

STUDY PROGRAM

BASIC INFORMATION

Study Program	Computer Science
Level of Studies	1st degree (bachelor degree)
Study Profile	ogólnoakademicki
Language of Instruction	English
Form of Study	Full time
No of Semesters	6
Degree Level	Bachelor
Concentration <i>(if applicable)</i>	

ASSIGNMENT OF THE PROGRAM TO FIELDS AND DISCIPLINES

DISCIPLINE	Social Sciences		
Scientific Discipline(s): if the field of study is related to two or more disciplines, it is also required to specify the percentage share of the number of ECTS points for each discipline in the total number of ECTS points necessary to complete the studies - indicating the main discipline	Discipline	ECTS	% ECTS
	Sciences of management and quality (leading discipline)	101	56%
	Computer Science (supporting discipline)	64	35%
	Mathematics (supporting discipline)	16	9%

PROGRAM CHARACTERISTICS

concepts and learning objectives / relationship with the University mission and strategy / socio-economic needs

Computer Science graduates will have extensive knowledge of modern computer science, with particular attention paid on its application in management and business. The strong emphasis placed during studies on the creation and implementation of software, as well as on databases and information systems in enterprises, will allow graduates of this field to take up employment as IT specialists in companies both in the IT firms and in virtually all enterprises and institutions (both in the business and public sectors).

The *Computer Science* study program is in line with the accepted in Krakow University of Economics development strategy, which assumes, among others, implementing modern education programs and reforming these programs taking into account the competences of the future. The fundamental update of the study program carried out within this field (compared to the *Applied Informatics* studies), taking into account the latest achievements and trends in the field of computer science, meets the above assumptions of the mission and development strategy of KUE and at the same time guarantees future graduates the competitiveness in the labour market postulated in this strategy.

Computer Science studies are conducted entirely in English. In the first year of studies, students receive solid theoretical preparation (which constitutes the basis for fundamental computer science issues), including mathematical analysis, linear algebra, discrete mathematics, probability theory and basic statistics, as well as the basics of algorithmics and computational theory. As part of IT subjects, students learn about computer systems, operating systems and the principles of computer networks. At the same time, they learn the basics of computer programming. In next years, students develop programming skills, acquaint with designing programs according to user requirements and utilise computer programs (including Internet applications), become familiar with several aspects of the construction and operation of databases and data warehouses. They also acquire knowledge concerning enterprise information systems, principles of IT project management, business process modelling, and cloud computing and other areas of IT. Elective subjects available in the last three semesters allow students to additionally supplement their knowledge with selected issues in the fields of data analysis, machine learning, natural language processing, various aspects of business automation and other issues. The context for this field of studies is the area of management sciences, which is manifested not only by including typical economic/business subjects in the study program (e.g. *Organization and Management, Enterprise Systems in Management, Economics and Corporate Finance, Entrepreneurship*), but also by the use of business/economic data and business threads in the curricula of particular IT subjects. As a consequence, the field has the value of interdisciplinarity, which should be an additional advantage for graduates applying for jobs in various types of organizations and enterprises.

Due to the wide and intense development of computer science methods and techniques in virtually all types of institutions and companies operating in the modern economy, it is expected that *Computer Science* graduates will be desired, sought-after specialists on the labour market. Therefore, this field of study is a response to the contemporary (and future), constantly growing socio-economic needs for employing graduates with this educational profile.

NO OF CLASSROOM HOURS

Total no of classroom hours	1800
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NO OF ECTS POINTS:

Necessary for graduation	189
Which a student must earn during classes with the direct participation of faculty members or other persons conducting classes	95
Which a student must earn during internships (if applicable)	not applicable
Which a student must earn during foreign language classes	18
Which a student may earn through distance learning activities	60

INTERNSHIPS (if applicable):

No of hours	N/A
Objective	N/A
Rules and a mode of accomplishing	N/A
Rules and a mode of completion	N/A

LEARNING OUTCOMES

The level of the Polish Qualifications Framework		6
Symbol of a learning outcome for the study program	Description of the learning outcomes	Reference to the characteristics of learning outcomes (universal first degree and second degree characteristics)
P_W (KNOWLEDGE) A graduate knows and understands:		
CS-W01	at an advanced level the components, factors, relationships and processes, as well as observation methods and explanatory theories of managing enterprise operation and information	P6S_WG
CS-W02	at an advanced level selected concepts and principles that constitute the formal basis for information processing, inference, estimation, prediction and algorithmic problem solving	P6S_WG
CS-W03	advanced methods, techniques and environments for designing and implementing components and entire computer systems with the use of programming languages and technologies	P6S_WG

CS-W04	to an advanced degree the structure and dynamics of the software life cycle and development processes, as well as the main classes of IT project management methodologies	P6S_WG
CS-W05	advanced issues related to the use of application software for managing information processes and integrating information resources and systems inside and outside the organization	P6S_WG
CS-W06	the fundamental challenges, opportunities, threats and dilemmas of contemporary civilization arising from the development of information technology, computing power, global connectivity and data availability	P6S_WK
CS-W07	the basic legal, economic, social and cultural circumstances and constraints of software development, distribution and delivery regarded as a creative and economic activity	P6S_WK
CS-W08	the origins and principles of creation of various forms of entrepreneurship and business models related to software development, in particular its lightweight and small-scale variants	P6S_WK
CS-W09	advanced concepts, scientific theories and research methodology used in the field of humanities	P6S_WG
P_U (SKILLS) A graduate is able to:		
CS-U01	collect information about business processes in a given organization and determine on this basis the needs of the organization and the feasibility of satisfying them with dedicated software	P6S_UW
CS-U02	choose and rationally explain the architecture of software components, applications and services, suitable for developing an IT solution supporting given information processes in an organization	P6S_UW
CS-U03	prepare and deploy a functional technological environment suitable for the implementation of a given IT solution, by selecting the components of such an environment and customizing their configuration	P6S_UW
CS-U04	implement a software solution supporting a given business process with the use of appropriate technologies and tools, as well as deploy it in a test environment and demonstrate its operation	P6S_UW
CS-U05	objectively present in a comprehensive manner the concept, design, current tasks and planned work in an IT project, and discuss its progress confronting their own opinions with those of others	P6S_UK

CS-U06	communicate precisely and effectively in the English language at the B2 level in professional contacts and within the industry environment, using appropriate and specific management and IT terminology	P6S_UK
CS-U07	participate in software development projects managed with the use of various methodologies, collaborating with stakeholders, planning activities, estimating effort and assessing work progress	P6S_UO
CS-U08	choose and follow their own path of self-development of IT knowledge and skills, by selecting the learned technology stack and taking into account the direction of its evolution and market demand	P6S_UU
CS-U09	correctly use their knowledge to interpret phenomena in the field of humanities	P6S_UW
P_K (SOCIAL ATTITUDES) A graduate is ready to:		
CS-K01	critically assess the features of a specific technology, its limitations, the scope and validity of application, and dependencies on other technologies, as well as the level of their own knowledge of it	P6S_KK
CS-K02	use customary means and methods of communication accepted in the IT industry to consult with colleagues and experts in order to seek advice regarding the current work and its periodic reviews	P6S_KK
CS-K03	recognize opportunities for the development of new applications, products and services supporting the local community or the society, and to take an entrepreneurial approach to these opportunities	P6S_KO
CS-K04	raise general awareness of the effects, consequences and risks resulting from the strong dependence of the organization's business processes on information technology and its applications	P6S_KO
CS-K05	promote basic knowledge and skills in the use of popular information technologies, providing intelligible advice in an accessible way, especially outside their professional environment	P6S_KO
CS-K06	maintain the professional ethics of diligence, reliability and responsibility, and to acknowledge the importance of the constant pursuit of technological excellence in software development professions	P6S_KR
CS-K07	initiate activities in the public interest regarding issues related to the field of humanities	P6S_KO

Explanation of symbols:

- CS (before hyphen) – study program learning outcomes
- 01, 02 and more (after hyphen) – indication of the next learning outcome

- P6S – learning outcomes according to the Polish Qualifications Framework in relation to the following detailed characteristics (knowledge - skills - social attitudes):
 - WG – depth; WK – context
 - UW – usage; UK – communicating; UO – organizing; UU – learning
 - KK – critical approach; KR – professional role; KO – responsibility

DESCRIPTION OF THE PROCESS LEADING TO ACHIEVING LEARNING OUTCOME

STUSY PLAN¹

Year: first Semester: first Total number of classroom hours: 360 Total ECTS: 32										
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	Informatyka	Matematyka	Other	
1	Mathematical Analysis and Linear Algebra	W + Ć	30 + 30	E	5	0	0	5	0	O
2	Organisation and Management	W + Ć	15 + 30	E	5	5	0	0	0	O
3	Foreign Language 1	L	30	Z	2	2	0	0	0	W
4	Foreign Language 2	L	30	Z	2	2	0	0	0	W
5	Computer Systems	W + Ć	15 + 15	E	3	0	3	0	0	O
6	Computer Programming 1	Ć	45	Z	5	1	4	0	0	O
7	Algorithms and Theory of Computation	W + Ć	15 + 30	E	4	0	3	1	0	O
8	Physical Education	Ć	30	Z	0	0	0	0	0	W
9	Business Data Processing	Ć	25	Z	4	3	1	0	0	O
10	Data Notations	Ć	20	Z	2	1	1	0	0	O
	SEMESTER TOTAL	W4 / Ć8 / L2	360	E4 / Z6	32	14	12	6	0	O7 / W3

¹ In the case of assigning a major to more than one discipline, the subjects indicated in the study plan as compulsory classes must ensure the achievement of at least half of the learning outcomes in the main discipline (at least 51% of the ECTS points necessary to complete the major).

