isolation Forests.
<b>P4</b>	One-Class SVM as an anomaly-detection method.
<b>P5</b>	Fault analysis and detection from time series.
<b>P6</b>	Constructing virtual (synthetic) diagnostic features.
<b>P7</b>	Autoencoders in machine diagnostics.
<b>P8</b>	Fault identification using AI models.

Didactic methods	
<b>1</b>	Case study
<b>2</b>	Project method
<b>3</b>	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

Required textbooks and other reading	
<b>1</b>	Surucu, O., et al. (2023), Condition Monitoring using Machine Learning: A Review of Theory, Applications, and Recent Advances. Expert Systems with Applications, 221. <a href="https://doi.org/10.1016/j.eswa.2023.119857">https://doi.org/10.1016/j.eswa.2023.119857</a>
	Chen, H., et al. (2022), Deep Learning-Based Machinery Fault Diagnostics, MDPI.

2	Brandt, A. (2011), Noise and Vibration Analysis: Signal Analysis and Experimental Procedures, Chichester, UK: John Wiley and Sons.
3	Keras API documentation. (n.d.). Retrieved June 2, 2025, from <a href="https://keras.io/api/">https://keras.io/api/</a>

Recommended (supplementary) textbooks and other reading	
1	Pawlik, P., et al. (2025), Gearbox fault identification using auto-encoder without training data from the damaged machine, Measurement, 242(Part A), Article 113020. <a href="https://doi.org/10.1016/j.measurement.2024.113020">https://doi.org/10.1016/j.measurement.2024.113020</a>
2	Pawlik, P., et al. (2023), Fault diagnosis of machines operating in variable conditions using artificial neural network not requiring training data from a faulty machine. Eksploatacja i Niezawodność – Maintenance and Reliability, 25(2), 282–290. <a href="https://doi.org/10.17531/ein.2023.2.8">https://doi.org/10.17531/ein.2023.2.8</a>
3	Pawlik, P., et al. (2021), The use of deep learning methods in diagnosing rotating machines operating in variable conditions. Energies, 14(9), 2533. <a href="https://doi.org/10.3390/en14092533">https://doi.org/10.3390/en14092533</a>

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in project classes	30
Student's own work, including:	20
Realisation of the project	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01+++ AIBS_U02++ AIBS_U06++	C1, C2	P1–P3	1, 2, 3	O1, O2
EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04+++ AIBS_U09++ AIBS_U18+++	C1, C2	P1–P5	1, 2	O1, O2
EK 3	AIBS_U14+++	C2, C3	P1–P8	2, 3	O1, O2

	AIBS_U15++ AIBS_U16+++ AIBS_U10+ AIBS_U12++				
EK 4	AIBS_K01+++ AIBS_K02++	C3	P1-P8	1, 2	O1, O2
EK 5	AIBS_K02++ AIBS_K03++	C3	P1-P8	2	O1, O2

<b>Author of the course syllabus:</b>	Dr inż. Korneliusz Pylak, mgr inż. Konrad Kania
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Designing LLM-based Systems</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 05
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Know the architecture and operating principles of Large Language Models (LLMs) used in chatbots
<b>C2</b>	Acquire skills to design, deploy, and test LLM-based chatbots across varied use cases
<b>C3</b>	Develop competencies in integrating language models with external systems and in improving their behavior via prompt engineering and fine-tuning
<b>C4</b>	Become aware of risks and challenges in the ethical use of LLM-based chatbots – privacy, hallucinations, and security – and critically evaluate positions on LLM adoption in business

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Ability to program in Python and basic familiarity with machine-learning libraries (e.g., TensorFlow, PyTorch) and NLP tools.

