Information Systems in Management

1 st Semester Fall Term	Module of Socio-Political Knowledge	Bases of Law and Anticorruption Culture, etc. (selective disciplines)	Higher Mathematics	Foreign language	Introductin to Information Systems	Succeeding as a Global Wildcat / Leadership and Innovation	Basics of Economics, Entrepreneurship and Financial Literacy / Basics of Law and Legal Regulation
2 nd Semester Fall Term	Kazakh Language	History of Kazakhstan	Mathematics 2	Physics 1	English language	Succeeding as a Global Wildcat 2/ Leadership and Innovation Management 2	Computer Mathematics / Computational Mathematics
3 rd Semester Fall Term	Foreign Language 1	Programming languages and technologies	Mathematics 3	Computer architecture and operating systems/Architecture and organization of computer systems	Introduction to Web Design and Development	Kazakh(Russian) language	
4 th Semester Fall Term	Foreign language workshop 2	Database management systems	Applied data visualization	Front-End development/Advanced Web Design	Algorithms and data structures/Analysis of discrete structures and algorithms	Data Analysis	
5 th Semester Fall Term	Information and Communication technologies	Professional English Language 3	Fundamentals of Computer Networks	WEB-Programming	Philosophy	Object Oriented Programming / Programming for Informatics Applications	
6 th Semester Fall Term	Web Analytics and Digital Marketing / Text Retrieval and Web Search	Expert Knowledge and Decision Support Systems / Special Topics in Information, Science, Technology & Arts	Software testing and quality assurance / Software Requirements Analysis and Test	Mobile Technologies and Applications / Information, Multimedia Design and the Moving Image	Production Practice 2	Ethics in a Digital World	Data Mining and Discovery
7 th Semester Fall Term	Artificial Intelligence Systems	Computing and the Arts	Digital Engagement	Quantitative Methods	Senior Capstone / Software Project Management		
8 th Semester Fall Term	Scientific research in information technologies / Quantitative Methods for the Digital Marketplace	Intelligent information systems / Neural Networks	Information Security	Production Practice 3 / Pre-Diploma Practice	Final Presentation of Writing and Defending a Diploma Thesis / Preparing and Passing a complex exam		

1-th Semester

Fall Term 2025/2026

Course number **IYa1101**	Course name **Foreign Language**	
Type of course Core discipline	Semester 2025/2026 Fall Term	Student capacity: 90
Teaching methods Interactive language classes, group projects, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 10 (240 contact hrs in class +60 hrs of self-study (together 300 hrs)
Module coordinator Senior Instructor:		Semester week hours: 16
Additional teacher involved: -		

Syllabus

Content Description

The course is aimed at understanding a foreign language to a sufficient extent to solve problems of interpersonal and intercultural interaction within the framework of four types of speech activity (reading, listening, writing, speaking).

Learning goals and qualifications in this module students learn to (national or international):

-**Knowledge:** Recall and use key English vocabulary and grammar structures for communication.
-**Comprehension:** Understand main ideas in spoken and written academic texts.
-**Application:** Write short essays, summaries, and reports in English.
-**Analysis:** Evaluate and discuss scientific texts using appropriate terminology.
-Synthesis: Integrate reading, writing, and speaking skills in professional contexts.
-Evaluation: Assess own language performance and identify strategies for improvement.

Core readings:

Bailey, S. (2018). Academic Writing: A Handbook for International Students. Routledge. – A practical guide for improving academic English writing and communication.

Jordan, R. R. (2020). English for Academic Purposes: A Guide and Resource Book for Teachers. Cambridge University Press. – Focus on academic English learning strategies and classroom practice.

Hyland, K. (2019). Second Language Writing. Cambridge University Press. – Insights into writing in academic contexts and applied linguistics.

Nation, I. S. P., & Macalister, J. (2021). Language Curriculum Design. Routledge. – Foundational framework for developing effective English learning curricula.

Swales, J. M., & Feak, C. B. (2021). Academic Writing for Graduate Students. University of Michigan Press. – Genre-based approach to academic writing and reading comprehension.

Course number **VIS1201**	Course name **Introduction to Information Systems**	
Type of course Basic discipline	Semester 2025/2026 Fall Term	Student capacity: 90
Teaching methods Lectures, seminars, case studies, group projects, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (60 contact hrs in class + 120 hrs of self-study; total 180 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The course is aimed at developing creative thinking, forming a scientific worldview of students, equipping future experts with a set of knowledge, practical skills and abilities for active production and analytical activities.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Define basic concepts of information, signals, data, and information systems; describe the main components of an information system.

Comprehension: Explain how information is represented, transmitted, stored, and processed in computer systems and organizational information systems.

Application: Apply simple models of information processing and entropy-based approaches to solve basic tasks related to coding and data transfer.

Analysis: Analyze the structure and functions of typical information systems in organizations and identify their strengths and limitations.

Synthesis: Propose simple designs of information flows and small-scale information systems to support decision-making in management.

Evaluation: Assess reliability, efficiency, and appropriateness of basic information-processing methods and tools in given scenarios.

Core readings:

1) O'Brien, James A.; c1994. Introduction to information systems
2) Ian Gwilt editor; 2021. Making data : materializing digital information
3) Silva, Fabio Guilherme da, author.; 2025. Information Systems
4) Liebowitz, Jay, 1957-; Khosrow-Pour, Mehdi, 1951-; c1997. Cases on information technology management in modern organizations

Course number **MSPZ1103**	Course name **Social-Political Studies Module**	
Type of course Basic discipline	Semester 2025/2026 Fall Term	Student capacity: 130
Teaching methods Lectures, discussions, debates, project work	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 8 (75 contact hours in class + 165 hours of self-study; total 240 hrs)
Module coordinator Senior Lecturer: Alexey Malikov		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The module provides an overview of social, political, and ethical issues affecting modern society and the development of information systems. It covers political systems, civic responsibility, social institutions, globalization, cultural diversity, and sustainable development. Special attention is given to the role of digital technologies in social change and governance.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Define basic concepts of political science, sociology, and ethics.

Comprehension: Explain relationships between society, government, technology and science.

Application: Apply social and political theories to case studies related to information systems and management.

Analysis: Critically analyze civic, ethical, and sustainability challenges in professional activity.

Synthesis: Integrate political, economic, and ethical knowledge to propose civic and organizational solutions.

Evaluation: Assess social policies and digital initiatives and their impact on sustainable innovation and social justice.

Core readings:

Heywood, A. Political Theory: An Introduction. Palgrave Macmillan, 2021.
Macionis, J. J., & Plummer, K. Sociology: A Global Introduction. Pearson, 2023.
UN. Sustainable Development Goals Report. United Nations, latest edition (open access).
Gabitov, T. Kazakh Culture Challenges. Almaty: TechnoErudit, 2019.
Rom, M. C., Hidaka, M., & Walker, R. B. Introduction to Political Science. OpenStax, 2022 (open textbook).

Course number SAGW/LIU1107	Course name Succeeding as a Global Wildcat / Leadership and Innovation (one discipline to choose from)	
Type of course Additional type of study	Semester / Rotation 2025/2026 / Fall Term	Student capacity: 130
Teaching methods Workshops, discussions, teamwork, presentations.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Assessment based on participation and project performance (100%)		**ECTS (+Workload in hrs)** 1 (10 contact hours in class + 20 hours of self-study (together 30hrs)
Module coordinator Senior Lecturer: Katelyn Maragi		Semester week hours: 0,5
Additional teacher involved: -		

Syllabus

The course develops leadership and teamwork skills in multicultural and academic environments. Students learn principles of innovation, creativity, and global citizenship.

Learning goals and qualifications in this module students learn to (national or international):

-Knowledge: Recognize the importance of leadership and collaboration.
- Comprehension: Understand principles of innovation and creative thinking.
- Application: Apply leadership and teamwork strategies to group projects.
- Analysis: Evaluate team dynamics and problem-solving effectiveness.
-Synthesis: Propose innovative solutions to community or academic challenges.
-Evaluation: Reflect on personal leadership style and growth.

Core readings:

- Kotter, J. P. (2012). *Leading Change.* Harvard Business Review Press. – Classic model of effective leadership and organizational transformation.
- Northouse, P. G. (2021). *Leadership: Theory and Practice.* SAGE Publications. – Comprehensive overview of leadership theories and applications.
- Goleman, D. (2020). *Emotional Intelligence: Why It Can Matter More Than IQ.* Bantam Books. – Development of self-awareness and team effectiveness.
- Pink, D. H. (2018). *Drive: The Surprising Truth About What Motivates Us.* Penguin Books. – Insights into human motivation and innovative work culture.
- Maxwell, J. C. (2021). *The 21 Irrefutable Laws of Leadership.* HarperCollins. – Practical guide for developing personal and professional leadership skills.

Course number **VM1202**	Course name **Higher Mathematics**	
Type of course Basic discipline	Semester 2025/2026 Fall Term	Student capacity: 130
Teaching methods Lectures, problem-solving sessions, tutorials, self-study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (60 contact hours in class + 120 hours of self-study; total 180 hrs)
Module coordinator Senior Lecturer: Ruslan Astamirov		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The course provides basic mathematical tools for further IT and management disciplines: algebra, functions, limits, derivatives, integrals, elements of linear algebra and basic statistics. Emphasis is placed on solving applied problems and interpreting mathematical results in practical contexts.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Recall basic mathematical formulas, concepts and operations used in calculus and linear algebra.

Comprehension: Explain mathematical relationships relevant to natural, technical and economic sciences.

Application: Solve problems involving derivatives, integrals, equations and simple systems of linear equations.

Analysis: Analyze functional relationships, interpret graphs and investigate behavior of functions.

Synthesis: Combine mathematical methods to model simple technical, economic or information processes.

Evaluation: Assess the appropriateness of mathematical models when solving applied problems.

Core readings:

Guichard, D. et al. Calculus: Early Transcendentals. Lyryx, 2020 (open textbook, online).
Dawkins, P. Calculus I. Paul's Online Math Notes (open educational resource).
Beezer, R. A. A First Course in Linear Algebra. Congruent Press, 2004 (open textbook).
Stewart, J. Calculus: Early Transcendentals. Cengage Learning, 2015.
De Veaux, R. D., Velleman, P. F., & Bock, D. E. Intro Stats. Pearson, 2021.

<table>
<tr><td>Course number</td><td colspan="2">Course name: Fundamentals of Scientific Research / Anti-Corruption Culture / Ecology and Sustainable Development / Life Safety / Inclusive Practices / Climate Change (one discipline to choose from)</td></tr>
<tr><td colspan="2">Type of course
Basic Course</td><td>Semester / Rotation
2025/2026 / Fall Term</td><td>Student capacity:
130</td></tr>
<tr><td colspan="2">Teaching methods
Workshops, discussions, teamwork, presentations.</td><td>Prerequisites for attendance
None</td><td>Language
English</td></tr>
<tr><td colspan="3">Type of examination (Final Grade Composition)

Written Exam (100%) (100 minutes)</td><td>ECTS (+Workload in hrs)

1 (10 contact hours in class + 20 hours of self-study (together 30hrs)</td></tr>
<tr><td colspan="3">Module coordinator
Senior Lecturer:</td><td>Semester week hours:
0,5</td></tr>
<tr><td colspan="4">Additional teacher involved: -</td></tr>
<tr><td colspan="4">Syllabus
This interdisciplinary course fosters students' research literacy, civic ethics, and environmental responsibility as part of their academic and professional development. The Fundamentals of Scientific Research component introduces methods of observation, hypothesis formulation, data collection, and analysis in natural sciences. The Anti-Corruption Culture unit explores legal and ethical norms promoting integrity and transparency in professional environments. Ecology and Sustainable Development highlights environmental challenges, ecosystem dynamics, and sustainability principles in the context of biotechnology. The Life Safety component develops understanding of occupational health, safety, and emergency preparedness. Inclusive Practices train students to create equitable and accessible professional environments. The Climate Change, examines global climatic processes, human impact, and mitigation strategies aligned with the UN Sustainable Development Goals (SDGs).</td></tr>
<tr><td colspan="4">Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Recall basic concepts and terminology of scientific research, ecology, and ethics.
- Comprehension: Explain the principles of sustainable development, inclusion, and integrity in scientific practice.
- Application: Apply research methods to simple case studies and demonstrate safe and ethical behavior in professional settings.
- Analysis: Analyze environmental and ethical issues using evidence-based approaches.
- Synthesis: Integrate research, ethics, and sustainability perspectives to design responsible solutions to real-world problems.
- Evaluation: Critically assess the social and environmental impact of professional decisions, demonstrating commitment to transparency, safety, and sustainability.</td></tr>
</table>

Core readings:

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* SAGE Publications.
- UNESCO. (2020). *Education for Sustainable Development Goals: Learning Objectives.* UNESCO Publishing.
- OECD. (2021). *Integrity and Anti-Corruption in Higher Education.* OECD iLibrary.
- Bell, J., & Waters, S. (2018). *Doing Your Research Project: A Guide for First-Time Researchers.* McGraw-Hill Education.
- IPCC. (2021). *Climate Change 2021: The Physical Science Basis.* Cambridge University Press.