Year: Semester: Total number of classroom hours: Total ECTS:				first second 345 32						
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	Informatyka	Matematyka	Other	
1	Discrete Mathematics	W + Ć	20 + 35	E	5	0	0	5	0	O
2	Operating Systems and Computer Networks	W + Ć	15 + 30	E	5	0	5	0	0	O
3	Business Law	W	30	E	4	2	0	0	2 – Law	O
4	Foreign Language 1	L	30	Z	2	2	0	0	0	W
5	Foreign Language 2	L	30	Z	2	2	0	0	0	W
6	Computer Programming 2	Ć	45	Z	5	2	3	0	0	O
7	Probability and Statistics	W + Ć	20 + 30	E	5	2	0	3	0	O
8	Physical Education	Ć	30	Z	0	0	0	0	0	W
9	Information Systems	W + Ć	15 + 15	E	4	3	1	0	0	O
	SEMESTER TOTAL	W5 / Ć6 / L2	345	E5 / Z4	32	13	9	8	2	O6 / W3

Year: second Semester: first Total number of classroom hours: 315 Total ECTS: 32										
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	Informatyka	Matematyka	Other	
1	Economics and Corporate Finance	W + Ć	15 + 15	E	4	4	0	0	0	O
2	E-business	W + Ć	15 + 15	E	4	4	0	0	0	O
3	Digital Control Systems for Industrial Processes	Ć	30	Z	3	1	1	0	1 - Automation, Electronics, Electrical Engineering and Space Technology	O
4	Foreign Language 1	L	30	Z	2	2	0	0	0	W
5	Foreign Language 2	L	30	Z	2	2	0	0	0	W
6	Numerical Methods	W + Ć	15 + 30	E	4	1	1	2	0	O
7	Computer Programming 3	Ć	45	Z	5	2	3	0	0	O
8	User Interface Development	Ć	30	Z	3	0	3	0	0	O
9	Relational Databases	W + Ć	15 + 30	E	5	2	3	0	0	O
	SEMESTER TOTAL	W4 / Ć7 / L2	315	E4 / Z5	32	18	11	2	1	O7 / W2

Year: second Semester: second Total number of classroom hours: 30 Total ECTS: 33										
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	Informatyka	Matematyka	Other	
1	Foreign Language 1	L	30	E	3	3	0	0	0	W
2	Foreign Language 2	L	30	E	3	3	0	0	0	W
3	Enterprise Systems in Management	W + Ć	15 + 30	E	5	5	0	0	0	O
4	IT Project Management	W + Ć	15 + 15	E	6	5	1	0	0	O
5	Implementation architecture	W + Ć	15 + 30	E	4	1	3	0	0	O
6	Computer Programming 4	Ć	45	Z	5	2	3	0	0	O
7	Business Processes Modelling	W + Ć	15 + 30	E	4	3	1	0	0	O
8	<i>Elective Course 1</i>	Ć	30	Z	3	1	2	0	0	W
	SEMESTER TOTAL	W4 / Ć6 / L2	300	E6 / Z2	33	23	10	0	0	O5 / W3

Year: third Semester: first Total number of classroom hours: 255 Total ECTS: 30										
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	Informatyka	Matematyka	Other	
1	Data Warehouses	W + Ć	15 + 25	E	5	4	1	0	0	O
2	Application Architecture	W + Ć	15 + 30	E	4	1	3	0	0	O
3	Development and Operations	Ć	45	E	4	1	3	0	0	O
4	Computer Programming 5	Ć	30	Z	3	1	2	0	0	O
5	<i>Elective Course 2</i>	Ć	30	Z	4	2	2	0	0	W
6	<i>Elective Course 3</i>	Ć	25	Z	4	4	0	0	0	W
7	<i>Elective Course 4</i>	Ć	25	Z	3	1	2	0	0	W
8	Seminar	S	15	Z	3	2	1	0	0	W
	SEMESTER TOTAL	W2 / Ć7 / S1	255	E3 / Z5	30	16	14	0	0	O4 / W4

Year: third Semester: second Total number of classroom hours: 225 Total ECTS: 30										
Lp.	Course (title)	Class Form	No of teaching hrs.	Form of completion	ECTS	ECTS/discipline(s)				Compulsory class (O) / Elective class (W)
						NoZiJ	informatyka	matematyka	inne	
1	Elective lecture in the field of humanities	W	30	E	5	0	0	0	5 - Philosophy, Cultural and Religious sciences	W
2	Entrepreneurship	Ć	15	Z	2	2	0	0	0	O
3	Cloud Computing	W + Ć	15 + 30	E	3	1	2	0	0	O
4	Computer Programming 6	Ć	30	Z	3	1	2	0	0	O
5	<i>Elective Course 5</i>	Ć	30	Z	4	4	0	0	0	W
6	<i>Elective Course 6</i>	Ć	30	Z	4	2	2	0	0	W
7	Seminar	S	45	Z	9	7	2	0	0	W
	RAZEM SEMESTR	W2 / Ć5 / S1	225	E2 / Z5	30	17	8	0	5	O3 / W4

METHOD OF VERIFICATION AND EVALUATION OF LEARNING OUTCOMES

The degree programme is completed on the day of passing the diploma examination. A prerequisite for taking the diploma examination is:

obtaining positive final grades in all subjects, including the Seminar, subject to the differences resulting from studies taken in the individual educational path mode. The final grades for individual subjects are calculated as the resultant of the grades obtained from the individual forms of teaching according to the formula indicated in the course syllabus.

1. Submission of a dissertation or diploma project, admitted to further proceedings by the dissertation supervisor after verification using the Uniform Anti-plagiarism System.
2. Obtaining positive grades for the diploma thesis/diploma project from the supervisor and the reviewer.

Verification and documentation of the learning outcomes achieved by students takes place through:

- in terms of knowledge - credit and examination papers, project works, presentations, written works, papers,
- in terms of skills - credit assignments, project work, task reports, individual and collective task result sheets, case studies, essays, group work,
- in terms of social competence - project work, presentations, activity scoring sheets, written papers.

The syllabus specifies the workload of the average student needed to achieve the learning outcomes. The importance of knowledge, skills and social competences effects is indicated. In the case of subjects taught in different forms (lecture and exercises), the final grade is formed by partial grades from particular forms of classes, taking into account the weights determined by the lecturer. This information, together with information on the requirements and criteria for passing the subject, is communicated before the commencement of classes, in particular by making the syllabus available. In the verification of learning outcomes, it is assumed that the attainment of a pass mark in an examination or final course credit, as well as a mark in a thesis or project and a diploma examination confirms the attainment of all learning outcomes. The level of achievement of learning outcomes is determined by the grade awarded.

The synthetic measure of the degree of achievement of the assumed learning outcomes is the final grade of the studies, the manner of the determination of which is specified by the *Rules and Regulations of the Studies of Krakow University of Economics*.

GRADUATION REQUIREMENTS

Graduation Requirements (thesis / final exam / other)	Thesis or diploma project
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EFEKTY UCZENIA SIĘ I TREŚCI PROGRAMOWE PRZYPISANE DO ZAJĘĆ (sporządzane dla przedmiotów pokazanych w planie studiów)

Przedmioty ogólne

1	Nazwa przedmiotu
	Physical Education
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się

	W (CS-W09): Student knows and understands issues in selected areas of physical culture, participation in tournaments and sports events, organization of sports events, and knows the range of physical exercises and their impact on the harmonious development and healthy lifestyle of a person. U (CS-U08): Student is able to independently perform tasks and motor exercises in the field of specific team games, individual sports, qualified tourism and has acquired motor and coordination skills to carry out technical and tactical tasks in individual sports disciplines and recreational and tourist activities. K (CS-K06): Student is ready to fulfil obligations based on the values present in sports, recreation and tourism (systematicity, activity, responsibility, respect for the opponent, "clean play", etc.) and organizes and actively participates in sports and recreational and tourist activities and events.
4	Treści programowe przedmiotu F1: Exercises that strengthen the muscular system and stimulate the functioning of the circulatory system (also using accessories and devices) in order to increase the level of physical fitness. F2: Exercises improving motor skills: utilitarian, recreational activities and sports, qualified tourism, specialized (sports sections) allowing participation in various forms of physical activity. F3: Exercises shaping correct posture and relaxation (also with music) to maintain physical and mental health. F4: Learning and improving elements of technique and tactics of various sports disciplines. F5: Proper game, school game, mini tournaments, sports competitions. F6: Rules of the game and refereeing rules in selected sports disciplines. F7: Organization and participation in various types of recreational, tourist and sports events (matches, tournaments, Academic Championships of Małopolska, Academic Championships of Poland, University tournaments etc.). F8: Self-monitoring and self-assessment of the exercises performed, as well as tests and examinations of the state of physical development, fitness and movement skills. F9: The history of physical culture, its role in the modern world and its impact on a healthy lifestyle. F10: Health and safety regulations during classes, Regulations and "Codes of conduct" applicable in a given place of physical activity, i.e. on the slope, on the water, swimming pool, sports hall, court, gym, etc.