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can prepare input data for conversational applications (texts, dialog structures, prompt engineering), taking into account the business and technical context
<b>EK 2</b>	can design, integrate, and test an LLM-based chatbot using selected programming tools and libraries, including via API

<b>EK 3</b>	can assess chatbot quality, design evaluation methods, and analyze cases of errors or model hallucinations in business use
<b>EK 4</b>	can design and deliver a team project involving LLM chatbots, allocating roles, planning component integration, and presenting results
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to assess the risks and limitations of using LLM-based chatbots, including potential ethical issues, model errors, and impacts on the end user
<b>EK6</b>	is ready to independently seek out and analyze technical documentation and scholarly sources related to applying large language models in conversational interfaces

<b>Class format: project</b>	
	Course content
<b>P1</b>	Introduction to large language model (LLM) architectures, chatbot operating context, and choice of implementation environment.
<b>P2</b>	Preparing training datasets or prompts: input formats and methods for processing textual data.
<b>P3</b>	Integrating an LLM (e.g., GPT, LLaMA) with the user interface – APIs, libraries, and frameworks.
<b>P4</b>	Personalizing and controlling chatbot behavior – prompt-engineering and fine-tuning methods.
<b>P5</b>	Dialogue analysis and design – defining behaviors, functions, and conversation context.
<b>P6</b>	Verification and testing – evaluating response quality, detecting errors, and analyzing use cases.
<b>P7</b>	Ethical aspects and risks of chatbot deployment – model limitations, hallucinations, and data privacy.
<b>P8</b>	Project presentation and documentation – user interface, system operation, conclusions, and avenues for further development.

<b>Didactic methods</b>	
<b>1</b>	Case study
<b>2</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%



Required textbooks and other reading	
1	Gazit, L., & Ghaffari, M., Advanced Natural Language Processing Techniques: From Basics to LLMs and Business Applications in Python, Packt Publishing, 2024.
2	Gheorghiu, A., Build AI Applications with LlamaIndex: A Practical Guide to RAG and LLMs, Packt Publishing, 2024.
3	Rothman D., Transformers for Natural Language Processing and Computer Vision – Third Edition (ChatGPT, GPT-4V i DALL-E 3), Packt Publishing, 2024.

Recommended (supplementary) textbooks and other reading	
1	Bender E., Gebru T., et al., On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?, Proceedings of ACM FAccT, 2021.
2	OpenAI. GPT-4 System Card, OpenAI, 2023 (online documentation).

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in project classes	30
Student's own work, including:	20
Preparation for the project classes	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01+++ AIBS_U02++ AIBS_U06++ AIBS_U18++	C1, C2	P1-P2	1, 2	O1, O2
EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04+++ AIBS_U09++ AIBS_U18++	C2, C3	P3-P4	1, 2	O1, O2
EK 3	AIBS_U14+++ AIBS_U15++	C2, C3	P5-P6	1, 2	O1, O2

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

	AIBS_U16+++ AIBS_U10+ AIBS_U12++ AIBS_U18+				
EK 4	AIBS_U14+++ AIBS_U15++ AIBS_U16++ AIBS_U10++	C2, C4	P4-P8	1, 2	O1, O2
EK 5	AIBS_K01+++ AIBS_K02++	C4	P7-P8	1	O1, O2
EK 6	AIBS_K02++ AIBS_K03++	C4	P1-P8	1, 2	O1, O2

<b>Author of the course syllabus:</b>	Dr inż. Korneliusz Pylak; mgr inż. Rafał Garbacz
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Image Processing</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 06
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Familiarize students with fundamental image-processing methods and their engineering applications
<b>C2</b>	Develop the ability to use programming tools and libraries for image analysis and manipulation
<b>C3</b>	Develop competencies in designing algorithms for image processing and classification using both classical methods and machine learning
<b>C4</b>	Introduce students to selected neural-network architectures used in image analysis (e.g., CNN, U-Net, convolutional autoencoders)
<b>C5</b>	Develop the ability to critically assess positions on the use of AI in image processing

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of programming in Python.
<b>2</b>	Knowledge of the basics of linear algebra and how neural networks work.

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can apply basic image-processing techniques in the spatial and frequency domains, including convolution filters and morphological operations

EK 2	can design and implement simple image-classification systems using convolutional neural networks (CNNs)
EK 3	can perform image segmentation analysis and use autoencoders for image-data compression
EK 4	can choose an appropriate representation of image data and transform it for further processing or analysis with selected tools
EK 5	can critically evaluate positions on the use of AI in business applications, including the ethical aspects – particularly in medical contexts
	<b>In the terms of social skills:</b>
EK 6	is ready to critically evaluate the correctness and validity of applied image-analysis methods, including accepting constructive feedback
EK 7	is ready to independently seek out technical and scientific information in image processing and machine learning

Course content	
Class format: lectures	
	Course content
P1	Introduction to image analysis; color models.
P2	Core image-processing mechanism: convolution filters.
P3	Nonlinear image operations: median filtering, morphological operations.
P4	Frequency-domain image processing.
P5	Convolutional neural networks; image classification.
P6	Image segmentation; U-Net architectures.
P7	Linear, lossy image compression: DCT and Image PCA.
P8	Image compression with convolutional autoencoders.
P9	Business applications of image analytics – ethical and social aspects of AI usage.