Course number	Basics of Economics, Entrepreneurship and Financial Literacy / Basics of Law and Legal Regulation (one discipline to choose from)	
Type of course Core Course	Semester / Rotation 2025/2026 / Fall Term	Student capacity: 130
Lectures, discussions, problem-based learning, case studies, and individual projects.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Assessment based on participation and project performance (100%)		**ECTS (+Workload in hrs)** 1 (10 contact hours in class + 20 hours of self-study (together 30hrs)
Module coordinator Dr. Dimash Shaikin		Semester week hours: 0,5
Additional teacher involved: -		

Syllabus

Basics of Economics, Entrepreneurship and Financial Literacy

This course introduces the fundamentals of economics, entrepreneurship, and financial literacy as essential competencies for biotechnology professionals. Students learn the principles of supply and demand, types of market structures, and the role of government in the economy. The entrepreneurship component covers innovation processes, startup creation, and small business management, with emphasis on financial literacy — budgeting, investment, and basic accounting. Case studies are used to connect economic theory to real-world biotech enterprises and sustainable innovation. Students develop analytical and decision-making skills for responsible participation in the bioeconomy.

Basics of Law and Legal Regulation

This course provides a foundation in law and legal regulation relevant to professional and scientific activities. It covers the structure of national and international legal systems, key principles of constitutional, civil, and business law, and the protection of intellectual property. Special attention is given to regulatory frameworks governing biotechnology, environmental law, and bioethics. Students learn about anti-corruption mechanisms, compliance procedures, and professional legal responsibility. The course aims to cultivate legal awareness and ethical decision-making in the context of scientific research and entrepreneurship.

Learning goals and qualifications in this module students learn to (national or international):

Basics of Economics, Entrepreneurship and Financial Literacy

- **Knowledge:** Define key concepts of economics, entrepreneurship, and finance.
- **Comprehension:** Explain how economic systems and innovation affect biotechnological industries.
- **Application:** Develop a basic financial plan for a small business or project.
- **Analysis:** Analyze market trends and interpret simple financial data.
- **Synthesis:** Integrate economic and entrepreneurial principles to propose innovative business ideas.
- **Evaluation:** Critically assess business sustainability and ethical financial decision-making.

Basics of Law and Legal Regulation

- **Knowledge:** Identify the main branches of law and their role in regulating professional and scientific activity.
- **Comprehension:** Explain the relationship between legal norms, ethics, and social

responsibility.

- **Application:** Apply legal principles to real-world scenarios involving business or research.
- **Analysis:** Analyze case studies concerning intellectual property or bioethical issues.
- **Synthesis:** Integrate legal and ethical considerations into project planning and innovation management.
- **Evaluation:** Critically evaluate legal risks and propose compliant, ethical solutions in professional practice.

Core readings:

- Samuelson, P. A., & Nordhaus, W. D. (2019). *Economics.* McGraw-Hill Education.
- Drucker, P. F. (2014). *Innovation and Entrepreneurship.* Routledge.
- Mankiw, N. G. (2021). *Principles of Economics.* Cengage Learning.
- Osterwalder, A., & Pigneur, Y. (2020). *Business Model Generation.* Wiley.
-OECD. (2020). *Entrepreneurship Education in Europe: Trends and Practices.* OECD iLibrary.
-Beatty, J. F., Samuelson, S. S., & Abril, P. S. (2022). *Introduction to Business Law.* Cengage Learning.
-Tricker, B. (2019). *Corporate Governance: Principles, Policies, and Practices.* Oxford University Press.
-OECD. (2021). *Integrity and Anti-Corruption in Higher Education.* OECD iLibrary.
- Martin, M. J. (2019). *Ethics and Professionalism in Engineering and Scientific Research.* CRC Press.
- UNESCO. (2021). *Recommendation on Open Science.* UNESCO Publishing.

2-nd Semester

Spring Term 2025/2026

Course number **K(R)Ya1104**	Course name **Kazakh Language**	
Type of course Compulsory language course	Semester 2025/2026 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language Kazakh
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (47 contact hrs in class +106 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor:		Semester week hours: 3
Additional teacher involved: -		

Syllabus

Content Description

The discipline is aimed at developing oral and written skills, acquiring knowledge in specialties in the Kazakh language.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge:
Recall ~3000 general and professional Kazakh words and expressions; understand the phonetic, grammatical, and stylistic norms of the Kazakh language; recognize features of official, academic, and everyday communication styles.

Comprehension:
Understand the main ideas of oral and written Kazakh texts; interpret meaning, tone, and context in professional and cultural communication; explain common communicative patterns in Kazakh.

Application:
Use Kazakh in practical situations — write essays, summaries, and official documents; engage in dialogues and discussions relevant to professional and academic settings; apply language rules correctly in written and spoken forms.

Analysis:
Analyze the structure, style, and vocabulary of Kazakh texts; identify main arguments, supporting details, and cultural nuances in different types of discourse.

Synthesis:
Combine information from multiple Kazakh-language sources to create coherent oral and written presentations; prepare thematic glossaries and summaries for professional communication.

Evaluation:
Assess the clarity, accuracy, and stylistic appropriateness of Kazakh texts; evaluate one's own progress in language learning and the effectiveness of communication strategies

Core readings:

1) Shnitnikov, Boris Nikolayevich, author.; American Council of Learned Societies, issuing body.; 2011. Kazakh-English dictionary
2) Nurgazina, Dana ; Kudubayeva, Saule. Research of semantic aspects of the Kazakh language when translating into the Kazakh sign language
3) Pansat, Zhansaya ; Khalikova, Nurila. Semantic Features of Color in Emotional, Expressive Words: The Concept of "Blue" in the Kazakh Language

Course number **IK1102**	Course name **History of Kazakhstan**	
Type of course Mandatory general education course	Semester 2025/2026 Spring Term	Student capacity: 90
Teaching methods Lectures, seminars, case studies, group projects, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Department of Information Systems in Management		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The purpose of the discipline: to provide objective historical knowledge about the main stages of the history of Kazakhstan; to direct students' attention to the problems of the formation and development of statehood and historical and cultural processes.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge:
Recall key events, dates, and figures in the history of Kazakhstan; understand the stages of state formation, colonization, and independence; recognize the influence of global historical processes on Kazakhstan’s development.

Comprehension:
Explain the causes and consequences of major historical events; understand the interaction between different peoples and cultures within Kazakhstan; interpret historical documents and sources.

Application:
Use historical knowledge to analyze modern social and political phenomena; prepare reports, essays, and presentations based on historical facts and evidence.

Analysis:
Analyze historical sources, compare different interpretations of events, and identify cause-and-effect relationships; distinguish between facts, opinions, and myths in historical narratives.

Synthesis:
Integrate data from multiple sources to create coherent summaries, analytical reviews, and arguments; connect national history with global historical trends.

Evaluation:
Assess the reliability of historical information and the significance of key events; reflect on

Kazakhstan’s historical path and its contribution to world civilization.
Core readings: 1) Insebayeva, Nafissa; 2022. Modernity, development and decolonization of knowledge in Central Asia : Kazakhstan as a foreign aid provider 2) Mustoyapova, Ainash; 2024. Leaders of the Nation: A Political History of Kazakhstan 3) Ayagan, Burkitbay, 2022-11, Vol.2022 (11-1), p.222-229. To the question of the routes of movement of Khan Abulkhair Sheibanid and localization of his burial place 4) Weatherford, J. McIver, author.; 2016. Genghis Khan and the quest for God : how the world's greatest conqueror gave us religious freedom

Course number **Mat1204**	Course name **Mathematics 2**	
Type of course Basic discipline	Semester 2025/2026 Spring Term	Student capacity: 90
Teaching methods Lectures, discussions, analytical workshops, practical exercises	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (62 contact hrs in class + 118 hrs of self-study; total 180 hrs)
Module coordinator Senior Lecturer:		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

Linear Algebra: Vectors and Matrices, Matrix Operations, Systems of Linear Equations, Eigenvalues and Eigenvectors. Discrete Mathematics: Introduction to Logic, Set Theory, Combinatorics, Graph Theory, Coding Theory, and Theory of Algorithms.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge:** Identify fundamental mathematical concepts, symbols, and structures; recall key formulas, theorems, and problem-solving methods across algebra, geometry, calculus, and statistics; recognize the role of mathematics in science, technology, and everyday life.
- **Comprehension:** Explain mathematical relationships, reasoning steps, and the logic behind formulas; interpret graphs, models, and symbolic representations; describe how mathematical methods apply to real-world and professional problems.
- **Application:** Use mathematical principles and algorithms to solve quantitative and analytical tasks; apply formulas, equations, and models to practical and research-based problems; utilize computational and software tools for calculation and visualization.
- **Analysis:** Break down complex problems into simpler components; analyze mathematical models, functions, and data patterns; compare different solution methods and evaluate their accuracy and efficiency.
- **Synthesis:** Combine mathematical concepts and techniques from different areas to develop integrated solutions; construct new models, proofs, and approaches; create visual and analytical representations of data and mathematical relationships.
- **Evaluation:** Assess the validity, accuracy, and effectiveness of mathematical reasoning and results; justify chosen methods and strategies; reflect on problem-solving approaches and outcomes for improvement.

Core readings:

Dancey, Christine P.; Reidy, John.; 1999. Statistics without maths for psychology : using SPSS for Windows

Schiefer, Hartmut ; Schiefer, Felix; 2021. Statistics for Engineers : an introduction with examples from practice.

Champagne, Ruth Inez.; Croom, Lucille, 1947-; Baston, Jackie.; Silver Burdett Ginn (Firm); c1995. Mathematics : exploring your world : [grade 5]

Course number **Fiz1205**	Course name **Physics 1**	
Type of course Basic discipline	Semester / Rotation 2025/2026 / Spring Term	Student capacity: 90
Teaching methods Lectures, problem-solving seminars, labs, homework sets, group work, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition)		**ECTS (+Workload in hrs)** 6 (62 contact hrs in class + 118 hrs of self-study; total 180 hrs)
Module coordinator		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Study of the theory of electromagnetism, electrical circuits, transformers, generators, electrical machines, power supply systems and other aspects of electrical engineering. In addition, students become familiar with electrical circuits, principles and methods of operation of various electronic devices such as power supplies, sensors, amplifiers, computers, etc.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge: Identify fundamental physical principles, laws, and formulas in mechanics, thermodynamics, electromagnetism, and optics / Recognize units, constants, and basic experimental methods in physics.**
- **Comprehension: Explain how physical laws govern natural phenomena and technological processes / Describe relationships between variables in experiments and theoretical models.**
- **Application: Apply physics formulas and principles to solve quantitative problems / Conduct laboratory experiments using proper techniques, measure physical quantities, and record data accurately.**
- **Analysis: Analyze experimental results, detect errors, and compare theoretical predictions with observations / Break down complex physical systems into components and study interactions.**
- **Synthesis: Combine knowledge from different physics areas to design experiments, models, and simulations / Integrate multiple data sources and theoretical approaches to explain phenomena or predict outcomes.**
- **Evaluation: Assess accuracy and reliability of measurements, models, and simulations / Judge validity of hypotheses, experimental design, and physical reasoning; suggest improvements and alternative approaches.**

Core readings:

Holbrow, Charles H. author.; Lloyd, James N. author.; Amato, Joseph C. author.; Galvez, Enrique. author.; Parks, M. Elizabeth. author.; 2010. Modern Introductory Physics

Polianin, A. D. (Andrei Dmitrievich); Chernoutsan, A. I.; 2010. A concise handbook of mathematics, physics, and engineering sciences

Woan, Graham, 1963- author.; 2000. The Cambridge handbook of physics formulas

Griffiths, David J. (David Jeffery), 1942-; c1999.Introduction to electrodynamics

Course number **Aya1203**	Course name English language	
Type of course Compulsory language course	Semester 2025/2026 Spring Term	Student capacity: 90
Teaching methods Lectures, interactive discussions, group work, reading comprehension exercises, writing assignments	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (122 contact hrs in class + 28 hrs of self-study; total 150 hrs)
Module coordinator		Semester week hours: 8
Additional teacher involved: -		

Syllabus

Content Description

The course is aimed at continuing and consolidating the understanding of the English language to a sufficient extent to solve problems of interpersonal and intercultural interaction within the framework of the implementation of four types of speech activity (reading, listening, writing, speaking).