Przedmioty podstawowe

1	Nazwa przedmiotu
	Entrepreneurship
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS_W01): Student knows and understands the contemporary conditions for the development of entrepreneurship, the motives for starting up a business, forms of entrepreneurship and institutions supporting entrepreneurship. U (CS_U01): Students is able to use their knowledge effectively to identify entrepreneurial opportunities, seek innovative solutions, undertake entrepreneurial activities. K (CS_K02, CS_K04): Student is ready to consciously supplement and improve the knowledge necessary to seek new business opportunities, initiate changes and solve problems.
4	Treści programowe przedmiotu
	C1: Entrepreneurship in practice (definitions, concepts, processes). C2: Entrepreneur (concept, roles, functions, entrepreneurial concepts, classifications). C3: Motives for starting a business. C4: Sources of business ideas and improvement of products and services. C5: Types of entrepreneurship (traditional, internal, corporate, family, silver, forced, opportunity-based, social, bypass). C6: Institutional and legal determinants of entrepreneurship. C7: Financial aspects of entrepreneurial activities. C8: Practical exercises to improve entrepreneurial skills.

1	Nazwa przedmiotu
	Mathematical Analysis and Linear Algebra
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	CS-W01, CS-W02): Student knows and understands basic concepts and techniques of mathematical analysis and linear algebra and applications to simple economic models. U (CS-U01, CS-U08): Student is able to apply knowledge and skills in mathematical analysis and linear algebra for applications to simple economic models. S-K06): Student is ready to learn cooperatively and independently, understands the necessity of continuous learning, works systematically and meets deadlines, writes all tests and exams with full respect to ethical rules, shows respect to the university staff and other students.
4	Treści programowe przedmiotu
	• Elements of mathematical logic Introduction of basic concepts, logical operators and quantifiers. • Calculus of one variable functions Limit of a function, continuity, asymptotes of the graph of a function, derivative and its geometric interpretation, de l'Hospital's rule, monotonicity and local extremes, convexity and inflection points of the graph of a function, differential of a function and its applications. • Integrals of functions of one variable

	Antiderivative and indefinite integral, technics of integration, definite integral, improper integral, economic and geometric applications of integrals. - Algebra of matrices Operations on matrices and their properties, determinant of a square matrix, inverse of a matrix, matrix equations, elementary row or column operations. - Systems of linear equations The rank of a matrix, the matrix form of a system of linear equations, Cramer's system, general system of linear equations, Kronecker-Capelli's theorem. - Differential calculus of functions of several variables Partial derivatives and their economic interpretations, local extrema, least squares method, constrained extrema.
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1	Nazwa przedmiotu
	Discrete Mathematics
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W02): Student understands mathematical concepts and methods necessary for constructing and analyzing advanced algorithms.
	U (CS-U01, CS-U08): Student is capable of communicating precisely and efficiently regarding construction and optimization of algorithms. K (CS-K01): Student is able to use mathematical models to construct and analyze advanced algorithms.
4	Treści programowe przedmiotu
	- Elementary logic and set theory. - Functions, sequences and asymptotics. - Induction and recurrence. - Elementary combinatorics. - Elementary number theory. - Elementary cryptography and cryptanalysis. - Introduction to graph theory. - Introduction to tree algorithms.

1	Nazwa przedmiotu
	Probability and Statistics
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W02): Student knows and understands the essence of statistical research and probability calculus in the field of basic concepts of probability and statistics, selected methods of statistical estimation and hypothesis verification, selected methods of correlation and regression analysis and selected methods of analysing the dynamics of socio-economic phenomena. U (CS-U01, CS-U08): Student is able to effectively apply acquired knowledge in the field of probability and statistics to solve practical problems, i.e. he can calculate

	and interpret: selected distributions of random variables, parameters of these distributions, selected estimation procedures, selected statistical tests, selected measures of correlation and regression functions, selected measures of dynamics of socio-economic phenomena. K (CS-K06): Student is ready to identify practical problems requiring the use of acquired knowledge and skills in the field of probability and statistics, so that he is aware of the need to complete the acquired knowledge and improve his skills in probability and statistics.
4	Treści programowe przedmiotu W1: Introduction to probability and statistics, including probability calculus and statistics, basic statistical concepts, random variables, distribution of random variables, statistical series, graphical representation of statistical series. W2: Parameters of random variable distribution, empirical distribution parameters (arithmetic mean, modal, median quartiles, variance, standard deviation, coefficient of variation, asymmetric measures). W3: Basic random variable distributions, two-dimensional random variable, multivariate variable, distribution parameters of selected random variables, linear regression function W4: Basic concepts of mathematical statistics, statistical estimation rules, point estimation, interval estimation rules, and confidence interval construction for selected parameters. W5: The theory of statistical hypothesis testing, basic concepts, the definition of statistical test, a schema of the test, the selected test parameters for single and two-dimensional variable, selected non-parametric tests. W6: Methods of analysis of phenomena dynamics, dynamics measures, economic indicators, indexes, methods of extracting the trend. C1: Statistical series and methods of graphical presentation of data, calculation of parameters of empirical distribution (arithmetic mean, modal, median, quartiles, variance, standard deviation, coefficient of variation, asymmetry). C2: Basic distributions of the random variable (distribution 0.1, binomial distribution, Poisson distribution, normal distribution), ability to apply these distributions in practice. C3: Methods of analysis of the interdependence of phenomena - correlation and regression of two variables. C4: Methods of analysis of the interdependence of phenomena - correlation and regression of many variables. C5: Statistical estimation methods - point estimation, confidence intervals for basic parameters. C6: Statistical estimation methods - determination of the necessary sample size. C7: Statistical tests for basic parameters. C8: Statistical tests for selected nonparametric tests. C9: Methods of dynamics analyse of socio-economic phenomena (economic indicators, indexes, analysis of development tendencies).

1	Nazwa przedmiotu
	Numerical Methods
2	Język prowadzenia zajęć
	angielski

3	Realizowane efekty uczenia się
	W (CS-W01, CS-W02): Student knows and understands the goals and role of numerical methods in analysis of mathematical models and knows concepts in this area, related to the computational issues and basic methods of solving them. U (CS-U01, CS-U04): Student is able to use the tools of numerical methods, with awareness of the limitations of their applicability, to implement the methods, to estimate the error of the methods and to interpret the results. K (CS-K06): Student is ready to individual and cooperative analysis of the economic phenomena with usage of mathematical methods.
4	Treści programowe przedmiotu
	• Basis of error theory. • Direct methods of solving the systems of linear equations. • Approximate methods of solving the systems of linear equations. • Properties of continuous functions. • Approximate methods of solving the nonlinear equations and systems of nonlinear equations. • Polynomial interpolation. • Numerical differentiation. • Numerical integration.