Didactic methods	
1	Case study
2	Project method
3	Guided class discussion

Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of prepared project	75%
O2	Assessment of the project defence	75%

Required textbooks and other reading	
1	Marques, O., Practical Image and Video Processing Using MATLAB, Wiley-IEEE Press, 2011.
2	Chollet, F., Deep Learning with Python., Manning Publications, 2017.
3	MathWorks., Discrete Cosine Transform – Image Processing Toolbox, 2025. <a href="https://www.mathworks.com/help/images/discrete-cosine-transform.html">https://www.mathworks.com/help/images/discrete-cosine-transform.html</a>

Recommended (supplementary) textbooks and other reading	
1	Ansari, Irshad Ahmad, Bajaj, Varun, Image Processing with Python A practical approach, IOP, 2024.
2	Szeliski, Richard, Computer Vision Algorithms and Applications, Springer, 2022.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in the project classes	30
Student's own work, including:	20
Preparation for the project classes	20
Total student's workload	50
Total number of the course ECTS credits	2

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01++ AIBS_U06 ++	C1, C2	P1–P3	1, 2	O1, O2
EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04++ AIBS_U09++ AIBS_U10++	C2, C3	P5–P6	1, 2	O1, O2
EK 3	AIBS_U04+++ AIBS_U09++	C2, C3, C4	P6–P8	1, 2	O1, O2
EK 4	AIBS_U14+++ AIBS_U15+++ AIBS_U16+++ AIBS_U18+++	C2, C3	P4–P7	1, 2	O1, O2

Project titled „POLLUB z nami nowoczesne technologie” is realized under the European Funds for Social Development 2021-2027 program, co-financed by the European Social Fund Plus in accordance with agreement no. FERS.01.05-IP.08-0319/23.

EK 5	AIBS_U12+++	C5	P1-P9	1, 2, 3	O1, O2
EK 6	AIBS_K01+++	C3, C4	P1-P8	1, 2	O1, O2
EK 7	AIBS_K02++ AIBS_K03++	C2, C4	P1-P8	1, 2	O1, O2

<b>Author of the course syllabus:</b>	Dr inż. Korneliusz Pylak; mgr inż. Konrad Kania
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Generative AI</b>
<b>Course type:</b>	elective
<b>Course code:</b>	AIBS S06 58 07
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	2
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Introduce students to the core concepts and architectures of generative models, such as autoencoders, GANs, diffusion models, and transformer
<b>C2</b>	Develop practical skills in implementing and experimenting with different types of generative models in a programming environment
<b>C3</b>	Build competencies in assessing the quality of generated data, modifying architectures, and applying generative models to selected engineering problems, including the critical evaluation of positions on their use
<b>C4</b>	Support teamwork in creating generative-AI-based projects, including planning, testing, and presenting solutions

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Basic knowledge of programming in Python.
<b>2</b>	General familiarity with machine learning and how neural networks work.

<b>Learning outcomes</b>	
	<b>In the terms of skills:</b>
<b>EK 1</b>	can acquire, prepare, and process input data for training generative models, selecting appropriate representations and methods depending on the data type

<b>EK 2</b>	applies selected generative models (AE, VAE, GAN, transformers, diffusion models) to data generation and image/text analysis; can match the model architecture to the problem and evaluate result quality
<b>EK 3</b>	designs and implements solutions using generative models in a team, dividing tasks, integrating models, and presenting results as technical documentation or a demonstrator
<b>EK 4</b>	critically evaluates claims regarding the use of generative models in business and scientific applications
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to evaluate generative models for their usefulness, ethical implications, and suitability for specific technological or social contexts
<b>EK 6</b>	is ready to independently and critically seek out knowledge on state-of-the-art generative AI solutions, including using documentation and scholarly sources

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Introduction to generative models: Autoencoders (AE).
<b>P2</b>	Variational Autoencoders (VAE).
<b>P3</b>	GANs (Generative Adversarial Networks).
<b>P4</b>	GAN variants and modifications.
<b>P5</b>	Autoregressive models for image generation.
<b>P6</b>	Diffusion models.
<b>P7</b>	Transformers and the self-attention mechanism.
<b>P8</b>	Text generation with transformers.
<b>P9</b>	Applications of generative models in business and science – ethics and their impact on society and scientific progress.