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Identify core grammar rules, vocabulary, and professional expressions / Recognize differences between formal, academic, and colloquial English; recall common communication strategies for professional and intercultural contexts.
- Comprehension: Explain how language structures convey meaning in context / Interpret texts, dialogues, and professional communication formulas; describe nuances of tone, style, and register.
- Application: Use English to read, write, listen, and speak in academic and professional situations / Write reports, summaries, emails, and presentations; participate in discussions, debates, and role-playing exercises.
- Analysis: Analyze texts for main ideas, supporting details, cohesion, and style / Compare different texts or sources; identify errors, ambiguities, and cultural subtleties; interpret idiomatic and figurative language.
- Synthesis: Integrate vocabulary, grammar, and communication strategies into coherent oral and written outputs / Produce essays, summaries, and presentations; prepare mini-glossaries or reports for cross-cultural communication.
- Evaluation: Assess clarity, accuracy, appropriateness, and effectiveness of language use / Reflect on communication strategies, correctness of grammar and vocabulary, and suitability for professional contexts; provide feedback and improve language skills.

Core readings:

Biber, Douglas, author.; Johansson, Stig, 1939- author.; Leech, Geoffrey N., author.; Conrad, Susan, author.; Finegan, Edward, 1940- author.; 2021.Grammar of spoken and written English

Brown, Goold, 1791-1857. The Grammar of English Grammars

Course number SAGW/LUI1108	Course name: Succeeding as a Global Wildcat 2/ Leadership and Innovation Management 2	
Type of course Professional Development Course	Semester / Rotation 2025/2026 / Spring Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written Exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 1 (12 contact hours in class + 18 hours of self-study (together 30hrs)
Module coordinator Senior Lecturer:		Semester week hours: 2
Additional teacher involved: -		

Syllabus

The course serves as an introduction to studying at the University of Arizona as an international student studying at one of our many microcampuses. In addition to interacting with fellow students on the main campus in Tucson and becoming familiar with the university's online lesson management system D2L (Desire 2 Learn), students will actively master the cultural knowledge and academic skills that are fundamental to university life in the United States /

The course studies aspects of effective leadership, the laws of innovation management; the student is capable of effective verbal, non-verbal and electronic communication, decision-making, team building, conflict and stress management, the formation and improvement of leadership qualities, participation in the management of a project, a program for the implementation of technological and product innovations or a program of organizational change; discussion methods, brainstorming, case method, "orator's platform", educational dialogue, "laboratory of unsolved problems", POPS formula are used

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge: Identify core principles of leadership, innovation management, and organizational change; recognize team dynamics, project structures, and decision-making frameworks.**
- **Comprehension: Explain when and why specific leadership and innovation strategies are applied; interpret team interactions, project outcomes, and organizational processes in context.**
- **Application: Plan and execute project tasks; apply leadership and innovation methods to manage teams, resolve conflicts, and implement programs or technological solutions; communicate effectively in professional settings.**
- **Analysis: Critically analyze team performance, workflow efficiency, and project constraints; evaluate leadership decisions and innovation outcomes; detect bottlenecks and areas for improvement.**
- **Synthesis: Integrate leadership techniques, project management tools, and innovation strategies into cohesive action plans; design workflows and team structures for complex tasks.**
- **Evaluation: Assess effectiveness of leadership approaches, team results, and innovation strategies; justify decisions and improvements; reflect on personal development and readiness for professional practice.**

Core readings:
Woodsworth, A., Penniman, W. D. Management and Leadership Innovations / A. Woodsworth & W. D. Penniman (eds.). – Emerald Group Publishing Limited, 2014.

Course number KM1206	Course name: Computer Mathematics	
Type of course Professional Development Course	Semester / Rotation 2025/2026 / Spring Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork.	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written Exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hours in class + 103 hours of self-study (together 180hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 6
Additional teacher involved: -		

Syllabus

The objective of the course: to study computational methods and numerical algorithms used in computer applications and programming (numerical methods, function approximation, interpolation methods, best approximation, approximate solution of equations, differentiation and integration, solution of differential equations, numerical optimization methods, computer modeling methods

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Identify fundamental concepts of computational mathematics, numerical methods, algorithms, and data structures.
- Comprehension: Explain how different numerical and computational methods solve mathematical problems.
- Application: Implement algorithms and numerical methods using programming languages (e.g., Python, MATLAB, C++); solve mathematical and engineering problems computationally.
- Analysis: Analyze algorithm efficiency, stability, and accuracy; evaluate computational errors, convergence, and resource usage.
- Synthesis: Combine multiple algorithms, numerical methods, and programming tools into cohesive computational workflows.
- Evaluation: Assess correctness, efficiency, and reliability of computational solutions; justify method and tool choices.

Core readings:

1) Bagdasar, Ovidiu; 2013. Concise computer mathematics : tutorials on theory and problems
2)Prudhomme, Gerard, author.; 2019. Computer mathematics
3)Filipovic, Nenad. editor.; 2020. Computational Bioengineering and Bioinformatics : Computer Modelling in Bioengineering

Course number VM1206	Course name: Computational Mathematics	
Type of course Professional Development Course	Semester / Rotation 2025/2026 / Spring Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork.	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written Exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hours in class + 103 hours of self-study (together 180hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 6
Additional teacher involved: -		

Syllabus

The objective of the course: to study computational methods and numerical algorithms used in computer applications and programming (numerical methods, function approximation, interpolation methods, best approximation, approximate solution of equations, differentiation and integration, solution of differential equations, numerical optimization methods, computer modeling methods /
The objective of the course is to master the methods of numerical analysis and computational algorithms used to solve applied mathematical problems in science, engineering and programming. Students will study the basic numerical methods of solving equations, optimization, differentiation and integration, and will also master their software implementation using modern computational tools and programming languages (Python, MATLAB, Wolfram Mathematica, etc.).
The course is aimed at developing skills in the practical application of computational mathematics for the analysis and modeling of complex processes, processing numerical data and assessing the accuracy of calculations.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Identify fundamental concepts of computational mathematics, numerical methods, algorithms, and data structures; recognize types of computational problems and appropriate solution techniques.
- Comprehension: Explain how different numerical and computational methods solve mathematical problems; interpret algorithm outputs, error estimates, and computational results.
- Application: Implement algorithms and numerical methods using programming languages (e.g., Python, MATLAB, C++); solve mathematical and engineering problems computationally; design simulations and computational experiments.
- Analysis: Analyze algorithm efficiency, stability, and accuracy; evaluate computational errors, convergence, and resource usage; compare different numerical methods for suitability.
- Synthesis: Combine multiple algorithms, numerical methods, and programming tools into cohesive computational workflows; design end-to-end simulations, models, and problem-solving pipelines.
- Evaluation: Assess correctness, efficiency, and reliability of computational solutions; justify method and tool choices; reflect on computational performance, limitations, and readiness for professional or research tasks.

Core readings:

1)Thangavel, K.; Balasubramaniam, P.; c2005. Computational mathematics
2) Foundations of Computational Mathematics Conference Corporate Author; Foundations of Computational Mathematics Conference; Cucker, Felipe, 1958- editor.; 2004
3) Dai, Wanyang ; Li, Jichun; 2025. Computational Mathematics and Numerical Analysis: CSAMCS 2023, Nanjing, China, November 10-12, 2023

Course number	Course name **Educational practice**	
Type of course **Production Practice**	Semester 2025/2026 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 4 (0 contact hrs in class +120 hrs of self-study (together 120 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: -
Additional teacher involved: Semenyuk Vladislav		

Syllabus

Content Description

Formation of practical professional skills in students, acquisition of initial practical experience in the main types of professional activity for their subsequent acquisition of general and professional competencies in their chosen specialty.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Recall InfoSec principles; identify software tools, equipment, and IT technologies; classify software and licensing models; recognize data types/structures; describe processing and storage methods; outline development, testing, and deployment methods.
- Comprehension: Explain why specific security controls, licenses, and storage approaches are used; interpret data structures and their implications; summarize how dev–test–deploy stages relate.
- Application: Choose suitable tools/technologies; apply licensing rules correctly; model and store data; implement basic processing pipelines; carry out development, testing, and deployment with standard tooling.
- Analysis: Compare licenses, tools, and architectures; analyze risks and vulnerabilities; examine integrity/availability/performance trade-offs; diagnose issues across the dev–test–deploy pipeline.
- Synthesis: Design secure, compliant solutions integrating data models, processing pipelines, and deployment architecture; create documentation and rollout plans.
- Evaluation: Audit solutions for security best practices and licensing compliance; evaluate reliability, maintainability, and scalability; recommend improvements.

Core readings:

Mohammad Khorasani, Mohamed Abdou, Javier Hernández Fernández; 2022. Web Application Development with Streamlit: Develop and Deploy Secure and Scalable Web Applications to the Cloud Using a Pure Python Framework

NATO Advanced Study Institute on Boolean Functions in Cryptology and Information Security Corporate Author; NATO Advanced Study Institute on Boolean Functions in Cryptology and Information Security; Logachev, Oleg A.; Preneel, Bart, 1963-; NATO Science for Peace and Security Programme.; North Atlantic Treaty Organization. Public Diplomacy Division.; c2008.Boolean functions in cryptology and information security

Sarker, M. O. Faruque, author.; Washington, Sam, author.; 2015. Learning Python network programming : utilize Python 3 to get network applications up and running quickly and easily

3rd Semester

Fall Term 2026/2027

Course number **PIYa2209**	Course name **Foreign Language 1**	
Type of course Compulsory language course	Semester / 2026/2027 Fall Term	Student capacity: 90
Teaching methods Interactive language classes, group projects, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (152 contact hrs in class +28 hrs of self-study (together 180 hrs)
Module coordinator		Semester week hours: 6
Additional teacher involved: -		

Syllabus

Content Descriptions

The purpose of studying the course: to acquire the basics of foreign language competence by future IT specialists, necessary for professional intercultural communication, mastering the basics of oral and written forms of communication in a foreign language for using it as a means of information activity and further self-education.

Learning goals and qualifications in this module students learn to (national or international):

-**Knowledge:** Recall and apply essential English vocabulary, grammar, and pronunciation patterns in everyday and academic communication.

-Comprehension: Understand and interpret the main ideas and details in spoken dialogues, classroom discussions, and short academic texts.

-Application: Use English in practical communication tasks such as presentations, conversations, and written exercises.

-Analysis: Compare linguistic and cultural aspects of English with the native language to improve accuracy and fluency.

-Synthesis: Combine listening, speaking, reading, and writing skills to perform role-plays, dialogues, and project-based tasks.

-Evaluation: Reflect on personal progress in English proficiency and set goals for further language development.