1	Nazwa przedmiotu
	Business Law
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W07): Student knows and understands characteristic of civil and commercial regulations U (CS-U01, CS-U08): Student is able to characterize basic institutions of commercial law, find legal sources and apply them K (CS-K01, CS-K02): Student is ready to make self-assessment of their competence and improve their skills in commercial matters
4	Treści programowe przedmiotu
	W1: The concept and significance of law. Public law versus civil law. Provision and norm. Legal relationship. Kinds and hierarchy of normative acts W2: The principles of the application of law. Conflicts of laws. Presumption of law and presumption of fact. Interpretation of the law and types of interpretation, loopholes, the power of interpretation. Winding force of law W3: General characteristics of civil law as a branch of the legal system. The subjects in civil law. The objects of civil law. The concept and types of entrepreneurs W4: The principles of representation of subjects. Civil law instances – legal procedures and declaration of will. Limitation of claims and deadlines W5: The concept and specific character of property law. Kinds of things. Types of property rights W6: Property – the concept, purchase, encumbrance, transfer, legal protection, co-ownership W7: Usufruct. Limited property rights. Collateral and mortgage. Possession and leasing. Land and mortgage register and land registry. Digitalization of land and mortgage registers W8: The concept of obligation and its elements. The sources of obligations

	W9: Torts and liability in tort. Groundless enrichment. Concluding traditional and electronic contracts W10: Consumer protection in adherence agreements. Consumer protection in contracts concluded on distance. The form of legal transaction – the types, the specifics in commercial relations. The basic forms of contract performance. General principles of contractual responsibility W11: The concept of business and commercial law. The concept of economic activity and an entrepreneur. The legal concept of an enterprise. The types of enterprises according to National Court register. The concept of a firm. The concept of firm's exclusiveness. Sanctions in cases of infringing right to a firm. Procuration – the concept, the scope, form, limitations and cancellation. Economic Activity Record - who is included, record-keeping organs, the character and the time of entry, application for entry. CIDG, National Registry of Partnerships – types of registers, application for registration, character and time of registration, principle of free access to records W12: The principle of economic freedom and the principle of prompt procedure. The right to the interpretation of regulations. The right to suspend economic activity. Concessions – the scope, the authority, granting concessions, promissory note. Regulated activity – entry in the registry and the consequences of the absence of entry. Permits, licenses, permissions – the scope and principles of regulation. The obligation for entrepreneur identification. Special duties. Control of entrepreneurs W13: Natural person as an entrepreneur. Status of civil partnership. Types of commercial partnerships. Differences between commercial partnerships and commercial companies. The principles of representation and partner's liability for partnerships' debts. EEIG and State Enterprises – specification of regulations. Transformations of partnerships. Other entrepreneurs – co-operatives, state enterprises, branches of entrepreneurs. Liquidation of an entrepreneur – the principles, the difference from insolvency. Insolvency and corrective proceedings – general principles
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1	Nazwa przedmiotu
	Economics and Corporate Finance
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01): Student knows and understands how to define basic concepts in the field of business management, with particular emphasis on large enterprises (corporations). Understanding the impact of marketing management, human resources management, operational management, and quality on the achieved results U (CS-U01): Student is able to determine individual factors, economic and financial parameters on costs, financial liquidity, and results of each enterprise under the corporation. Ability to analyze the functioning of the corporation, in basic aspects, including economic and financial analysis, management, human resource management, knowledge management, and problems of financial decisions within corporations. The ability to indicate the basic ways of decision-making processes of the corporation, and their functioning, with particular emphasis on strategy, management, identity, investing, and financing the development as well cooperation with other economic entities

	K (CS-K06): Student is ready to develop the attitude of future responsibility for the decisions made in a corporation. Making students aware of the necessity of having knowledge in the field of marketing management, human resources management, operational, quality, and financial management in big enterprises in the conditions of existing competition market
4	Treści programowe przedmiotu
	W1: Introduction to Corporate Economics and Finance W2: The Corporate Firm - The Sole Proprietorship, The Partnership, The Corporation, A Corporation by Another Name W3: The Agency Problem and Control of the Corporation W4: Financial Statements and Cash Flow W5: Valuation and Capital Budgeting W6: Making Capital Investment Decisions W7: Risk Analysis, Real Options, and Capital Budgeting W8: Stock Valuation W9: Efficient Capital Markets and Behavioral Challenges W10: Long-Term Financing: An Introduction W11: Capital Structure: Basic Concepts W12: Mergers, Acquisitions, and Divestitures. International Corporate Finance C1: The Corporate Firm - Goals and Management Strategy C2: Determination of Objectives in the Structure of the Strategy of Corporation C3: Financial Statements and Cash Flow C4: Financial Statements Analysis and Financial Models C5: Discounted Cash Flow Valuation. Net Present Value and Other Investment Rules C6: Making Capital Investment Decisions C7: Risk Analysis, Real Options, and Capital Budgeting C8: Risk, Cost of Capital, and Capital Budgeting C9: Long-Term Financing. Leasing

1	Nazwa przedmiotu
	Organisation and Management
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01): Student knows and understands advanced concepts, theoretical issues, and methods of problem description and solving typical for basic general knowledge in the disciplines of quality and management science and computer science. U (CS-U01): Student is able to analyse complex information and business processes and formulate a description of problems regarding information technology applications in these processes, including organizational, legal, and social aspects. K (CS-K06): Student is ready to follow best practices, organizational culture, security principles and legal regulations related to the specificity of information technology professions, in relation to oneself and associates.
4	Treści programowe przedmiotu

	W1: Organization, management and a survey of history of management thought W2: Organizational structures W3: Management functions and processes W4: Methods of organization and management W5: Information and decision-making in organizations W6: Motivation, management styles and techniques, leadership W7: Introduction to strategic management W8: Introduction to international management C1: Discussion about origins of management and relevance of old rules in modern world C2: Designing management structures (management systems) C3: Project management C4: Organizational change C5: Development, assessment, and improvement of organizations C6: Decision games and simulations C7: Conflict management and negotiation C8: Management styles and techniques C9: Elements of strategic management – analysis of examples of corporate strategies C10: Methods of creative thinking C11: Innovation and entrepreneurship C12: Business planning C13: Implementation of modern management methods C14: Companies on the global market C15: Assessment of students' results/grading
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Przedmioty kierunkowe

1	Nazwa przedmiotu
	Algorithms and Theory of Computation
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W02): Student knows and understands the concept of an algorithm, the properties and techniques of constructing algorithms, and the basic data structures used in algorithmics. U (CS-U02): Student is able to assess the usefulness of particular techniques for constructing algorithms for solving a given problem by estimating the complexity and selecting appropriate data structures. K (CS-K02): Student is ready to interpret the fundamental relationships between computer science, mathematics and scientific knowledge in technical, economic and social aspects.
4	Treści programowe przedmiotu
	W1: Information and methods of recording it. Text coding. Integers encoding. W2: U2 encoding. Encoding real numbers in computer memory. Data encryption. Introduction to algorithmics. The concept and features of an algorithm. W3: Algorithms. Methods of writing algorithms. Programming languages and their evolution. Basics of computer programming. W4: Algorithms. Basic algorithmic constructions, iterations, recursion. Basics of computer programming – continued. Sorting algorithms. W5: Algorithms – continued. Computational complexity of algorithms. Types of computational problems. P, NP, NP-complete problems. W6: Data structures. Static and dynamic data structures. Queues, lists, trees, graphs. Operations used in dynamic data structures. W7: Finite automata, regular expressions, formal grammars and formal languages. C1: Algorithms and algorithmic strategies. Computational complexity of algorithms, complexity measures and classes. A review of classic algorithms in computer science. C2: Formal grammars, tools for processing formal languages. Syntactic elements of programming languages. Interpretation of expressions, styles and effects of evaluation. C3: Data structures and their applications. Ways to implement collections, iteration, advantages and disadvantages of various structures and their implementation. C4: Automata, their applications and implementation methods. C5: Data types, representation and its limitations. Hierarchies and type systems, security, type control, polymorphism.

1	Nazwa przedmiotu
	Computer Systems
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W03): Student knows and understands the construction and functioning of computer devices and knows how to use them in different areas of economic activity.

	U (CS-U03): Student is able to appropriately present, select, and utilize computer devices in various areas of economic activity. K (CS-K04): Student is ready to follow-up changes in the area of computer devices and information technology, acquaint themselves with them, and enhance their skills.
4	Treści programowe przedmiotu W1: Machine representation of information W2: Structure and operation of computer architecture using Intel x86 as an example (memory units, data and how they are placed in memory, processor registers, syntax of processor commands, transfer commands, mathematical and logical operations) W3: Program execution and interrupt handling in Intel x86 architecture. W4: Data devices and media (types of media, data encoding methods, structure and physical and logical structure of hard disk, organization of data on disk) W5: Optical devices and data carriers (construction and principle of operation of optical drives CD, DVD, Blu-ray) W6: Image generation and presentation devices - graphics cards, LCD displays W7: Printers (dot matrix, inkjet, laser), scanners (types, construction and principle of operation), keyboard and control devices. C1: Arithmetic and logical operations in binary and hexadecimal system. C2: The DEBUG program and its use to demonstrate the operation of computer architecture. C3: Assembler programming (assembler program structure, basic programming constructs, program writing, program compilation and linking)