<b>Didactic methods</b>	
<b>1</b>	Case study
<b>2</b>	Project method
<b>3</b>	Guided class discussion

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	75%
<b>O2</b>	Assessment of the project defence	75%

<b>Required textbooks and other reading</b>
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1	Goodfellow, I., Bengio, Y., & Courville, A. (2016), Deep Learning, MIT Press.
2	Langr, J., & Bok, V. (2019)., GANs in Action, Manning Publications.
3	Dürr, O., Sick, B., & Murina, E. (2020), Probabilistic Deep Learning: With Python, Keras and TensorFlow Probability, Manning Publications.
4	Sanseviero, O. et al. (2024), Hands-On Generative AI with Transformers and Diffusion Models, O'Reilly Media.
5	Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, Ł., & Polosukhin, I. (2017), Attention Is All You Need. In Proceedings of the 31st Conference on Neural Information Processing Systems (NeurIPS 2017).

Recommended (supplementary) textbooks and other reading	
1	Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., ... & Amodei, D. (2020), Language models are few-shot learners. In Proceedings of the 34th Conference on Neural Information Processing Systems (NeurIPS 2020). <a href="https://doi.org/10.48550/arXiv.2005.14165">https://doi.org/10.48550/arXiv.2005.14165</a>
2	Géron, A. (2019), Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (2nd ed.), O'Reilly Media.
3	Al-kfairy, M. (2024), Ethical challenges and solutions of generative AI: An interdisciplinary perspective, Informatics, 11(2), 56. <a href="https://doi.org/10.3390/informatics11020056">https://doi.org/10.3390/informatics11020056</a>

Student's Workload	
Form of activity	Average number of hours to complete the activity
<b>Contact hours with instructor including:</b>	<b>30</b>
Participation in the project classes	30
<b>Student's own work, including:</b>	<b>20</b>
Preparation the project	20
<b>Total student's workload</b>	<b>50</b>
<b>Total number of the course ECTS credits</b>	<b>2</b>

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_U01+++ AIBS_U02++ AIBS_U06++ AIBS_U18+	C1, C2	P1-P2	1, 2	O1, O2

EK 2	AIBS_U01++ AIBS_U02+++ AIBS_U04+++ AIBS_U09++ AIBS_U18++	C1, C2, C3	P3-P6	1, 2	O1, O2
EK 3	AIBS_U14+++ AIBS_U15++ AIBS_U16+++ AIBS_U10+ AIBS_U18++	C2, C3, C4	P3-P8	1, 2	O1, O2
EK 4	AIBS_U12+++	C3	P1-P9	1, 2, 3	O1, O2
EK 5	AIBS_K01+++ AIBS_K02++	C3, C4	P1-P8	1	O1, O2
EK 6	AIBS_K02++ AIBS_K03++	C3, C4	P1-P8	1, 2	O1, O2

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Diploma Project I</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S05 53 00
<b>Year:</b>	III
<b>Term:</b>	5
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	3
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Enhancing the ability to present concepts, literature review findings, and assumptions for design/project work
<b>C2</b>	Familiarising students with the substantive and formal guidelines and requirements for preparing the diploma project
<b>C3</b>	Enhancing the ability to independently search for and effectively use appropriate information sources when carrying out assigned tasks
<b>C4</b>	Verifying and developing competencies acquired during the course of study

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the tools and techniques used to develop business solutions, prepare literature reviews, and formulate conceptual assumptions for the analysed problems
	<b>In the terms of skills:</b>
<b>EK 2</b>	can define editorial and formal requirements for preparing AI/ML-based business projects, accounting for legal constraints such as copyright, data rights, and accountability for algorithm use