Core readings:

1) Crystal, David, author.; 2014. Words in time and place : exploring language through the historical thesaurus of the Oxford English dictionary
2) Wallwork, Adrian; 2022. Writing an Academic Paper in English: Intermediate Level
3) Wallwork, Adrian; 2022. Essential English Grammar and Communication Strategies: Intermediate Level

Course number YaTP2108	Course name Programming languages and technologies	
Type of course Basic discipline	Semester / Rotation 2026/2027 / Fall Term	Student capacity: 90
Teaching methods Lecture, seminars, case studies, group projects.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Creative Exam - Presentation defense (100%), 100 minutes		**Example for ECTS:** 8 (92 contact hours in class + 148 hours of self-study (together 240 hrs)
Module coordinator: -		Semester week hours: 8
Additional teacher involved: -		

Syllabus

Course objective: study of the main programming paradigms, overview of programming languages, data structures and algorithms, basics of a high-level programming language (C++), memory management mechanisms, template functions and classes, exception handling, debugging and profiling tools, introduction to object-oriented programming.

Learning goals and qualifications in this module students learn to (national or international):

- Programming Languages and Technologies

- **Knowledge:** Identify basic programming paradigms (procedural, object-oriented, functional) and core language constructs (variables, data types, control structures, functions).
- **Comprehension:** Explain how high-level code is translated into executable programs and describe differences between common programming languages and runtimes.
- **Application:** Write, run, and debug simple programs using appropriate language syntax, standard libraries, and development tools.
- **Analysis:** Compare alternative implementations and select suitable data structures, control flows, or language features for a given problem.
- **Synthesis:** Design and implement a small software module that integrates multiple technologies (e.g. files, networking, or databases).
- **Evaluation:** Assess code quality in terms of readability, efficiency, maintainability, and adherence to programming best practices.

Core readings:

1. **Nesteruk, Dmitri; 2018. Design Patterns in Modern C++: Reusable Approaches for Object-Oriented Software Design**

2. Perry, Greg M.; NetLibrary, Inc.; c2000. C by Example

Course number Mat2206	Course name Mathematics 3	
Type of course Basic Discipline	Semester / Rotation 2026/2027 / Fall Term	Student capacity: 90
Teaching methods Lectures, problem-solving sessions, tutorials, self-study.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%), 100 minutes		**ECTS (+Workload in hrs)** 5 (62 contact hours in class + 88 hours of self-study (together 180hrs)
Module coordinator:		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Probability theory and mathematical statistics: probability distributions, distribution functions, mathematical exp
statistical methods and hypothesis testing.

Learning goals and qualifications in this module students learn to (national or international):
-Knowledge: Recall advanced mathematical concepts, including multivariable functions, matrices, and differential equations.
-Comprehension: Explain the relationships between mathematical theories and their applications in engineering and computer science.
-Application: Solve problems involving partial derivatives, multiple integrals, linear algebra, and differential equations.
-Analysis: Analyze complex systems using mathematical models and interpret the results through graphs and analytical methods.
-Synthesis: Integrate different mathematical techniques to solve interdisciplinary problems in science and technology.
-Evaluation: Evaluate the accuracy and efficiency of mathematical solutions and justify the choice of methods used.

Core readings:

1. Rippon, Philip J ; Stallard, Gwyneth M; Rippon, Philip J. ; Stallard, Gwyneth M.; 2008. Transcendental Dynamics and Complex Analysis

2. Stoll, Robert Roth.; Wong, E. T. (Edward Tak-wah), 1924-; 1968. Linear algebra

3. Salsa, Sandro; 2016. Partial Differential Equations in Action: From Modelling to Theory

Course number KAOS2214	Course name Computer architecture and operating systems	
Type of course Basic Discipline	Semester / Rotation 2026/2027 / Fall Term	Student capacity: 90
Teaching methods Lectures, discussions, debates, project work.	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written exam (100%), 100 minutes		**ECTS (+Workload in hrs)** 4 (62 contact hours in class + 58 hours of self-study (together 120hrs)
Module coordinator: Senior Lecturer Vladislav Semenyuk		Semester week hours: 4
Additional teacher involved: -		

Syllabus

The objective of the course: to study the main components and devices of a computer, such as the central processor, RAM, hard drive, and the principles of their interaction. The principles of organization and operation of processors, memory, input-output systems, as well as the architecture of computer networks and data transfer protocols are considered. The course also covers the basics of assembler programming and the principles of operation of operating systems. /

Learning goals and qualifications in this module students learn to (national or international):

-Knowledge: Define key concepts of computer architecture (CPU, memory hierarchy, I/O, buses) and operating systems (process, thread, file system).

-Comprehension: Explain how hardware components and the operating system interact to execute programs and manage resources.

-Application: Apply principles of instruction execution, addressing, and process management to solve practical computing tasks.

-Analysis: Critically analyze system performance using concepts like pipelining, caching, concurrency, and scheduling.

-Synthesis: Integrate hardware and OS concepts to design or describe a simple computer system architecture and its software support.

-Evaluation: Assess efficiency, reliability, and security of system configurations and justify the choice of architectural or OS solutions.

Core readings:

- Baer, Jean Loup.; c1980. Computer systems architecture

- ACSAC 2007 (2007 : Seoul, Korea); ACSAC (Asia-Pacific Computer Systems Architecture Conference); Choi, Lynn, editor.; Paek, Yunheung, editor.; Cho, Sangyeun, editor.; 2007. Advances in Computer Systems Architecture : 12th Asia-Pacific Conference, ACSAC 2007, Seoul, Korea, August 23-25, 2007, Proceedings

Course number AOKS2214	Course name Architecture and organization of computer systems	
Type of course Basic Discipline	Semester / Rotation 2026/2027 / Fall Term	Student capacity: 90
Teaching methods Lectures, discussions, debates, project work.	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written exam (100%), 100 minutes		**ECTS (+Workload in hrs)** 4 (62 contact hours in class + 58 hours of self-study (together 120hrs)
Module coordinator: Senior Lecturer Vladislav Semenyuk		Semester week hours: 4
Additional teacher involved: -		

Syllabus

The objective of the course is to develop students' fundamental knowledge of the principles of construction, operation and organization of modern computer systems, as well as the development of practical skills in the analysis, design and optimization of hardware and software components of computing systems.
During the course, students will master the basic concepts of processor architecture, memory, input-output, multithreading and parallel computing, and learn to apply this knowledge when selecting, configuring and developing computing systems for various purposes.

Learning goals and qualifications in this module students learn to (national or international):

-Computer Architecture and Operating Systems / Architecture and Organization of Computer Systems

-Knowledge: Define key concepts of computer architecture (CPU, memory hierarchy, I/O, buses) and operating systems (process, thread, file system).

-Comprehension: Explain how hardware components and the operating system interact to execute programs and manage resources.

-Application: Apply principles of instruction execution, addressing, and process management to solve practical computing tasks.

-Analysis: Critically analyze system performance using concepts like pipelining, caching, concurrency, and scheduling.

-Synthesis: Integrate hardware and OS concepts to design or describe a simple computer system architecture and its software support.

-Evaluation: Assess efficiency, reliability, and security of system configurations and justify the choice of architectural or OS solutions.

Core readings:

- Wang, Shuangbao Paul; 2021. Computer Architecture and Organization: Fundamentals and Architecture Security

- Świątek, Jerzy ; Borzemski, Leszek ; Wilimowska, Zofia; 2020. Information Systems Architecture and Technology: Proceedings of 40th Anniversary International Conference on Information Systems Architecture and Technology – ISAT 2019: Part I

Course number VVDR2208	Course name Introduction to Web Design and Development	
Type of course Basic Discipline	Semester / Rotation 2025/2026 / Fall Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork, presentations.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Assessment based on participation and project performance (100%)		**ECTS (+Workload in hrs)** 5 (62 contact hours in class + 88 hours of self-study (together 150 hrs)
Module coordinator: Senior Lecturer Vladislav Semenyuk		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Basic principles and methods of designing user interfaces, special tools and technologies used in UX/UI design. Practical skills in developing prototypes and designing web pages and mobile applications, taking into account modern interface requirements and visual design standards.

Learning goals and qualifications in this module students learn to (national or international):

-Knowledge: Identify the fundamental concepts of web technologies, including HTML, CSS, and JavaScript.

-Comprehension: Understand the structure of web pages, the role of client–server interaction, and responsive design principles.

-Application: Create simple, functional, and visually appealing web pages using standard web development tools and frameworks.

-Analysis: Evaluate website usability, accessibility, and performance across different devices and browsers.

-Synthesis: Integrate design and development skills to build a small interactive website or web application.

-Evaluation: Assess the effectiveness, aesthetics, and functionality of web projects, providing constructive feedback for improvement.

Core readings:

- Holzschlag, Molly E.; c1998. Web by design : the complete guide
- Niederst, Jennifer; 2007. Learning web design : a beginner's guide to (X)HTML, style sheets, and web graphics
- Duckett, Jon, author.; 2011. HTML & CSS : design and build websites

Course number K2107	Course name: Kazakh language	
Type of course Basic Course	Semester / Rotation 2026/2027 / Fall Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork, presentations.	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written Exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hours in class + 88 hours of self-study (together 150 hrs)
Module coordinator Senior Lecturer:		Semester week hours: 5
Additional teacher involved: -		

Syllabus

The discipline studies the grammar of the Kazakh language, types of speech activity, features of the use of Kazakh language tools in oral and written communication to establish interpersonal contact in the socio-cultural, professional spheres and situations of human activity.

Learning goals and qualifications in this module students learn to (national or international):

-Knowledge: Recall fundamental vocabulary, grammar structures, and pronunciation rules of the Kazakh (or Russian) language.
-Comprehension: Understand the main ideas and details in spoken and written texts related to everyday and academic contexts.
-Application: Use appropriate vocabulary and grammar to communicate effectively in dialogues, presentations, and written assignments.
-Analysis: Compare linguistic and cultural features between Kazakh, Russian, and other languages to enhance language awareness.-
Synthesis: Integrate listening, speaking, reading, and writing skills to produce coherent and contextually appropriate communication.
-Evaluation: Reflect on personal language progress, identify strengths and weaknesses, and develop strategies for continued improvement.

Core readings:

- Shnitnikov, Boris Nikolayevich, author.; American Council of Learned Societies, issuing body.; 2011. Kazakh-English dictionary
- Nurgazina, Dana ; Kudubayeva, Saule. Research of semantic aspects of the Kazakh language when translating into the Kazakh sign language
- Pansat, Zhansaya ; Khalikova, Nurila. Semantic Features of Color in Emotional, Expressive Words: The Concept of "Blue" in the Kazakh Language

4-th Semester

Spring Term 2026/2027

Course number **PIYa2207**	Course name **Foreign language workshop 2**	
Type of course Basic discipline	Semester 2026/2027 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (152 contact hrs in class +28 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor:		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The purpose of studying the discipline: acquisition by future IT specialists of the basics of foreign language competence necessary for professional intercultural communication, mastery of the basics of oral and written forms of communication in a foreign language for using it as a means of information activity and further self-education.

Learning goals and qualifications in this module students learn to (national or international):

-Knowledge: Recall ~3000 general and technical terms, features of scientific style, basics of annotation/abstracting, and rules for using reference tools.
-Comprehension: Understand main ideas and terminology in technical texts and explain communicative formulas in professional contexts.
-Application: Read specialized texts using active/passive vocabulary and produce accurate annotations and abstracts with reference tools.
-Analysis: Analyze structure, cohesion, and terminology of scientific texts, distinguishing main arguments from supporting details.
-Synthesis: Integrate information from multiple sources into concise summaries/abstracts and prepare mini-glossaries for intercultural communication.
-Evaluation: Assess the quality of annotations/abstracts and the credibility of sources; reflect on vocabulary growth and independent-work strategies.

Core readings:

Bailey, S. (2018). Academic Writing: A Handbook for International Students. Routledge. – A practical guide for improving academic English writing and communication.

Jordan, R. R. (2020). English for Academic Purposes: A Guide and Resource Book for Teachers. Cambridge University Press. – Focus on academic English learning strategies and classroom practice.

Hyland, K. (2019). Second Language Writing. Cambridge University Press. – Insights into writing in academic contexts and applied linguistics.