1	Nazwa przedmiotu Operating Systems and Computer Networks
2	Język prowadzenia zajęć angielski
3	Realizowane efekty uczenia się W (CS-W03): Student knows and understands the areas of application and responsibilities of operating systems in modern information systems. U (CS-U03): Student is ready to configure, diagnose, and automate the configuration of computer networks in operating systems. K (CS-K01): Student is able to manage a system in a local, virtual, and cloud computing environment.
4	Treści programowe przedmiotu W1: Origin and development of operating systems (MS-DOS, Windows, Unix, Linux). Characteristics of the file system and basic file operations in Windows (command line) and Linux (Bash shell). W2: Creating and running batch files in Windows and Bash shell scripts in Linux. W3: Input-output operations, streams, and pipelines in the Linux system. W4: Creating advanced shell scripts in the Linux system. W5: Shell configuration, access rights, and process management in the Linux system. W6: Layered models (ISO OSI, TCP/IP, IEEE-802) [ISO-OSI.pdf] as an abstraction of existing computer networks. Description of network operation as the interaction of protocol stacks. The principle of encapsulation. Handling networks in operating systems -> physical, logical, and service (application) networks. Standardization organizations and key

	standards. LAN and WAN networks in the context of standards and technologies for building physical networks. W7: Role of the application layer in the ISO OSI model. Basic TCP/IP (Internet) network applications such as DNS, DHCP, HTTP, FTP, etc., and application layer protocols in the TCP/IP model. W8: Network layer (ISO OSI)/internetwork (TCP/IP). Tasks and protocols. IPv4 vs IPv6 addressing (differences in IPv6 addressing compared to IPv4). Static and dynamic (DHCP) configuration of network interfaces. Automatic address translation (role of ARP and RARP protocols). Auxiliary protocols ICMP and IGMP. C1: Working with the Windows operating system (command line). Creating batch files. C2: Basic operation of the operating system from the command line (Bash shell) - file and directory operations, using the mc file manager, using the vi editor, creating simple shell scripts. C3: Managing access rights to directories and files. C4: Addressing resources and services in computer networks (URL, UNC, IP, MAC). Configuration parameters of network interfaces. DHCP, DNS, WWW, FTP, and other application layer services. C5: Network layer (internetwork). Addressing in TCP/IP networks: IPv4 & IPv6. IP networks, subnets, and supernetting. Configuration of network interfaces: static and dynamic (DHCP protocol) in MS Windows and Linux systems. Configuration files and system commands for configuring interfaces and controlling network configuration parameters. Configuration of DHCP server for LAN of virtual machines. C6: Routing in TCP/IP networks: static vs dynamic. Routing protocols. Routing metrics. Routing configuration. Resolving typical configuration problems of local services and Internet access based on the TCP/IP protocol stack - practical tasks of routing configuration for LANs operating on private IPs (e.g., home networks) using internet services and sharing their own services.
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1	Nazwa przedmiotu
	Business Data Processing
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W05): Student knows and understands the importance of a spreadsheet in storing and processing data in enterprises
	U (CS-U04): Student is able to use a spreadsheet fluently in the field of data importing and advanced data processing
	K (CS-K01): The student is ready to constantly expand their knowledge of spreadsheet usage with its new functionalities
4	Treści programowe przedmiotu
	C1: Importing data into a spreadsheet
	C2: Relationships between data in a spreadsheet
	C3: Pivot tables

	C4: Automation of feeding a spreadsheet with data from a form C5: Macro commands C6: Information functions C7: Dynamic array formulas
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1	Nazwa przedmiotu
	Computer Programming 1
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (IS6_W01): Student knows and understands the basic concepts of syntax and semantics of modern general-purpose programming languages
	U (IS6_U01): Student is able to select and use appropriate syntactic structures to record the intention and expression of the algorithm
	K (IS6_K01): Student is ready to use the semantics of the programming language in communicating in a development team
4	Treści programowe przedmiotu
	C1: Types and variables
	C2: Control instructions
	C3: Subroutines and recursion
	C4: Arrays as data structures
	C5: File handling
	C6: Dictionaries, sets, stacks, queues
	C7: Elements of object-oriented programming
	C8: Elements of functional programming
	C9: Software testing

1	Nazwa przedmiotu
	Computer Programming 2
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W02, CS-W05): Student knows and understands the methods of communication of computer programs with their environment as well as IT standards and conventions adopted in this area.
	U1 (CS-U04): Student is able to plan and implement a solution to a problem in the form of a program communicating with the environment.
	U2 (CS-U01): Student is able to use professional literature, documentation and Internet resources to search for solutions to the encountered problems.
4	K (CS-K02): Student is ready to describe the stages of work on the project and prepare its documentation.
	Treści programowe przedmiotu
	C1: Installation, configuration and testing of the working environment.
	C2: Principles of operation and practical use of version control systems.
4	C3: Use of common file formats for storing and exchanging data between programs.

	C4: Communication with the web environment, use of data available online. C5: Text interface for program's communication with the environment. C6: Refactoring of the application code - defining functions, error handling, adapting the program to recommended standards. C7: Basics of analysis and presentation of data extracted from the web. C8: Use of the framework as a basis for creating applications. C9: Web interface for program's communication with the environment.
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1	Nazwa przedmiotu
	Computer Programming 3
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W02): Student knows and understands the basic concepts related to the organization of the system along with its components, interconnections, working environment and rules establishing the method of its construction and development U (CS-U04): Student is able to select and use appropriate tools to support the process of building a web application K (CS-K01): Student is ready to test software to detect defects in interfaces and interactions between modules or systems
4	Treści programowe przedmiotu
	C1: Software architecture and architectural patterns C2: Components of the MVC architectural pattern (model, view, controller) C3: The idea of web applications C4: Using a programming platform (framework) to build a web application C5: Testing applications using integration tests

1	Nazwa przedmiotu
	Computer Programming 4
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W03, CS-W05): Student knows and understands the principles of creating web applications in .NET, the C# language and the Entity Framework U (CS-U03, CS-U04): Student is able to create a web application using a database, running in .NET K (CS-K02, CS-K03): The student is ready to apply appropriate methods and tools to carry out a web application project on the basis of a description of the expected outcome
4	Treści programowe przedmiotu
	C1: .NET environment C2: Visual Studio Community, solutions and projects C3: C# programming language – syntax, object oriented programming C4: Collections, interfaces C5: LINQ C6: Entity Framework, Code First, migrations C7: Web application in MVC architecture

	C8: Routing, controllers and views C9: User data collection and validation C10: Controlling the status of application C11: Easy applications - Razor Pages C12: Web API creation C13: CRUD application
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1	Nazwa przedmiotu
	Computer Programming 5
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W05, CS-W06): Student knows and understands the consequences of choosing architecture on the future performance of an application.
	U (CS-U02, CS-U04): Student is able to apply knowledge of monolithic architecture in the implementation of functional requirements.
	K (CS-K01): Student is ready to conduct analysis and make a selection of an appropriate architecture for the class of problems being addressed.
4	Treści programowe przedmiotu
	C1: Mapping business process to software construction elements
	C2: Identification and implementation of system modules defining key rules in the business process
	C3: Encapsulation of complexity, determination of module boundaries in terms of consistency and responsibility in the system
	C4: State persistence in the database
	C5: Representation of significant values, behavioural states in the process using value objects, aggregates, and policies
	C6: Tuning the system's behaviour without modifying the source code
	C7: Introducing changes, private APIs, public APIs, levels of coupling in the application
	C8: Archetypes of business model

1	Nazwa przedmiotu
	Computer Programming 6
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W05, CS-W06): Student knows and understands the consequences of architecture choices and can identify technical challenges of decentralized architecture in the context of future application performance.

	U (CS-U02, CS-U04): Student is able to apply knowledge of distributed architecture in the implementation of functional requirements. K (CS-K01, CS-K03): Student is ready to conduct analysis and make a selection of an appropriate architecture for the class of problems being addressed.
4	Treści programowe przedmiotu C1: Definition of non-functional requirements in a project with a modular architecture achievable only in a distributed system C2: Synchronous communication of modules in a distributed system C3: Implementation of the CQRS pattern C4: Handling errors in communication between services C5: Implementation of the Circuit Breaker pattern C6: Implementation of the Load Balanced Service pattern C7: Implementation of the Service Registry pattern C8: Asynchronous communication C9: Simulation of external factors affecting the system's operation C10: Conventions, patterns, and pitfalls of distributed systems

	wa przedmiotu
	rmation Systems
	k prowadzenia zajęć
	elski
	lizowane efekty uczenia się
	CS-W01, CS-W03): Student knows and understands the principles of design, development and management of information systems and associated technologies in an organized human enterprise.
	CS-U01, CS-U03): Student is able to effectively and efficiently analyse the information requirements of a given organization.
	K (CS-K01, CS-K02): Student is ready to develop the skills of critical thinking and team-working.
	sci programowe przedmiotu
	Introduction
	W2: Basic Concepts
	Typology of Information Systems
	W4: Enterprise Systems
	W5: SCM Systems
	CRM Systems
	Cloud Computing
	C1: Introduction to the subject matter
	C2: Planning the activities of the organization and market characteristics
	C3: Business strategy and hierarchy of goals as the basis for defining an IT project
	C4: Feasibility study and pre-implementation study
	C5: Feasibility study: project objectives and scope, feasibility constraints, venture profitability study, feasibility and conclusions Establishing the overall scope of the project