<b>EK 3</b>	can acquire complex information from scientific literature, databases, model repositories, and other knowledge sources, integrate it, and transform it into clear, practical formats useful for designing AI/ML solutions
<b>EK 4</b>	can analyze and discuss existing AI/ML-based solutions in the context of a given business problem and propose new approaches
<b>EK 5</b>	can use specialized industry terminology from business, information technology, and artificial intelligence
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to work independently and demonstrates creativity in solving business problems using AI and machine-learning tools
<b>EK 7</b>	is ready to critically analyze their own knowledge and the information obtained, including content related to AI/ML-based solutions

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Discussion of the project's overall scope, objectives, schedule, and deliverable requirements. Identification of a real business problem that can be addressed with AI/ML tools. Selection of project topics.
<b>P2</b>	Review of literature, industry reports, technical documentation, and case studies on AI/ML in similar contexts. Identification of best practices and analysis of available tools and technologies.
<b>P3</b>	Definition of the project goal, formulation of hypotheses, determination of implementation scope, and preliminary risk identification. Preparation of the solution concept, including the adopted methodology and the theoretical and technological architecture.
<b>P4</b>	Development of a detailed action plan, including tool selection, data sources, implementation stages, and criteria for evaluating solution effectiveness. Setup of the working environment (technical and organizational) necessary to execute the project.

<b>Didactic methods</b>	
<b>1</b>	Project method

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Assessment of the prepared project	50%
<b>O2</b>	Assessment of the project defence	50%

<b>Required textbooks and other reading</b>
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1	Batz, Aaron, i in. Integrating Machine Learning into Business and Management in the Age of Artificial Intelligence. Humanities and Social Sciences Communications, Springer Nature, 2025.
2	Vicci, H. The Power of Artificial Intelligence in Project Management: A Review and Evaluation Study. ResearchGate, 2024.
3	Abbasi, Mostaffa, i in. A Review of AI and Machine Learning Contribution in Predictive Business Process Management. arXiv, 2024. <a href="https://arxiv.org/abs/2407.11043">https://arxiv.org/abs/2407.11043</a>
4	Hon, L. C. Guidelines for writing a thesis or dissertation [PDF]. University of Florida. Retrieved June 7, 2025 <a href="https://www.jou.ufl.edu/grad/forms/Guidelines-for-writing-thesis-or-dissertation.pdf">https://www.jou.ufl.edu/grad/forms/Guidelines-for-writing-thesis-or-dissertation.pdf</a>
5	Literature collected during the literature search for the assigned topics.

Recommended (supplementary) textbooks and other reading	
1	Kritz, David James. How to Write a Thesis: A Guide for Master's Students. American Public University System, 2022. <a href="https://www.apu.apus.edu/area-of-study/intelligence/resources/how-to-write-a-thesis/">https://www.apu.apus.edu/area-of-study/intelligence/resources/how-to-write-a-thesis/</a>
2	Purdue OWL. Tips and Examples for Writing Thesis Statements. Purdue University Online Writing Lab, [data dostępu 8.06.2025] <a href="https://owl.purdue.edu/owl/general_writing/the_writing_process/thesis_statement_tips.html">https://owl.purdue.edu/owl/general_writing/the_writing_process/thesis_statement_tips.html</a>

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in the project classes	30
Student's own work, including:	45
Preparation for the project classes	45
Total student's workload	75
Total number of the course ECTS credits	3

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W05+ AIBS_W07+++	C1, C2	P1, P2	1	O1

	AIBS_W13++ AIBS_W14+++ AIBS_W16++				
EK 2	AIBS_U07+++	C2, C3	P1, P3	1	O1, O2
EK 3	AIBS_U01+++ AIBS_U04++ AIBS_U18+++	C3	P2, P3	1	O1
EK 4	AIBS_U03+++ AIBS_U12++ AIBS_U15++	C3, C4	P3, P4	1	O1, O2
EK 5	AIBS_U11+++	C1, C4	P1, P4	1	O2
EK 6	AIBS_K04++ AIBS_K05++	C1, C4	P1, P4	1	O1, O2
EK 7	AIBS_K01+++ AIBS_K02++	C3, C4	P3, P4	1	O1