Nation, I. S. P., & Macalister, J. (2021). Language Curriculum Design. Routledge. – Foundational framework for developing effective English learning curricula.

Swales, J. M., & Feak, C. B. (2021). Academic Writing for Graduate Students. University of Michigan Press. – Genre-based approach to academic writing and reading comprehension.

Course number **SUBD2210**	Course name **Database management systems**	
Type of course Basic discipline	Semester 2026/2027 Spring Term	Student capacity: 90
Teaching methods Lectures, seminars, case studies, group projects, self-study.	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Department of Information Systems in Management		Semester week hours: 5
Additional teacher involved:		

Syllabus

Content Description

Study of theoretical and practical aspects of database management, such as data models, query languages, database design and optimization, methods of processing and storing information in databases, as well as tools and technologies used for developing and managing databases. During the course of studying the discipline, students also gain practical skills in working with MySQL and PostgreSQL databases.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge: Recall core concepts of conceptual and logical database design, and fundamentals of QBE and SQL DML.**
- **Comprehension: Interpret customer requirements and explain their mapping to entities, attributes, relationships, and constraints.**
- **Application: Develop a relational schema and implement it in MS Access; build tables/relationships, load data, write QBE/SQL CRUD queries, and organize the user interface.**
- **Analysis: Examine requirements and schemas to identify keys and dependencies; normalize and optimize the model; troubleshoot data and query issues.**
- **Synthesis: Integrate schema, data, queries, and UI into a coherent database application, collaborating effectively in a team.**
- **Evaluation: Assess correctness, integrity, performance, and usability of the solution; propose improvements based on testing and user feedback.**

Core readings:

1) Elmasri, R., & Navathe, S. (2016). *Fundamentals of Database Systems* (7th ed.).
2) Connolly, T., & Begg, C. (2005/посл. изд.). *Database Systems: A Practical Approach to Design, Implementation and Management.*
3) Sarka, D. (2014). *Data Warehouse Systems: Design and Implementation.*

Course number **PVD2211**	Course name **Applied data visualization**	
Type of course Basic discipline	Semester 2026/2027 Spring Term	Student capacity: 90
Teaching methods Lectures, discussions, debates, project work	Prerequisites for attendance Introduction to IS	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

This course will introduce students to the fundamental concepts and tools used to communicate the information contained in large, complex data sets using a variety of visualization techniques. Students will learn the fundamentals of data exploration through visualizations, how to manipulate and reshape data to make it suitable for visualization, and how to prepare everything from simple single-variable visualizations to large, multi-level and interactive visualizations. Visualization theory will be presented alongside the technical aspect of the course to develop a holistic understanding of the topic.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Identify the role of visualization in research, technology, education, and your field; name modern tools/technologies and basic project/pre-project research methods.
- Comprehension: Explain when and why to use particular visualization methods and systems; describe how methods map to data types and research questions.
- Application: Select suitable visualization methods/scenarios and implement them in general-purpose and information-visualization systems to solve applied problems.
- Analysis: Analyze requirements, data, and audience; compare tools/techniques; detect issues in encoding, scales, clutter, and data quality.
- Synthesis: Design end-to-end visualization workflows (data prep → encoding → interaction → narrative) and integrate multiple tools into coherent dashboards/reports.
- Evaluation: Assess effectiveness, clarity, and usability of visuals; justify tool/method choices; test with users and iterate based on feedback and performance.

Core readings:

Healy, K. (2018). *Data Visualization: A Practical Introduction.* Princeton University Press.
Wilke, C. O. (2019). *Fundamentals of Data Visualization.* O'Reilly

Course number SAGW1107	Course name **Front-End development**	
Type of course Basic Discipline	Semester / Rotation 2026/2027 / Spring Term	Student capacity: 90
Teaching methods Lectures, problem-solving seminars, coding labs, homework sets, group work on algorithmic tasks, self-study.	Prerequisites for attendance Introduction to Web Design and Development	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The goal of the course is to develop students' knowledge, skills and abilities necessary for designing, developing and optimizing user interfaces (UI) and ensuring convenient user interaction with software products (UX). The course is aimed at studying modern technologies, tools and methods for creating interfaces for web applications, mobile and desktop systems, taking into account the principles of usability, accessibility and adaptability.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge:** Identify key differences between static (print) and dynamic (web) design. Explain methods for creating a design system, basic graphic-processing technologies, and core concepts of web design and Internet programming.
- **Comprehension:** Describe why Google Material and Apple Human Interface Guidelines matter and how they shape components, navigation, and behavior. Explain when to choose specific online design tools and web technologies given project goals and constraints.
- **Application:** Apply Google/Apple design-system standards to layouts and UI patterns. Select an online tool and produce a publish-ready website using HTML5, CSS3, and JavaScript.
- **Analysis:** Compare design tools and development stacks by functionality, collaboration/hand-off, limits, and cost. Structure heterogeneous content into clear information architecture (sitemaps, flows, components) and diagnose UX issues with evidence.
- **Synthesis:** Integrate content, visual principles, and components into a coherent design system and interactive prototype. Prepare developer-ready handoff (design tokens, specs, assets) and assemble different site types in the chosen environment.
- **Evaluation:** Assess a site against accessibility, usability, consistency, and performance criteria. Verify conformance to the design system and justify improvements with metrics or user feedback.

Core readings:

McFarland, David Sawyer.; Fröhlich, Stefan.; 2008, c2009.JavaScript
Kapoor, Sonu; 2025.Beginning JavaScript Syntax: Understanding Syntactical Rules and Structures for Better JavaScript Programming
Chiaretta, Simone, author.; 2018. Front-end development with ASP.NET Core, Angular, and Bootstrap
Lanciaux, Ryan; 2021.Modern Front-end Architecture: Optimize Your Front-end Development with Components, Storybook, and Mise en Place Philosophy

Course number LIU1107	Course name **Advanced Web Design**	
Type of course Basic Discipline	Semester / Rotation 2026/2027 / Spring Term	Student capacity: 90
Teaching methods Lectures, problem-solving seminars, coding labs, homework sets, group work on algorithmic tasks, self-study.	Prerequisites for attendance Introduction to Web Design and Development	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The goal of the course is to develop students' in-depth knowledge and practical skills in developing modern, aesthetically pleasing and functional web interfaces taking into account advanced technologies, UX/UI design trends and accessibility principles. The course is aimed at studying the tools and methodologies used in high-quality web design, including adaptive design, interactive elements, animation, typography and design systems.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge:** Identify modern UX/UI principles and explain how perception, composition, color, and typography shape user experience. Describe responsive vs. adaptive design methods and current trends (micro-animations, parallax, interactive elements).
- **Comprehension:** Explain when and why to choose adaptive vs. responsive approaches and how visual choices affect usability. Describe how design systems and component thinking guide consistent, scalable interfaces and tool selection for prototyping/testing.
- **Application:** Build adaptive, mobile-first UIs with HTML/CSS/JavaScript and implement motion with CSS, SVG, WebGL, or GSAP. Create interactive prototypes in Figma/XD/Sketch and prepare assets for development using a design system.
- **Analysis:** Compare tools and animation techniques by usability, performance, accessibility, and maintenance cost. Break down user flows and content into clear information architecture and diagnose UX issues using test/analytics data.
- **Synthesis:** Integrate visual principles, components, and motion into a cohesive, cross-platform interface and living design system (tokens, reusable components). Combine user feedback with prototypes to iterate and deliver developer-ready specs and assets.
- **Evaluation:** Assess interfaces against usability heuristics, WCAG accessibility, performance budgets, and mobile-first criteria. Justify design and animation decisions with analytics, usability tests, and clear trade-off reasoning.

Core readings:

Verou, Lea, author.; 2015.CSS secrets : better solutions to everyday web design problems
Chiaretta, Simone, author.; 2018. Front-end development with ASP.NET Core, Angular, and Bootstrap
Lanciaux, Ryan; 2021.Modern Front-end Architecture: Optimize Your Front-end Development with Components, Storybook, and Mise en Place Philosophy

Course number **ASD2215**	Course name Algorithms and data structures	
Type of course Basic Discipline	Semester 2026/2027 Fall Term	Student capacity: 90
Teaching methods Lectures, problem-solving sessions, tutorials, self-study	Prerequisites for attendance Introduction to IS, Programming languages and technologies	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The course studies, using the Python language as an example, data structures, basic data structures, static, semi-static, dynamic data structures, the concept of an algorithm, types of algorithms, examples of algorithms and algorithmization of tasks, executable operators, subroutines, file data types, analysis of algorithms, the concept of algorithm complexity, complexity: time and theoretical, algorithm efficiency.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Identify main data-structure types, their processing algorithms, and pros/cons.
- Comprehension: Explain when and why specific structures fit a problem and map requirements to DS+operations.
- Application: Select and implement suitable structures & algorithms in C# (library + custom) to solve tasks.
- Analysis: Analyze time/space trade-offs, invariants, and bottlenecks of chosen structures.
- Synthesis: Design composite/custom data structures and integrate them with algorithms into complete solutions.
- Evaluation: Justify DS/algorithm choices against performance, maintainability, and constraints; reflect on professional readiness.

Core readings:

Morin, P. (2013). *Open Data Structures: An Introduction.*
Hetland, Magnus Lie.; 2010.Python algorithms : mastering basic algorithms in the Python language
Shi, Chenyang; 2025.Mastering Algorithms with Python: A Practical Approach to Problem Solving and Python Implementation

Course number **ADSA2215**	Course name Analysis of discrete structures and algorithms	
Type of course Basic Discipline	Semester 2026/2027 Fall Term	Student capacity: 90
Teaching methods Lectures, problem-solving sessions, tutorials, self-study	Prerequisites for attendance Introduction to IS, Programming languages and technologies	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class + 88 hrs of self-study; total 150 hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The goal of the course is to study the fundamental discrete structures used in computer science, as well as master the methods of analysis, design and optimization of algorithms for the effective solution of computational problems. The course is aimed at developing students' ability to analyze the complexity of algorithms, select appropriate discrete data structures and apply graph-theoretical, combinatorial and logical models to solve practical and scientific problems in the field of computer science.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge: Identify logical & algebraic structures, core paradigms (greedy, DP, divide-and-conquer), basics of asymptotic analysis, and foundations of coding/cryptography/automata.**
- **Comprehension: Explain how paradigms map to problems, interpret Big-O/Ω/Θ, and describe how Boolean algebra models discrete processes.**
- **Application: Implement search, sorting, and hashing; apply DP/greedy/D&C; use discrete math in security and cryptography.**
- **Analysis: Analyze correctness and complexity; model efficiency mathematically; examine automata/formal-language properties.**
- **Synthesis:Compose multi-paradigm solutions; develop approximate/probabilistic algorithms; design coding/crypto pipelines.**
- **Evaluation: Evaluate algorithms and security schemes for correctness, complexity, and robustness; choose trade-offs (accuracy/speed/security).**

Core readings:

Morin, P. (2013). *Open Data Structures: An Introduction.*
Hetland, Magnus Lie.; 2010.Python algorithms : mastering basic algorithms in the Python language
Shi, Chenyang; 2025.Mastering Algorithms with Python: A Practical Approach to Problem Solving and Python Implementation

Course number	Course name: Data Analysis	
Type of course Basic Course	Semester / Rotation 2026/2027 / Spring Term	Student capacity: 90
Teaching methods Workshops, discussions, teamwork, presentations.	Prerequisites for attendance Intoduction to IS	Language English
Type of examination (Final Grade Composition) Written Exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 8 (90 contact hours in class + 148 hours of self-study (together 240hrs)
Module coordinator Associate Professor Gulnar Kim		Semester week hours: 8
Additional teacher involved: -		