1	Nazwa przedmiotu
	Enterprise Systems in Management
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W05): Student knows and understands the concept of enterprise system (ES) and the complexity of ES implementation process
	U (CS-U05): Student is able to identify and evaluate organizational considerations of ES implementation and threats to ES implementation project and is able to indicate solutions to these threats
	K (CS-K01): Student is ready to continuously improve and update his/her knowledge of contemporary enterprise systems in both theoretical and practical aspects
4	Treści programowe przedmiotu
	W1: Characteristics and evolution of enterprise systems (ES)
	W2: Motivations for ES adoption and their use in companies
	W3: ES adoption process: Participants, phases, tasks
	W4: Success in ES adoption
	W5: Critical success factors for ES adoption
	W6: Benefits from ES adoption
	W7: Evaluation of ES adoption and directions for future development of ES

	C1: MRP algorithm C2: Enterprise system choice C3: Considerations across the ES lifecycle C4: Best practices in ES adoption: A case study C5: Problems and barriers to ES adoption and use C6: Determinants of ES implementation C7: Considerations of ES adoptions depending on the project/organization type and business environment
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1	Nazwa przedmiotu
	Relational Databases
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W02): Student knows and understands how to design databases and process them U (CS-U04): Student is able to design database and is familiar with SQL functional and selecting commands K (CS-K05): Student is ready to communicate to share experiences and knowledge to design appropriate database systems.
4	Treści programowe przedmiotu
	W1: Relational model, table as a structure for data collecting. W2: Relationships: their types and other attributes. Case study: designing database on the basis of information being the result of system analysis and interviews conducted among users for whom the database is designed W3: Logical design. Creating logical design of a database on the basis of textual information describing data that is going to be stored in the database W4: SQL language: description, introduction and classification. Description of CREATE TABLE and the statements used for performing functional operations on data (INSERT, UPDATE, DELETE) W5: Database designing process - from needs analysis to conceptual, logical and physical design of a database W6: Selecting queries. Project, selection, calculated fields, cartesian product, inner join, outer join, grouping and aggregate functions W7: SELECT statement of SQL language. Syntax, project operation, select conditions, ordering, joins, self-joins, aliases, subqueries, negative queries, correlated sub-queries, unions, intersects, calculated fields, grouping and aggregate functions, HAVING clause C1: Introduction. Description of relational model C2: Data structures: various kinds of keys, tables and non-atomic fields. Indexes. The problem of integrity C3: Entity relationship diagrams. The process of database designing C4: Logical design of a database. Implementation of database for films renting C5: Selected problems connected with database designing C6: Functional statements of SQL language: using CREATE TABLE statement for physical database project designing. Statements for data manipulation. VBA programming basics C7: Using QBE tool for selecting queries designing

	C8: SELECT statement of SQL language
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1	Nazwa przedmiotu
	E-business
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W06): Student knows and understands e-business and the role it plays in the information economy, understands the concepts of e-business environment. U (CS-U01, CS-U03): Student is able to apply concepts and models of e-business in the design and implementation of IT enabled organizational change. K (CS-K01): Student is ready to design and implement an e-business venture.
4	Treści programowe przedmiotu
	W1: History of the Internet and e-business. Definitions of essential concepts. W2: E-business theoretical foundations. Technology related empirical laws. Nolan-Gibson Model. Transaction cost theory, Disruptive innovations theory. W3: E-business environment. PEST analysis method. E-business technological infrastructure with the emphasis on information security. W4: E-business strategies and models. Different e-business typologies. Sell-side and buy side strategies. Complex strategies. Revenue models. W5: User Experience and Web-usability C1: E-business venture project C2: Case study: Orlikowski W., Thompson S., (2010), Leveraging the Web for Customer Engagement: A Case Study of BT's Debatescape, Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts, Working Paper No. 380. C3: Case study: Wixom, B. H., Ross, J. W., Beath, C. M., (2013), comScore, Inc.: Making Analytics Count, CISR WP No. 392. C4: Case study: Lacity, M., Moloney, K., Ross, J. W. (2018). Blockchain at BNP Paribas: The Power of Co-Creation. CISR WP No. 428.

1	Nazwa przedmiotu
	Data Notations
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (IS6_W02): Student knows and understands modern data description formats, the structure of documents based on these formats and the methods of storing and exchanging data in a network environment U (IS6_U03): Student is able to design a syntactically correct document describing a certain fragment of reality and convert it between various formats. K (IS6_K02): Student is ready to use available communication media and data exchange standards to expand his knowledge and improve skills
4	Treści programowe przedmiotu
	C1: Text document formats (TXT, CSV, XML, JSON) C2: Ways of describing and exchanging data in text documents. C3: Basics of web technologies and data presentation formats (HTML, CSS, SVG) C4: Processing text documents in applications

	C5: Managing text documents. Document version control systems
1	Nazwa przedmiotu Data Warehouses
2	Język prowadzenia zajęć angielski
3	Realizowane efekty uczenia się W (CS-W03, CS-W07): Student knows and understands the idea of using databases as a source of information in decision-making processes (analytical databases), including conceptual concepts such as Business Intelligence and Big Data and the architecture of systems such as Data Warehouse and Data Vault U (CS-U02, CS-U04): Student is able to indicate the right type of analytical database architecture and propose an appropriate technical solution based on business conditions K (CS-K04, CS-K06): Student is ready to expand his or her knowledge on his/her own. They are aware that the rapid development of information technologies requires constant self-education, and technological decisions (system architecture, choice of tools, etc.) may affect the operation of the organization and, taking into account ethical issues and the functioning of society
4	Treści programowe przedmiotu W1: Definition of a data warehouse (DW) and its location in the enterprise information system. Variants of DW architecture: pros and cons of different solutions. Distinctive features of HD computing W2: Conceptual model of DW construction: business and functional layer W3: Conceptual model of DW construction: the logical layer. ETL Process Design Challenges W4: Conceptual model of DW construction: physical layer. Basic implementation problems W5: DW metadata: parameterization and automation of processes, control and monitoring of HD operation W6: Exploitation and continuous development of DW W7: The relationship between DW concepts and related concepts (Business Intelligence, BigData). DataVault concept. Major Providers of Implementation Tools C1: Introduction to Data Warehouse C2: ETL (Extract, Transform, Load) in wholesalers C3: SQL Query Language in the Context of a Data Warehouse C4: Data visualization in the context of a warehouse C5: Application of data warehousing in practice
1	Nazwa przedmiotu IT Project Management
2	Język prowadzenia zajęć angielski
3	Realizowane efekty uczenia się W (CS-W04, CS-W07): Student knows and understands the role of information technology in the functioning of an organization as a tool for achieving the goals of that organization U (CS-U05, CS-U07): Student is able to define the scope of the IT project and prepare its plan taking into account the scope of work, the necessary resources and the work schedule K (CS-K02, CS-K03, CS-K04): Student is ready to use the knowledge in the field of forms

	and methods of group work to implement IT projects, understanding that success is only possible with the harmonious cooperation of all team members
4	Treści programowe przedmiotu
	W1: The project definition. Project as an element (phase) of the investment. IT project as a way of achieving the organization's goals. Stakeholders and their expectations W2: Project preparation: opportunity, pre-feasibility and feasibility studies. Initiation of the project – forms of implementation. Different approaches to managing (leading) IT projects (traditional, agile) W3: Selected areas of project management: Scope and time management. Planning and scheduling in different approaches. W4: Selected areas of project management: People management (structure and construction of the project team). Communication management (internal and external communication, stakeholder requirements) W5: Selected areas of project management: scope, change, risk, quality, supply management W6: Economic aspects of project management – cost-benefit calculation, performance assessment (TCO and TBO) W7: Completion of the project. Putting the results into operation. Operation and maintenance of IT systems from the point of view of management Exercises based on the implementation of group projects using methods such as UserStories, UseCases, StoryPoints, FunctionPoints, WBS, PERT/CP, Gantt and others, supported by IT tools. C1: Defining the scope of the project - elements of requirements engineering, criteria for evaluating the implementation C2: Estimating the workload - an introduction to project planning C3: Project Planning - Task Identification and Scheduling C4: Summary, discussion, presentation of group projects

1	Nazwa przedmiotu
	Digital Control Systems for Industrial Processes
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	CS-W02, CS-W03): Student knows and understands the techniques of designing digital control systems for the manufacturing processes. U (CS-U03, CS-U04, CS-U08): Student is able to independently design, implement, and test the operation of a digital controller based on combinational and sequential circuits. K (CS-K06): Student is ready to collaborate within a group and present and compare solutions related to the design of control systems for manufacturing processes.
4	Treści programowe przedmiotu
	Introduction to the exercises. Presentation of the basic logical functors used in control systems and codes applied in the digital circuits. Discussion of De Morgan's laws and their practical application in designing of digital circuits. Karnaugh maps, merging of redundant states, and design of combinational circuit. Designing a decoder transforming binary code into hexadecimal, Gray code, and other codes applicable in the creation of industrial controllers.