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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Diploma project II</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S06 57 00
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	30
Lecture	0
Exercises	0
Laboratory	0
Project	30
<b>Number of ECTS credits:</b>	4
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Improving the ability to present concepts, literature-search findings, and assumptions for project deliverables
<b>C2</b>	Familiarizing students with the substantive and formal guidelines and requirements for preparing the diploma/final project
<b>C3</b>	Refining the ability to independently search for and effectively use relevant information sources while carrying out assigned tasks
<b>C4</b>	Verifying and further developing the competencies acquired during the course of study

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	None

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows the methods and tools used in designing IT solutions – including those leveraging artificial intelligence and machine learning – and the current directions and dilemmas in the development of these technologies and their applications in engineering practice
	<b>In the terms of skills:</b>



<b>EK 2</b>	can acquire, select, and critically analyze information from scientific literature, databases, patent databases, and internet sources, as well as integrate and interpret data to draw conclusions and formulate sound project assumptions
<b>EK 3</b>	can independently and in teams prepare documentation and a business project description using AI/ML tools, presenting a logical structure, correct language, and compliance with formal requirements; shows initiative and creativity in identifying and solving organizational and decision-making problems with modern technologies
<b>EK 4</b>	can effectively use specialized software and tools supporting the design and analysis of business solutions, including low-code/no-code or Python environments, data-analysis platforms, and AI tools
<b>EK 5</b>	can appropriately select and apply digital technologies to the project's needs and the specifics of the problem under study
	<b>In the terms of social skills:</b>
<b>EK 6</b>	is ready to critically evaluate both existing and newly acquired knowledge – especially regarding the business use of AI and machine learning – and to reflect on its usefulness for project decision-making
<b>EK 7</b>	is ready to solve business problems creatively and act in an entrepreneurial manner, including initiating and implementing innovative solutions using modern IT technologies, particularly AI/ML tools

<b>Course content</b>	
<b>Class format: project</b>	
	Course content
<b>P1</b>	Applying insights from the literature review to refine the project assumptions: specifying goals, scope, and solution structure; selecting the methodological approach; and identifying key tools and technologies (including AI, ML, and low-code/no-code environments) appropriate for the business problem.
<b>P2</b>	Data preparation, environment setup, and component development: building and testing a prototype or business model, and documenting the execution of each project stage.
<b>P3</b>	Result analysis and method validation: assessing the effectiveness of the applied methods, evaluating the solution's business usefulness, identifying limitations, and proposing improvements or future development.
<b>P4</b>	Project presentation: discussing objectives, technologies used, obtained results, and the solution's business value, supported by storytelling; participating in a Q&A session, discussion, and joint evaluation of projects from substantive and implementation perspectives.

<b>Didactic methods</b>	
<b>1</b>	Project method



Evaluation methods and criteria		
Evaluation method symbol	Description of evaluation method	Credit threshold
O1	Assessment of the prepared project	50%
O2	Assessment of the project defence	50%

Required textbooks and other reading	
1	Literature on the business, technological, and interdisciplinary aspects relevant to the assigned project topics, including AI applications, project management, data analytics, and the digital tools used in business settings.

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	30
Participation in the project classes	30
Student's own work, including:	70
Preparation for the project classes	70
Total student's workload	100
Total number of the course ECTS credits	4

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03+++ AIBS_W01++ AIBS_W06++ AIBS_W11++ AIBS_W16++	C1, C4	P1	1	O1
EK 2	AIBS_U01+++ AIBS_U05+++ AIBS_U03++	C1, C3	P1	1	O1
EK 3	AIBS_U02+++ AIBS_U08+++ AIBS_U04++	C1, C2, C3	P2	1	O1
EK 4	AIBS_U06+++ AIBS_U07++	C1, C3	P2	1	O1

	AIBS_U09++				
EK 5	AIBS_U06+++ AIBS_U10+++ AIBS_U12+ AIBS_U18+++	C1, C4	P2	1	O1
EK 6	AIBS_K01+++ AIBS_K02+++	C4	P3	1	O2
EK 7	AIBS_K03+++ AIBS_K04+++	C4	P3, P4	1	O2

<b>Author of the course syllabus:</b>	dr hab. Edward Kozłowski
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<b>Organizational unit:</b>	Department of Quantitative Methods in Management

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Student Internship I</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S04 43 00
<b>Year:</b>	II
<b>Term:</b>	4
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	500
Lecture	0
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	20
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Use of knowledge gained in classes to carry out practical tasks in a business environment, including with AI tools
<b>C2</b>	Development of analytical, communication, and organizational competencies under real organizational conditions
<b>C3</b>	Strengthening responsibility, professional ethics, and readiness for teamwork in an interdisciplinary setting

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of the basics of data analysis, digital tools, and the business environment.