Syllabus

Fundamentals of data analysis (visualization, descriptive statistics) and machine learning methods (classification, regression, clustering algorithms). In addition, the application of analytical tools in solving real business problems, such as customer base analysis, sales forecasting, analysis of advertising campaign effectiveness, etc. is studied.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge: Identify theoretical foundations of big-data analytics and machine-learning methods; recognize problem types and modern BD/ML technologies and tools.**
- **Comprehension: Explain when and why specific BD/ML methods fit a research question; interpret model outputs and metrics in context.**
- **Application: Formulate tasks and design a research program; select methods; implement pipelines and apply BD/ML to experimental and theoretical problems; present results clearly.**
- **Analysis: Critically analyze innovation problems, data quality, assumptions, and constraints; compare methods and diagnose model/data issues.**
- **Synthesis: Integrate multiple methods, tools, and datasets into end-to-end workflows; combine modeling, evaluation, and reporting into actionable insights.**
- **Evaluation: Validate results (reliability, generalization, performance, fairness, ethics); justify method choices and improvements; reflect on readiness for professional practice.**

Core readings:

- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021/2023). *An Introduction to Statistical Learning with Applications in R (ISL).*
- Kuhn, M., & Silge, J. (2022). *Tidy Modeling with R.*
- Bruce, P., Bruce, A., & Gedeck, P. (2020). *Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python.*

<table>
<tr><td>Course number</td><td colspan="3">Course name
Industrial practice 1</td></tr>
<tr><td colspan="2">Type of course
Production Practice</td><td>Semester 2026/2027
Spring Term</td><td>Student capacity:
90</td></tr>
<tr><td colspan="2">Teaching methods
group projects, self-study, case study</td><td>Prerequisites for attendance
None</td><td>Language
English</td></tr>
<tr><td colspan="3">Type of examination (Final Grade Composition)

Written exam (100%) (100 minutes)</td><td>ECTS (+Workload in hrs)
4 (0 contact hrs in class +120 hrs of self-study (together 120 hrs)</td></tr>
<tr><td colspan="3">Module coordinator
Senior Instructor: Kim Gulnar</td><td>Semester week hours:
-</td></tr>
<tr><td colspan="4">Additional teacher involved:
Semenyuk Vladislav</td></tr>
<tr><td colspan="4">Syllabus
Content Description
Formation of practical professional skills in students, acquisition of initial practical experience in the main types of professional activity for their subsequent acquisition of general and professional competencies in their chosen specialty.</td></tr>
<tr><td colspan="4">Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the structure, stages, and real-world processes of software development within a professional environment, including project planning, teamwork, and quality standards.
- Comprehension: Explain the roles and responsibilities of specialists in software development teams, as well as how theoretical knowledge from coursework is applied to practical engineering tasks.
- Application: Apply programming, testing, and software design skills to real projects under the guidance of industry mentors or supervisors, following professional workflows and documentation standards.
- Analysis: Evaluate technical and organizational challenges encountered during the development process, propose solutions, and assess the effectiveness of implemented approaches.
- Synthesis: Integrate acquired knowledge and practical experience to participate in the full software development lifecycle — from requirements analysis and design to implementation, testing, and deployment.
- Evaluation: Reflect on personal performance, teamwork, and professional communication skills, assessing progress toward mastering general and professional competencies in the field of software engineering.</td></tr>
</table>

Core readings:

Wang, Qing ; Garousi, Vahid ; Madachy, Raymond ; Pfahl, Dietmar; 2009.Trustworthy Software Development Processes: International Conference on Software Process, ICSP 2009 Vancouver, Canada, May 16-17, 2009 Proceedings

Jadhwani, Prateek, author.; 2019. Getting started with Web components : build modular and reusable components using HTML, CSS and JavaScript

Lott, Steven F; 2025. Python Essentials: Modernize existing Python code and plan code migrations to Python using this definitive guide

Lee, Kent D ; Hubbard, Steve; 2024.Data structures and algorithms with Python : with an introduction to multiprocessing

Straccia, Alessandro. Interactive Web Development with Three. Js and A-Frame: Create Captivating Visualizations and Projects in Immersive Creative Technology for 3D, WebAR, and WebVR Using Three. Js and a-Frame (English Edition). 1st ed. Delhi: Orange Education PVT Ltd, 2024.

5-th Semester

Fall Term 2027/2028

Course number **IKT3106**	Course name **Information and Communication technologies**	
Type of course General education discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: PhD Celal Ceken		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The discipline is aimed at training highly qualified specialists who have the skills to apply modern information technologies in the field of professional activity.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental principles, architectures, and trends of modern information technologies, including cloud computing, data management, software development, and network systems.

- Comprehension: Explain how contemporary IT tools, programming environments, and digital platforms support automation, optimization, and decision-making in professional and organizational contexts.

- Application: Apply modern information technologies, such as web and mobile development tools, databases, analytics platforms, and cloud services, to solve practical problems in the chosen professional field.

- Analysis: Evaluate the efficiency, scalability, and security of IT solutions, identifying opportunities for digital transformation and improvement within business or technical processes.

- Synthesis: Integrate diverse IT tools and methodologies to design innovative, technology-driven solutions that address real-world challenges across industries.

- Evaluation: Critically assess the effectiveness and sustainability of implemented IT solutions, demonstrating professional competence, adaptability, and ethical responsibility in the use of digital technologies.

Core readings:

Dovgyi, Stanislav et al. Information and Communication Technologies and Sustainable Development : Advanced Approaches and Innovations in up-To-Date Networks and Systems. 1st ed. Cham: Springer, 2023.

Fiaidhi, Jinan [Herausgeber], Debnath Bhattacharyya, and N. Thirupathi Rao. Smart Technologies in Data Science and Communication : Proceedings of SMART-DSC 2019. Ed. by Debnath Bhattacharyya, N. Thirupathi Rao, and Jinan Fiaidhi. 1st ed. 2020. vol. 105.

Bawden, David, and Lyn Robinson. Introduction to Information Science. Second edition. London: Facet, 2022.

Course number **PIYa3214**	Course name **Professional English Language 3**	
Type of course Basic discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (152 contact hrs in class +28 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Fedorova Antonina		Semester week hours: 4
Additional teacher involved: Aleshkina Ilvira Moschenko Yuliya		

Syllabus

Content Description

The purpose of the course is to study English, intended for non-native speakers, which is also called English as a Foreign Language (EFL), English as an additional language (EAL) or English for speakers of other languages (ESOL). The discipline is necessary for students in order to improve their knowledge of English in the shortest possible time, which is necessary for the effective development of academic disciplines.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental principles of English grammar, vocabulary, pronunciation, and structure, as well as key differences between academic, professional, and conversational language use.

Comprehension: Explain and interpret written and spoken English in academic and everyday contexts, demonstrating comprehension of main ideas, arguments, and details.

Application: Apply English language skills in reading, writing, listening, and speaking to communicate effectively in academic and professional settings, including classroom discussions, written assignments, and presentations.

Analysis: Identify and correct common linguistic and stylistic errors, improving clarity, coherence, and precision in both oral and written communication.

Synthesis: Integrate language skills to produce structured academic texts, reports, and oral statements using appropriate vocabulary and grammatical forms.

Evaluation: Assess one's own progress in English proficiency, set learning goals for continuous improvement, and apply strategies for independent language learning and academic success.

Core readings:

1) Oxenden, C., Latham-Koenig, C., Seligson, P., & Lambert, J. (2019). New English File. Elementary. Student's Book / Workbook (4th ed.). Oxford University Press.

2) Oxenden, C., Latham-Koenig, C., Seligson, P., & Lambert, J. (2019). New English File. Pre-Intermediate. Student's Book / Workbook (4th ed.). Oxford University Press.

3) Mann, M., & Taylore-Knowles, S. (2006). Destination B2: Grammar and Vocabulary. Macmillan.

4) Vince, M., & McNicholas, K. (2003). Elementary Language Practice: English Grammar and

Vocabulary. Macmillan.
5) Zamach, D. E., & Rumisek, L. A. (2005). Academic Writing: From Paragraph to Essay. Macmillan.
6) Vince, M. (2010). Intermediate Language Practice: English Grammar and Vocabulary. Macmillan Heinemann.

Course number **OKS3215**	Course name **Fundamentals of Computer Networks**	
Type of course Basic discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: PhD Tashibaev Rustem		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The basic principles of network operation, network classification, network architecture, network layer protocols, routing and switching technologies, network protection tools and methods, security issues in computer networks, network services and applications.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental principles of computer network operation, including network models, architectures, and classifications, as well as the functions of core protocols at different network layers.

Comprehension: Explain how data transmission, routing, and switching technologies operate within local and global networks, and describe the role of network devices and topologies in maintaining connectivity.

Application: Configure and manage network components, implement routing and switching mechanisms, and use diagnostic tools to ensure efficient and secure data exchange.

Analysis: Evaluate network performance, identify potential vulnerabilities, and analyze security threats affecting data integrity, confidentiality, and availability.

Synthesis: Design and optimize network architectures that integrate various technologies, protocols, and protection mechanisms to meet organizational and performance requirements.

Evaluation: Assess the effectiveness of network configurations, security strategies, and management practices, demonstrating the ability to maintain stable, reliable, and secure network infrastructures.

Core readings:

Sadiku, Matthew N. O, and Cajetan M Akujuobi. Fundamentals of Computer Networks. Cham, Switzerland: Humana Press, 2022.

Sharma, Rachna, and Sudipto Das. A Complete Guide to Computer Networks. New Delhi, India: University Science Press, 2015.

Vien, Quoc-Tuan. *Network Design, Modelling and Performance Evaluation*. 1st ed. Stevenage: The Institution of Engineering and Technology, 2019.

Sahu, Partha Pratim. *Fundamentals of Optical Networks and Components*. 1st ed. Boca Raton, FL: CRC Press, 2021.

Course number **WP3301**	Course name **WEB-Programming**	
Type of course Professional discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Front-End development	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The discipline studies the basics of creating and deploying client-server applications, the basics of TCP/IP, FTP, WebSockets network protocols, server-side programming languages (PHP), creating RESTful APIs, working with databases, creating and processing requests.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental concepts of client-server architecture, web communication principles, and the functioning of key network protocols such as TCP/IP, FTP, and WebSockets.

Comprehension: Explain the structure and interaction between clients, servers, and databases, as well as the logic of request handling and data exchange in modern web applications.

Application: Develop and deploy client-server applications using server-side programming languages (such as PHP), implement RESTful APIs, and integrate database operations for dynamic data processing.

Analysis: Evaluate the performance, scalability, and security of client-server systems, identifying bottlenecks and applying optimization techniques.

Synthesis: Design full-cycle web solutions that combine backend logic, database management, and network communication protocols into cohesive, reliable systems.

Evaluation: Assess the functionality, efficiency, and maintainability of developed applications, ensuring compliance with industry standards for usability, performance, and cybersecurity.

Core readings:

1) Flitton, Maxwell. Rust Web Programming : A Hands-on Guide to Developing Fast and Secure Web Apps with the Rust Programming Language. Birmingham ; Packt Publishing, 2021
2) Yang, Danny. Introducing ReScript: Functional Programming for Web Applications. 1st ed. Berkeley, CA: Apress, 2022.
3) Bampakos, Aristeidis, and Pablo Deeleman. Learning Angular: A No-Nonsense Guide to

Building Web Applications with Angular 15. 4th ed. Birmingham: Packt Publishing, Limited, 2023.
4) Straccia, Alessandro. Interactive Web Development with Three. Js and A-Frame: Create Captivating Visualizations and Projects in Immersive Creative Technology for 3D, WebAR, and WebVR Using Three. Js and a-Frame (English Edition). 1st ed. Delhi: Orange Education PVT Ltd, 2024.
5) Jain, Shubham, and Mathew Dony Chittezhath. Modern Web Applications with Mext. JS : Learn Advanced Techniques to Build and Deploy Modern, Scalable and Production Ready React Applications with next. JS. First edition. Delhi, India: Orange Education Pvt Ltd, 2023.