	Automation of a chemical reactor as a practical application of combinational circuits. Advantages and disadvantages of this type of control method. Introduction to synchronous and asynchronous sequential circuits. The use of synchronous and asynchronous flip-flops in the control process, as well as the designing of controllers based on these circuits. Practical application of synchronous sequential circuits. Design and simulation of a controller based on such digital circuits. Theory of automata. Introduction to Mealy automata, merging of redundant states, design, and testing of controllers of this type. Introduction to Moore automata. Design, simulation, and testing of controllers of this type. Designing of a chemical reactor controller based on one of the selected types of automation. Comparison of advantages and disadvantages of this type of control systems and controllers based on combinational circuits. C12: Summary of classes and discussion of the possibilities of applying the knowledge in designing FPGA circuits.
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1	Nazwa przedmiotu
	Implementation Architecture
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W03, CS-W04): Student knows and understands the ways of application implementation on the web U (CS-U02, CS-U03): Student is able to configure and operate applications on different environments: localhost, in a cloud application, and is able to automate the process using scripts and containers K (CS-K01): Student is ready follow trends in development of software and computer networks and improve his/her skills
4	Treści programowe przedmiotu
	W1: Analysis of technical requirements of project implementation, definition of implementation goals W2: Cloud computing and its impact on the implementation architecture W2: CI/CD principles in the context of web applications W3: Overview of a web application deployment in Amazon Web Service. C1: Implementation of a web application in a localhost environment (programming 1) C2: Automation of web scripts in Bash (localhost and cloud) C3: Configuring and running the application in the cloud C4: Analysis of web application deployment C5: Docker: containerization of web applications

1	Nazwa przedmiotu
	User Interface Development
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się

	W (CS-W02, CS-W04): Student knows and understands the specification and usage rules for HTML, CSS and Javascript U (CS-U04): Student is able to create the interface of a website or web application using HTML, CSS and Javascript K (CS-K01, CS-K03): Student is ready to select and apply appropriate methods and tools to implement the user interface design on the basis of the description of the expected effect
4	Treści programowe przedmiotu C1: HTML 5 - syntax, linear and block elements C2: HTML 5 - links, graphics, video C3: CSS - selectors, cascading C4: CSS - box model, responsiveness C5: CSS - flexbox, grid C6: Javascript - syntax, functions, objects C7: Asynchronicity in Javascript C8: DOM - Document Object Model, event handling C9: JSON i Ajax C10: Cookies, localStorage C11: ESM modules

1	Nazwa przedmiotu Application Architecture
2	Język prowadzenia zajęć angielski
3	Realizowane efekty uczenia się W (CS-W05, CS-W06): Student knows and understands the impact and significance of choosing the right software architecture. U (CS-U02): Student is able to identify and apply heuristics for assessing the benefits and usefulness of a chosen software architecture in the selection process. K (CS-K01, CS-K02): Student ready to use contemporary architectural styles in monolithic systems and distributed systems.
4	Treści programowe przedmiotu W1: Architecture in a project and components of architecture. W2: Methods of evaluating architecture in an application. W3: Ways of documenting architecture. W4: Architectural styles, structuring elements in a project, the need for modularization. W5: Architectural styles in monolithic systems: hierarchical, domain-driven, persistence. W6: Architectural styles in distributed systems: SOA/Microservice, event-driven systems, REST. W7: Challenges for architecture during project development. C1: Analysis and documentation of sample software architecture using Open Source examples with the use of visual UML tools and the C4 Method.

	C2: Refactoring to a layered architecture of a sample application. Analysis of challenges and benefits. C3: Analysis and implementation of different data persistence methods: Repository, Event Sourcing, Active Record. C4: The impact of architecture on software testability. C5: Refactoring to a Hexagonal architecture (Ports & Adapters). C6: The importance of modularization, defining module boundaries. C7: Dispersion of a monolithic system. Case study: modular system vs monolithic system. C8: Microservices architecture. C9: Introduction to event-driven communication. C10: Technical challenges of decentralized systems.
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1	Nazwa przedmiotu
	Business Processes Modelling
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W05, CS-W08): Student knows and understands the assumptions and methods of operation of a process-oriented enterprise. Knows the approaches and methods of process modeling at the stages of information system analysis and design. Student knows IT tools supporting process modeling. U (CS-U01, CS-U06): Student is able to create business process models using standard modeling languages such as BPMN and UML. Is able to use IT tools such as CASE. K (CS-K02, CS-K03): Student is ready, together with the project team, to prepare requirements for the system by modeling processes, data and other structures of a selected area of a real enterprise using a process-object approach.
4	Treści programowe przedmiotu
	W1: A structured approach to process modeling. The concept of the information process. Structural IS development cycle. Data and process modeling. DFD, ERP, STD tools, data dictionaries, pseudocode. W2: Process oriented approach to management. Business process concept. Types of processes. Decomposition. Process maps. Evolution of approaches to process modeling. Overview of notations and techniques. W3: The standard process modeling language Business Process Model and Notation (BPMN). Evolution. Main assumptions. The main elements of the notation: activities, events, gateways, flows, data objects. W4: Object-oriented approach in analysis and design. UML. Object-oriented description of processes. Business use cases. UML and BPMN. Transition from a process model to an object model. Business and system analysis. Use of use case, class, activity and sequence diagrams. W5: Supporting methods for describing process requirements. Documenting use cases. User Stories.

	C1: Structural modeling. Building process and data models. Process specifications. Model compatibility checking. C2: BPMN. Swimlines. Participants and roles. Events and activities. Scenario modeling. C3: BPMN. Gateways and data objects. Scenario modeling. C4: BPMN. Project patterns. Scenario modeling. C4: UML. Use cases, classes, states. Scenario modeling. C5: Use case documentation. C6: Creating process models of selected areas of the enterprise in project teams using BPMN and UML. C7: Presentation and evaluation of models created in project teams.
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1	Nazwa przedmiotu
	Development and Operations
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W04): Student knows and understands key principles and objectives of the DevOps Methodology, focusing on contemporary aspects of this approach U (CS-U07): Student is able to effectively implement and use code management tools K (CS-K05, CS-K06): Student is ready to take action to support the adoption of DevOps methodologies in the organisation
4	Treści programowe przedmiotu
	W1: Introduction to DevOps methodology W2: Practical application of code management tools W3: Preparation for the adoption of DevOps methodologies in the organisation W4: Develop the ability to implement DevOps strategies W5: Analysis of the challenges of implementing DevOps C1: Code management in a live environment C2: Automation of implementation processes C3: Monitoring and analysis of operational data C4: Infrastructure management as code C5: Implementation of continuous integration and delivery (CI/CD)

1	Nazwa przedmiotu
	Cloud Computing
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W06, CS-W08): Student knows and understands the benefits and challenges associated with utilizing public cloud computing U (CS-U02): Student is able to design a system based on solutions provided by a public cloud computing service provider K (CS-K03, CS-K04): Student is ready to design new and adapt existing applications towards compatibility with deployment in cloud computing, particularly in the serverless model
4	Treści programowe przedmiotu

	W1: The significance of the cloud in modern IT projects W2: Responsibility model in the public cloud W3: Compute category services W4: Storage category services W5: Database category services W6: Services supporting the work of a programmer W7: Security management in the cloud C1: Implementation of file read/write responsibilities C2: Publication of UI interface using HTTP, CDN in a serverless model C3: Authorization of access to cloud resources, addressing the statelessness challenge in a decentralized system C4: Execution of source code in a serverless model: Azure Functions, AWS Lambda C5: Publication and securing access using HTTP protocol and API Gateway services C6: Implementation of additional functional requirements based on cloud resources C7: Methods of data storage, databases in both classical and serverless models C8: Application scaling in a pull model using a queue C9: Application scaling in a push model using the publish/subscribe model C10: Machine learning in the cloud, application of pre-trained models in the context of applications
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1	Nazwa przedmiotu
	Seminar
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W09): Student knows and understands basic concepts and principles for conducting scientific work, identifying research topics and planning work
	U (CS-U05, CS-U08, CS-U09): Student is able to plan basic research projects in the field of computer science and its applications and carry them out using the scientific research workbench
	K (CS-K01, CS-K02): Student is ready to use the literature on the subject in the preparation of scientific studies
4	Treści programowe przedmiotu
	S1: Basic elements of a research workshop
	S2: Selected information and literature databases
	S3: Scientific work as the intellectual property of author. How to avoid plagiarism
	S4: Overview of the rationale for choosing a thesis topic
	S5: Thesis agenda preparation and discussion
	S6: Requirements for carrying out research analyses and editing their results

	S7: Referencing of thesis chapters
	S8: Discussion of thesis drafts

Przedmioty do wyboru

1	Nazwa przedmiotu
	Przedmioty do wyboru (semestr 4, 5, 6)
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	Karta przedmiotu obejmuje co najmniej trzy efekty uczenia się (maksymalnie sześć) – co najmniej po jednym efekcie z zakresu wiedzy (W), umiejętności (U) i kompetencji społecznych (K):
	E1 (W): CS-W01, CS-W02, CS-W03, CS-W04, CS-W05, CS-W06, CS-W07, CS-W08, CS-W09
	E2 (U): CS-U01, CS-U02, CS-U03, CS-U04, CS-U05, CS-U06, CS-U07, CS-U08, CS-U09
4	E3 (K): CS-K01, CS-K02, CS-K03, CS-K04, CS-K05, CS-K06, CS-K07
	Treści programowe przedmiotu
4	Zakres treści programowych przedmiotów obejmuje zagadnienia powiązane z zakresem problematyki związanej z technologią informacyjną.