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	knows and understands the role of artificial intelligence and data in business processes
<b>EK 2</b>	knows the practical realities of executing tasks in areas such as data analysis, digital marketing, process automation, digital transformation of enterprises, and AI project management
	<b>In the terms of skills:</b>

<b>EK 3</b>	can select appropriate analytics and AI tools to solve a typical business problem
<b>EK 4</b>	can collaborate effectively in an interdisciplinary team and plan their own work within a project environment
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to perform professional tasks responsibly, in line with ethical standards and data protection
<b>EK 6</b>	is ready for continuous learning and professional development, actively seeking practical solutions to problems

<b>Course content</b>	
	Course content
<b>Pr1</b>	Organization and structure of departments responsible for data analysis, AI development, and process automation in the enterprise.
<b>Pr2</b>	Tools and platforms used for data analysis, data exploration, and building AI-based solutions (e.g., Power BI, Python, SQL, AutoML, RPA).
<b>Pr3</b>	Data acquisition, preparation, and processing in the context of solving real business problems (data wrangling, EDA, cleaning).
<b>Pr4</b>	Participation in projects in digital marketing, customer analytics, or process optimization – e.g., building dashboards, scoring models, and predictive models.
<b>Pr5</b>	Applying process-automation tools (e.g., no-code/low-code, chatbots, RPA) within operational or marketing activities.
<b>Pr6</b>	Involvement in tasks related to designing or assessing AI solutions from ethical, legal, or user perspectives (e.g., impact analysis, model documentation, UX).
<b>Pr7</b>	Creating presentations, reports, or visualizations that support communicating analysis outcomes to stakeholders (dashboards, data storytelling, pitch decks).

<b>Didactic methods</b>	
<b>1</b>	Observations
<b>2</b>	Discussions with the host-company internship supervisor and practitioner specialists
<b>3</b>	Working with source texts and other materials
<b>4</b>	Working on assigned tasks under a specialist's supervision

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Crediting of the internship report	60%

Student's Workload	
Form of activity	Average number of hours to complete the activity
Contact hours with instructor including:	500
Participation in the work of the company/institution	500
Student's own work, including:	0
Total student's workload	500
Total number of the course ECTS credits	20

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03++ AIBS_W07+++ AIBS_W08++ AIBS_W16+++	C1	Pr1, Pr2, Pr3	1, 2, 3, 4	O1
EK 2	AIBS_W02++ AIBS_W04++ AIBS_W05++ AIBS_W08+ AIBS_W09+ AIBS_W12++ AIBS_W15+	C1	Pr2, Pr3, Pr4, Pr5	1, 2, 3, 4	O1
EK 3	AIBS_U01++ AIBS_U03+++ AIBS_U05++ AIBS_U07+ AIBS_U12+ AIBS_U18+++	C1	Pr3, Pr4, Pr5	1, 2, 3, 4	O1
EK 4	AIBS_U14++ AIBS_U15++ AIBS_U16+++	C2	Pr1, Pr4, Pr7	1, 2, 3, 4	O1
EK 5	AIBS_K01+++ AIBS_K04++ AIBS_K06+++	C3	Pr6, Pr7	1, 2, 4	O1
EK 6	AIBS_K02++ AIBS_K03++	C3	Pr2, Pr4, Pr5, Pr6	1, 2, 4	O1

	AIBS_K05++				
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<b>Organizational unit:</b>	Department of Organisation of Enterprise