Course number **Fil3105**	Course name **Philosophy**	
Type of course General education discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Malikov Alexey		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The discipline is focused on developing students' critical and analytical thinking, enabling them to understand fundamental principles of knowledge, morality, and human existence. It cultivates intellectual independence and the ability to reason logically in addressing ethical and social issues. The course contributes to forming a holistic worldview and responsible citizenship aligned with modern global challenges.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge:** Understand fundamental philosophical concepts, categories, and theories in the context of classical and modern philosophy.
- **Comprehension:** Interpret philosophical texts and identify key arguments, ethical positions, and worldviews.
- **Application:** Apply philosophical reasoning to analyze contemporary social, cultural, and professional issues.
- **Analysis:** Compare different philosophical schools and critically evaluate their relevance to modern challenges.
- **Synthesis:** Integrate philosophical knowledge with professional and personal decision-making, forming a coherent system of values.
- **Evaluation:** Assess moral and intellectual perspectives, demonstrating independent judgment and reflective thinking.

Core readings:

Yeon, Asmah Laili, and Yuhanif Yusof. *Philisophy and Theory of Law.* Sintok: Universiti Utara Malaysia, 2015.

McKaughan, D.J., VandeWall, H. The history and philosophy of science: A reader. - London: Bloomsbury Academic, 2018. - 1104 p.

Smith N. Introduction to philosophy. – OpenStax, 2022. Payne R. W. An introduction to philosophy. – 2015.

Grayling A. C. The history of philosophy. – Penguin UK, 2019

Russell B. History of western philosophy. – Routledge, 2004.

Course number **OOP3307**	Course name **Object Oriented Programming**	
Type of course Professional discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Programming Languages and Technologies	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The aim of the course is to develop an understanding of the ideology and key aspects of object-oriented programming (OOP) in Python, sufficient for practical use in further education and in the professional field. OOP is used to: structure information, accurately determine the interaction of some elements with others; improve program manageability; scale code faster for various tasks; better understand what is written; more effectively support ready-made programs; implement changes without having to rewrite the entire code.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental principles and terminology of object-oriented programming (OOP) in Python, including classes, objects, inheritance, encapsulation, and polymorphism.

- Comprehension: Explain how OOP structures improve code organization, reusability, and scalability in real-world programming tasks.

- Application: Design and implement Python programs using OOP concepts to solve practical problems in academic and professional contexts.

- Analysis: Decompose complex systems into interacting objects and evaluate the efficiency, readability, and maintainability of code structures.

- Synthesis: Integrate OOP techniques with other programming paradigms and tools to create flexible, scalable, and modular software solutions.

- Evaluation: Critically assess one's own code and peer projects for adherence to OOP principles, performance optimization, and best programming practices.

Core readings:

Lott, Steven F, and Dusty Phillips. Python Object-Oriented Programming: Build Robust and Maintainable Object-Oriented Python Applications and Libraries. Fourth edition. Birmingham: Packt Publishing, 2021.

Hardin, Therese et al. Concepts and Semantics of Programming Languages 2: Modular and Object-Oriented Constructs with OCaml, Python, C++, Ada and Java. 1st ed. Newark: John Wiley & Sons, Incorporated, 2021.

Phillips, Dusty. Python 3 Object-Oriented Programming : Unleash the Power of Python 3 Objects. 2nd ed. Birmingham, [England] ; Packt Publishing, 2015.

Sarcar, Vaskaran. Python Bootcamp: A Rapid Crash Course Featuring Q&A Sessions, Exercises, and Projects. Berkeley, CA: Apress, 2025.

Anaya, Mariano. Clean Code in Python: Develop Maintainable and Efficient Code. Second edition. Birmingham: Packt Publishing, 2021.

Ciesla, Robert. Programming Basics: Getting Started with Java, C#, and Python. 1st ed. Berkeley, CA: Apress, 2021.

Course number **PDPI3307**	Course name **Programming for Informatics Applications**	
Type of course Professional discipline	Semester 2027/2028 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Programming Languages and Technologies	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The discipline is designed to provide students with fundamental programming skills necessary for solving applied problems in the field of informatics. The course focuses on developing algorithmic thinking, understanding data structures, and learning to design efficient programs that process, analyze, and visualize information. Students will acquire practical experience in using modern programming languages and libraries to automate data workflows, manage databases, and create software tools for research and business analytics. Emphasis is placed on the integration of programming knowledge with informatics concepts, preparing students to apply computational approaches in various professional domains.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the core programming principles, syntax, and data structures used in informatics applications, including variables, control flow, functions, and algorithms.

Comprehension: Explain how programming techniques can be applied to automate data processing, analysis, and visualization in informatics tasks.

Application: Develop and debug programs that solve applied problems in data management, analytics, and decision support systems.

Analysis: Evaluate program performance, identify logical errors, and optimize code for efficiency and clarity.

Synthesis: Integrate programming methods with informatics tools, databases, and APIs to build comprehensive computational solutions.

Evaluation: Reflect on one's own coding practices, assess program quality and functionality, and apply best practices in software development and information system design.

Core readings:

Severance, Charles. Python for Informatics: Exploring Information. Ann Arbor: Charles Severance, 2016.

Šilhavý, Radek, et al. Software Engineering Application in Informatics. Cham: Springer, 2022.

Balamurugan, R. Programming Big Data Applications: Scalable Tools and Frameworks. Boca Raton: CRC Press, 2023.

6-th Semester

Spring Term 2027/2028

Course number **VACM3308**	Course name **Web Analytics and Digital Marketing**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Web-Programming	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The discipline studies the basics of web analytics, including setting up and using analytics tools such as Google Analytics and analyzing user behavior on the site; studies methods for optimizing a website and improving its performance, digital marketing tools such as contextual advertising, search engine optimization, social media marketing, email marketing and others; students They learn to analyze the market, create marketing strategies, develop content and monitor the results of marketing campaigns.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental principles and terminology of web analytics, digital marketing, and website optimization, including traffic sources, conversion rates, SEO, SMM, and contextual advertising.

- Comprehension: Explain how analytics tools (such as Google Analytics) and digital marketing platforms are used to collect, interpret, and visualize data on user behavior and marketing performance.

- Application: Configure web analytics tools, set up campaign tracking, and apply digital marketing strategies such as SEO, social media promotion, and email marketing in practical tasks.

- Analysis: Evaluate website performance and user interaction data to identify trends, measure marketing effectiveness, and suggest data-driven improvements.

- Synthesis: Integrate various digital marketing tools and analytics techniques to design comprehensive marketing strategies and optimize digital presence.

- Evaluation: Critically assess the results of marketing campaigns, interpret analytics reports, and formulate recommendations for enhancing user engagement and return on investment (ROI).

Core readings:

Kelsey, Todd. Introduction to Google Analytics: A Guide for Absolute Beginners. 1st ed. Berkeley, CA: Apress L. P, 2017.

Solberg Söilen, Klaus. Digital Marketing: Tools, Techniques and Best Practices for Graduate Students and Managers. 1st ed. Cham: Springer, 2024.

Aghazadeh, Hashem, and Mozhde Khoshnevis. Digital Marketing Technologies. 1st ed. Singapore: Palgrave Macmillan, 2024.

Kapoor, Avinash. Marketing in the Digital World. 1st ed. New York: Business Expert Press, 2020.

Course number **ITVP3308**	Course name **Text Retrieval and Web Search**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The purpose of the course is to familiarize students with modern technical means and information technologies used for the tasks of automatic extraction of information from the text. The student studies the main modern technical means and information technologies that serve to ensure linguistic activity; is able to study and master modern technical means and information technologies; has the skills to work with the main modern technical means and information technologies.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the key concepts, terminology, and technologies used in the field of automatic information extraction from text, including linguistic data processing and text-mining systems.

- Comprehension: Explain the role of natural language processing tools and modern information technologies in solving linguistic and analytical tasks.

- Application: Use modern software and computational tools for linguistic data analysis, text parsing, and information extraction.

- Analysis: Compare different approaches and technologies for text processing, evaluating their efficiency and suitability for specific linguistic tasks.

- Synthesis: Integrate multiple information technologies and linguistic tools to build automated systems for extracting, structuring, and interpreting text data.

- Evaluation: Assess the accuracy and reliability of automated linguistic analyses, ensuring the correct and ethical use of digital technologies in linguistic research and professional communication.

Core readings:

Aggarwal, Charu C. Machine Learning for Text. 1st ed. 2018. Cham: Springer Nature, 2018.

Goker, Ayse, and J Davies. Information Retrieval : Searching in the 21st Century. 1st ed.

Chichester, West Sussex, U.K. ; Wiley, 2009.

Neal, Diane Rasmussen. Indexing and Retrieval of Non-Text Information. Ed. by Diane Rasmussen Neal. 1st ed. Germany: De Gruyter, 2012.

Course number **EZSP3310**	Course name **Expert Knowledge and Decision Support Systems**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The discipline studies methods of formalizing knowledge and decision-making processes, as well as forms practical skills for developing simple expert systems in a programming language.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the principles of knowledge representation, decision-making models, and the structure of expert systems.

- Comprehension: Explain how formalization of knowledge supports reasoning, inference, and automated decision-making processes in computational systems.

- Application: Develop simple expert systems in a programming language using rule-based logic, decision trees, or inference engines.

- Analysis: Evaluate the structure, functionality, and logic of expert systems, identifying limitations and opportunities for improvement.

- Synthesis: Integrate multiple knowledge sources and algorithms to design intelligent systems that simulate expert-level reasoning in specific domains.

- Evaluation: Assess the accuracy, efficiency, and reliability of decision-making algorithms, ensuring the ethical and practical application of knowledge-based technologies.

Core readings:

Klein, Patrick. Combining Expert Knowledge and Deep Learning with Case-Based Reasoning for Predictive Maintenance. 1st ed. 2025. Wiesbaden: Springer Fachmedien Wiesbaden, 2025

Darrel Ryan, ed. Expert Systems : Design, Applications and Technology. New York: Nova Science Publishers, 2017.

Hu, S. David. Expert Systems for Software Engineers and Managers. Springer, 2013.

Course number **STOI3310**	Course name **Special Topics in Information, Science, Technology & Arts**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The purpose of the course is to consider the mathematical, physical foundations of the theory of computer science and the relationship of computer science as a scientific and applied discipline in the understanding of the information community of Kazakhstan with Information Science, Computer Science and Computational Science in the representation of information specialists in the United States and Western countries. The unit of measurement of the amount of information bits is presented and the possibility of estimating the amount of information of complex natural systems is proved.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the mathematical and physical foundations of computer science, including the concept of information measurement, information units (bit, byte), and the principles of information processing.

Comprehension: Explain the interrelations between Computer Science, Information Science, and Computational Science as academic and applied disciplines in both the Kazakh and international contexts.

Application: Apply theoretical knowledge to model information systems and quantify the amount of information in various processes and natural systems.

Analysis: Analyze the structure of information exchange and evaluate the efficiency of data transmission, coding, and storage methods.

Synthesis: Integrate mathematical and physical principles with computational approaches to interpret complex information phenomena in scientific and technical domains.

Evaluation: Critically assess theoretical models of information processing and their applicability to modern computing and data analysis within global scientific frameworks.

Core readings:

Hopcroft, John E., Motwani, Rajeev, & Ullman, Jeffrey D. Introduction to Automata Theory, Languages, and Computation (3rd Edition). Pearson, 2006.

Theory of Computation and Application: Automata, Formal Languages and Computational Complexity – Implementation through JFLAP Simulator (2nd Revised Edition) by S. R. Jena & S. K. Swain. University Science Press / Laxmi Publications, 2020

Kahre, Jan. The Mathematical Theory of Information. SECS 684. Netherlands: Springer Nature, 2012.

Burgin, Mark. Theory of Information : Fundamentality, Diversity and Unification. 1st ed. Hackensack, N.J: World Scientific, 2010.

Course number **TPOO3311**	Course name **Software testing and quality assurance**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: PhD Celal Ceken		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

Studies the basics of software testing, testing methods and technologies, quality control processes, as well as software quality assurance tools and methods.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental concepts of software testing, quality assurance (QA), and quality control (QC), including testing methodologies, test levels, and verification/validation principles.

- Comprehension: Explain the role of testing within the software development life cycle and how quality assurance contributes to reliable and maintainable software products.

- Application: Apply manual and automated testing methods to identify software defects, ensure functionality, and validate user requirements using modern tools and technologies.

- Analysis: Evaluate software performance and testing results, interpret metrics, and detect patterns that indicate potential quality or process issues.