Języki obce

1	Nazwa przedmiotu
	Język angielski
2	Język prowadzenia zajęć
	angielski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W06): Student rozumie przekaz ustny i pisemny odpowiedni do swojego poziomu językowego, określonego w Europejskim Systemie Opisu Kształcenia Językowego, pozwalającego prowadzić komunikację werbalną i pisemną w języku angielskim w zakresie tematyki kierunkowej U1 (CS-U06): Student potrafi wyrazić zasadnicze aspekty problemów w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej U2 (CS-U05): Student potrafi przekazać treści merytoryczne w formie prezentacji lub w ramach spotkania biznesowego K (CS-K02): Student jest gotów nawiązać interakcję w języku angielskim zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych
4	Treści programowe przedmiotu
	C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Szczegółowe zagadnienia specyficzne dla kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Korespondencja handlowa / służbowa z uwzględnieniem specyfiki kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C5: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR

1	Nazwa przedmiotu
	Język francuski
2	Język prowadzenia zajęć
	francuski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W06): Student zna i rozumie system języka docelowego odpowiedni do swojego poziomu, określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia komunikację werbalną i pisemną w języku francuskim w zakresie tematyki kierunkowej U1 (CS-U06): Student potrafi wyrazić zasadnicze aspekty problemów przedstawionych w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej

	U2 (CS-U05): Student potrafi przekazać treści merytoryczne w formie prezentacji bądź w ramach spotkania biznesowego, również w środowisku międzynarodowym K (CS-K02): Student jest gotów do nawiązania interakcji w języku francuskim, zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych oraz rozwiązania sytuacji konfliktowych
4	Treści programowe przedmiotu C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Szczegółowe zagadnienia specyficzne dla kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Korespondencja handlowa / służbowa z uwzględnieniem specyfiki kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR C5: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem dostępnym na stronie internetowej SJO oraz z uwzględnieniem poziomu językowego wg skali CEFR

1	Nazwa przedmiotu Język hiszpański
2	Język prowadzenia zajęć hiszpański
3	Realizowane efekty uczenia się W (CS-W01, CS-W06): Student rozumie system języka docelowego odpowiedni do swojego poziomu, określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia zrozumienie przekazu ustnego i pisanego, jak również komunikację werbalną i pisemną w j. hiszpańskim w zakresie tematyki kierunkowej U (CS-U06): Student potrafi wyrazić w sposób adekwatny do wymaganego poziomu j. hiszpańskiego zasadnicze aspekty problemów przedstawionych w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej K (CS-K02): Student jest gotów do nawiązania interakcji komunikacyjnej w języku hiszpańskim zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych
4	Treści programowe przedmiotu C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR

	C3: Korespondencja handlowa/służbowa z uwzględnieniem specyfiki kierunku zgodnie z sylabusem CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem CJ
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1	Nazwa przedmiotu
	Język niemiecki
2	Język prowadzenia zajęć
	niemiecki
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W06): Student zna i rozumie system języka docelowego odpowiedni do swojego poziomu, określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia zrozumienie przekazu ustnego i pisanego, jak również komunikację werbalną i pisemną w języku niemieckim w zakresie tematyki kierunkowej U1 (CS-U06): Student potrafi wyrazić w sposób adekwatny do wymaganego poziomu języka niemieckiego zasadnicze aspekty problemów, przedstawionych w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej U2 (CS-U05): Student potrafi przekazać treści merytoryczne w formie prezentacji bądź w ramach spotkania biznesowego, również w środowisku międzynarodowym K (CS-K02): Student jest gotów do nawiązania interakcji komunikacyjnej w języku niemieckim zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych oraz rozwiązania sytuacji konfliktowych
4	Treści programowe przedmiotu
	C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Szczegółowe zagadnienia specyficzne dla kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Korespondencja handlowa / służbowa z uwzględnieniem specyfiki kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C5: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR

1	Nazwa przedmiotu
	Język rosyjski
2	Język prowadzenia zajęć
	rosyjski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W06): Student zna i rozumie system języka docelowego odpowiedni do swojego poziomu, określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia zrozumienie przekazu ustnego i pisanego, jak również komunikację werbalną i pisemną w zakresie tematyki kierunkowej U1 (CS-U06): Student potrafi wyrazić w sposób adekwatny do wymaganego poziomu języka rosyjskiego zasadnicze aspekty problemów, przedstawionych w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej U2 (CS-U05): Student potrafi przekazać treści merytoryczne w formie prezentacji bądź w ramach spotkania biznesowego, również w środowisku międzynarodowym K (CS-K02): Student jest gotów do nawiązania interakcji komunikacyjnej w języku rosyjskim zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych oraz rozwiązania sytuacji konfliktowych
4	Treści programowe przedmiotu
	C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Szczegółowe zagadnienia specyficzne dla kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Korespondencja handlowa / służbowa z uwzględnieniem specyfiki kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C5: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR

1	Nazwa przedmiotu
	Język włoski
2	Język prowadzenia zajęć
	włoski
3	Realizowane efekty uczenia się
	W (CS-W01, CS-W06): Student zna i rozumie system języka docelowego odpowiedni do swojego poziomu, określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia zrozumienie przekazu ustnego i pisanego, jak również komunikację werbalną i pisemną w zakresie tematyki kierunkowej U1 (CS-U06): Student potrafi wyrazić w sposób adekwatny do wymaganego poziomu języka włoskiego zasadnicze aspekty problemów, przedstawionych w

	tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej U2 (CS-U05): Student potrafi przekazać treści merytoryczne w formie prezentacji bądź w ramach spotkania biznesowego, również w środowisku międzynarodowym K (CS-K02): Student jest gotów do nawiązania interakcji komunikacyjnej w języku włoskim zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych oraz rozwiązywania sytuacji konfliktowych
4	Treści programowe przedmiotu C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Szczegółowe zagadnienia specyficzne dla kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Korespondencja handlowa / służbowa z uwzględnieniem specyfiki kierunku Informatyka stosowana zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C5: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR

1	Nazwa przedmiotu Język polski dla obcokrajowców
2	Język prowadzenia zajęć polski
3	Realizowane efekty uczenia się W (CS-W01, CS-W06): Student zna i rozumie system języka docelowego odpowiedni do swojego poziomu językowego określonego w Europejskim Systemie Opisu Kształcenia Językowego, który umożliwia zrozumienie przekazu ustnego i pisanego, jak również komunikację werbalną i pisemną w języku polskim (jako obcym) w zakresie tematyki kierunkowej U (CS-U06): Student potrafi wyrazić w sposób adekwatny do wymaganego poziomu języka polskiego (jako obcego) zasadnicze aspekty problemów przedstawionych w tekstach złożonych, łącznie z dyskusją specjalistyczną w zakresie kierunkowej tematyki zawodowej. Potrafi przekazać treści merytoryczne w formie prezentacji bądź w ramach spotkania biznesowego. Potrafi pracować w zespole, również w środowisku międzynarodowym. Potrafi świadomie realizować proces samokształcenia oraz dzielić się wiedzą K (CS-K02): Student jest gotów do nawiązania interakcji komunikacyjnej w języku polskim (jako obcym), zarówno w celu zainicjowania jak i podtrzymania kontaktów służbowych. Jest gotów radzić sobie w sytuacjach konfliktowych
4	Treści programowe przedmiotu

	C1: Podstawowe zagadnienia ekonomii i biznesu (rekrutacja, zarządzanie, marketing, sprzedaż, ICT, organizacja i finanse firmy, kultura korporacyjna, etyka w biznesie) zgodnie z sylabusem dostępnym na stronie internetowej CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C2: Odpowiednie dla poziomu językowego elementy wiedzy systemowej języka (gramatyka, składnia, frazeologia, fonetyka) zgodnie z sylabusem CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C3: Korespondencja handlowa/służbowa z uwzględnieniem specyfiki kierunku zgodnie z sylabusem CJ oraz z uwzględnieniem poziomu językowego wg skali CEFR C4: Umiejętności typu soft skills i komunikacja międzykulturowa zgodnie z sylabusem CJ
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W – wiedza

U, U1, U2 – umiejętności

K – kompetencja społeczne