**Module (Course) syllabus**  
**Field of study: *AI in business solutions***  
**First - cycle studies**

<b>Course:</b>	<b>Student Internship II</b>
<b>Course type:</b>	compulsory
<b>Course code:</b>	AIBS S06 59 00
<b>Year:</b>	III
<b>Term:</b>	6
<b>Study mode:</b>	full-time studies
<b>Class format and the number of hours per semester:</b>	475
Lecture	0
Exercises	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	19
<b>Method of completion form (evaluation):</b>	credit
<b>Language of instructions:</b>	English

<b>Course objectives</b>	
<b>C1</b>	Deepening practical knowledge in designing, deploying, and monitoring data- and AI-driven solutions in business settings
<b>C2</b>	Gaining experience in project work using AI tools and technologies across areas such as marketing, financial analysis, logistics, sales, and customer service
<b>C3</b>	Developing competencies in team collaboration, professional responsibility, and presenting project outcomes

<b>Prerequisites in terms of knowledge, skills, and other competencies</b>	
<b>1</b>	Knowledge of the basics of AI, data analysis, BI tools, and business processes
<b>2</b>	Experience gained during Student Internship I

<b>Learning outcomes</b>	
	<b>In the terms of knowledge:</b>
<b>EK 1</b>	possesses and understands knowledge related to designing and implementing AI-based solutions in business environments
<b>EK 2</b>	knows and understands methods of data analysis and the integration of AI/BI tools with business processes
	<b>In the terms of skills:</b>
<b>EK 3</b>	can apply knowledge to carry out tasks in data- and AI-driven projects

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<b>EK 4</b>	can analyze data, prepare reports, and present results to the team and stakeholders
	<b>In the terms of social skills:</b>
<b>EK 5</b>	is ready to collaborate in an interdisciplinary team and solve problems related to implementing AI in organizations
<b>EK 6</b>	is ready to pursue continuous self-improvement, act responsibly, and take initiative in a project environment

<b>Course content</b>	
	Course content
<b>Pr1</b>	Organizational structure and functions of departments implementing AI and analytics systems.
<b>Pr2</b>	Participation in AI/BI implementation projects (needs analysis, tool selection, action planning).
<b>Pr3</b>	Execution of tasks in data modeling, prediction, customer scoring, segmentation, etc.
<b>Pr4</b>	Process automation using RPA, chatbots, no-code/low-code, and system integration.
<b>Pr5</b>	Cross-department collaboration (e.g., with marketing, sales, finance) on data-driven projects.
<b>Pr6</b>	Evaluation of implemented solutions (KPIs, comparative analysis, presentation of results).

<b>Didactic methods</b>	
<b>1</b>	Observations
<b>2</b>	Discussions with the workplace internship supervisor and industry practitioners
<b>3</b>	Working with source texts or other materials
<b>4</b>	Performing assigned tasks under a specialist's supervision

<b>Evaluation methods and criteria</b>		
<b>Evaluation method symbol</b>	<b>Description of evaluation method</b>	<b>Credit threshold</b>
<b>O1</b>	Crediting of the internship report	60%

<b>Student's Workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with instructor including:</b>	<b>475</b>



Participation in the operations of the enterprise/institution	45
Student's own work, including:	0
Total student's workload	475
Total number of the course ECTS credits	19

Learning outcomes matrix					
Learning outcome symbol	Reference of the given learning outcome to effects defined for the field of study	Course objectives	Course content	Didactic methods	Evaluation methods
EK 1	AIBS_W03++ AIBS_W07++ AIBS_W08+++ AIBS_W16+++	C1	Pr1, Pr2, Pr3	1-4	O1
EK 2	AIBS_W05++ AIBS_W12++ AIBS_W15++	C1	Pr2, Pr3, Pr4	1-4	O1
EK 3	AIBS_U01++ AIBS_U03+++ AIBS_U05++ AIBS_U07+ AIBS_U18+++	C2	Pr2, Pr3, Pr4	1-4	O1
EK 4	AIBS_U04++ AIBS_U09++ AIBS_U10++ AIBS_U11+ AIBS_U12+	C2	Pr3, Pr5, Pr6	1-4	O1
EK 5	AIBS_K01++ AIBS_K02++ AIBS_K05+++	C3	Pr1-Pr6	1-4	O1
EK 6	AIBS_K03++ AIBS_K04+++ AIBS_K06+++	C3	Pr2-Pr6	1-4	O1

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