- Synthesis: Design and document test cases, testing plans, and defect reports, integrating different testing techniques for comprehensive software evaluation.

- Evaluation: Critically assess software quality, select appropriate testing strategies, and provide recommendations for process improvement and risk mitigation in software projects.

Core readings:

Boni Garcia. Mastering Software Testing with JUnit 5. Packt Publishing, 2017.

Shetty, Rahul. Hands-On Automation Testing with Java for Beginners: Build Automation Testing Frameworks from Scratch with Java. 1st ed. Birmingham: Packt Publishing, Limited, 2018.

Crotts, Joshua. Learning Java: A Test-Driven Approach. 1st ed. Cham: Springer, 2024.

Pajankar, Ashwin. Python Unit Test Automation: Practical Techniques for Python Developers and Testers. 1st ed. edition. Berkeley, CA: Apress L. P, 2017.

Molina, Alessandro. Crafting Test-Driven Software with Python : Write Test Suites That Scale with Your Applications' Needs and Complexity, Using Python and Pytest. Birmingham, England ; Packt, 2021.

Course number **ATTP3311**	Course name **Software Requirements Analysis and Test**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (62 contact hrs in class +88 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Semenyuk Vladislav		Semester week hours: 4
Additional teacher involved: -		

Syllabus

Content Description

The purpose of mastering the discipline is to acquire knowledge and practical experience in the field of software requirements development and analysis. As a result of mastering the discipline, the student must know the techniques for formulating requirements, the basic principles and methods for identifying and documenting requirements in projects of certain classes using models of visual representation of requirements. The formation of skills and practical skills is aimed at methods of coordinating and verifying the validity of requirements, developing a concept document on software requirements and requirements specifications using visual models.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the principles, methods, and standards of software requirements engineering, including elicitation, specification, analysis, and documentation of functional and non-functional requirements.

Comprehension: Explain the importance of accurate requirements definition for software quality, project success, and stakeholder satisfaction, and describe the role of visual modeling in representing requirements.

Application: Apply practical techniques for identifying, formulating, and documenting requirements using structured templates and visual tools such as UML, BPMN, or use-case diagrams.

Analysis: Evaluate requirements for consistency, completeness, feasibility, and traceability; detect ambiguities or contradictions in requirement sets.

Synthesis: Develop a complete set of software requirements, including concept documents and detailed specifications, integrating textual descriptions with visual models.

Evaluation: Assess the validity and clarity of requirements through stakeholder review, verification, and validation procedures, ensuring alignment with project objectives and standards of software engineering.

Core readings:

Crotts, Joshua. Learning Java: A Test-Driven Approach. 1st ed. Cham: Springer, 2024.

Pajankar, Ashwin. Python Unit Test Automation: Practical Techniques for Python Developers and Testers. 1st ed. edition. Berkeley, CA: Apress L. P, 2017.

Molina, Alessandro. Crafting Test-Driven Software with Python : Write Test Suites That Scale with Your Applications' Needs and Complexity, Using Python and Pytest. Birmingham, England ; Packt, 2021.

Cohen, F. (2004). Java Testing and Design: From Unit Testing to Automated Web Tests. Prentice Hall PTR. ISBN 978-0131421899.

Okken, B. (2017). Python Testing with pytest: Simple, Rapid, Effective, and Scalable. Pragmatic Bookshelf. ISBN 9781680502404.

Course number **MTP3309**	Course name **Mobile Technologies and Applications**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Web-Programming	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 5
Additional teacher involved: Semenyuk Vladislav		

Syllabus

Content Description

The main architectures of mobile applications, platforms for mobile application development, principles of user interface design and algorithms, features of mobile application development and testing for various operating systems (Android, iOS, etc.), as well as issues of monetization and promotion of mobile applications. Students are also introduced to popular mobile application development tools such as Android Studio, Xcode, React Native, Flutter, etc.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the architecture, principles, and lifecycle of mobile application development across major platforms (Android, iOS, cross-platform frameworks), including interface design, usability, and performance optimization.

Comprehension: Explain the features and constraints of mobile platforms, their development environments (Android Studio, Xcode), and frameworks such as React Native and Flutter, emphasizing differences in system design and user experience.

Application: Design, prototype, and implement mobile applications using industry-standard tools and best practices in UI/UX, testing, and deployment.

Analysis: Evaluate mobile applications in terms of functionality, responsiveness, performance, and compliance with platform guidelines and accessibility standards.

Synthesis: Integrate front-end and back-end components, APIs, and databases to build complex mobile applications with effective interaction and data flow.

Evaluation: Critically assess applications for usability, scalability, and market readiness, applying methods of testing, optimization, monetization, and promotion within app marketplaces.

Core readings:

Sakhniuk, Mikhail, and Adam Boduch. React and React Native : Build Cross-Platform JavaScript and TypeScript Apps for the Web, Desktop, and Mobile. Fifth edition. Birmingham, England: Packt Publishing Ltd., 2024.

Bilgin, Can. Mobile Development with .NET : Build Cross-Platform Mobile Applications with Xamarin.Forms 5 and ASP.NET Core 5. Second edition. Birmingham ; Packt Publishing, 2021.

Späth, Peter, and Jeff Friesen. Learn Java for Android Development : Migrating Java SE Programming Skills to Mobile Development. 4th ed. 2020. Berkeley, CA: Apress, 2020.
Salter, Tamie. Technological and Business Fundamentals for Mobile App Development. 1st ed. 2022. Cham: Springer International Publishing, 2022.

Dakić, Maja. Mobile App Development for Businesses : Create a Product Roadmap and Digitize Your Operations. 1st ed. 2023. Berkeley, CA: Apress, 2023.

Course number **IMDD3309**	Course name **Information, Multimedia Design and the Moving Image**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Web-Programming	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 5
Additional teacher involved: Semenyuk Vladislav		

Syllabus

Content Description

The purpose of mastering the discipline is practical skills in creating an imaginative system that exists in analog and digital environments, to familiarize students with a variety of interactive technologies in graphic design, a variety of their applications and their correspondence with the concept of a design task and a design solution.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the principles of interactive and multimedia design, the relationship between analog and digital creative environments, and the foundations of user-centered visual communication.

- Comprehension: Explain how interactive technologies and design tools support creativity, audience engagement, and effective problem-solving in graphic design.

- Application: Create visual and interactive compositions using modern tools such as Adobe Creative Suite, Figma, Blender, or other digital platforms to express conceptual ideas.

- Analysis: Evaluate design solutions based on functionality, visual harmony, user experience, and technological feasibility.

- Synthesis: Combine analog and digital techniques to develop coherent imaginative systems that align artistic expression with design objectives.

- Evaluation: Critically assess design outcomes, justify creative decisions, and refine projects through iteration, feedback, and testing within both artistic and professional contexts.

Core readings:

Brown, N., & Perrett, J. (2020). Hybrid Practices in Moving Image Design: Methods of Heritage and Digital Production in Motion Graphics. London, UK: Routledge. ISBN 9780367878043.

Benedetti, C. (2019). Architectures of Illusion: From Motion Pictures to Navigable Interactive Environments. Amsterdam: Amsterdam University Press. ISBN 9789463727227.

Dodds, David. Hands-On Motion Graphics with Adobe after Effects CC: Develop Your Skills As a Visual Effects and Motion Graphics Artist. 1st edition. Birmingham: Packt Publishing, Limited, 2019

Brusca, Victor G. Advanced Unity Game Development: Build Professional Games with Unity, C#, and Visual Studio. 1st ed. Berkeley, CA: Apress, 2021.

Kelvin Sung, Gregory Smith. Basic Math for Game Development with Unity 3D: A Beginner's Guide to Mathematical Foundations. Second edition. Berkeley, CA: Apress, 2023.

Course number	Course name **Production Practice 2**	
Type of course **Production Practice**	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Production Practice 1	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 4 (0 contact hrs in class +120 hrs of self-study (together 120 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: -
Additional teacher involved: Semenyuk Vladislav		

Syllabus

Content Description

Formation of practical professional skills in students, acquisition of initial practical experience in the main types of professional activity for their subsequent acquisition of general and professional competencies in their chosen specialty.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the structure, stages, and real-world processes of software development within a professional environment, including project planning, teamwork, and quality standards.

- Comprehension: Explain the roles and responsibilities of specialists in software development teams, as well as how theoretical knowledge from coursework is applied to practical engineering tasks.

- Application: Apply programming, testing, and software design skills to real projects under the guidance of industry mentors or supervisors, following professional workflows and documentation standards.

- Analysis: Evaluate technical and organizational challenges encountered during the development process, propose solutions, and assess the effectiveness of implemented approaches.

- Synthesis: Integrate acquired knowledge and practical experience to participate in the full software development lifecycle — from requirements analysis and design to implementation, testing, and deployment.

- Evaluation: Reflect on personal performance, teamwork, and professional communication skills, assessing progress toward mastering general and professional competencies in the field of software engineering.

Core readings:

Sakhniuk, Mikhail, and Adam Boduch. React and React Native : Build Cross-Platform JavaScript and TypeScript Apps for the Web, Desktop, and Mobile. Fifth edition. Birmingham, England: Packt Publishing Ltd., 2024.

Molina, Alessandro. Crafting Test-Driven Software with Python : Write Test Suites That Scale with Your Applications' Needs and Complexity, Using Python and Pytest. Birmingham, England ; Packt, 2021.

Lott, Steven F, and Dusty Phillips. Python Object-Oriented Programming: Build Robust and Maintainable Object-Oriented Python Applications and Libraries. Fourth edition. Birmingham: Packt Publishing, 2021.

Hardin, Therese et al. Concepts and Semantics of Programming Languages 2: Modular and Object-Oriented Constructs with OCaml, Python, C++, Ada and Java. 1st ed. Newark: John Wiley & Sons, Incorporated, 2021.

Bampakos, Aristeidis, and Pablo Deeleman. Learning Angular: A No-Nonsense Guide to Building Web Applications with Angular 15. 4th ed. Birmingham: Packt Publishing, Limited, 2023.

Straccia, Alessandro. Interactive Web Development with Three. Js and A-Frame: Create Captivating Visualizations and Projects in Immersive Creative Technology for 3D, WebAR, and WebVR Using Three. Js and a-Frame (English Edition). 1st ed. Delhi: Orange Education PVT Ltd, 2024.

Course number **ECM3302**	Course name **Ethics in a Digital World**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: PHD Volodymyr Lysenko		Semester week hours: 5
Additional teacher involved: Sara Young		

Syllabus

Content Description

This course explores the social, legal, and cultural fallout from the exponential explosion in communication, storage, and increasing uses of data and data production. In this class, we emphasize the opposing potentials of information technologies to make knowledge widely available and to distort and restrict our perceptions. In a world of rapid technological change, topics include (but are not limited to): eavesdropping and secret communications, privacy; Internet censorship and filtering, cyberwarfare, computer ethics and ethical behavior, copyright protection and peer-to-peer networks, broadcast and telecommunications regulation, including net neutrality, data leakage, and the power and control of search engines.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the key social, legal, ethical, and cultural issues surrounding data production, digital communication, and information technologies in a global context.

- Comprehension: Explain the dual nature of modern information systems — their capacity to democratize knowledge and their potential to manipulate, censor, or distort information.

- Application: Analyze real-world cases involving privacy, surveillance, intellectual property, and digital rights to apply ethical and legal frameworks to contemporary information challenges.

- Analysis: Critically evaluate the implications of emerging technologies such as data mining, cyberwarfare, and algorithmic bias on society, governance, and individual freedom.

- Synthesis: Integrate interdisciplinary perspectives from law, ethics, communication, and computer science to formulate informed approaches to responsible digital citizenship and policy-making.

- Evaluation: Assess current debates and policies related to information control, net neutrality, and online privacy, demonstrating the ability to reason ethically and make balanced judgments in complex digital environments.

Core readings:

Mattson, Kristen. Ethics in a Digital World : Guiding Students through Society's Biggest Questions. First edition. Portland, OR: International Society for Technology in Education, 2021.

Kéfi, Hajer, ed. Information Technology Ethics : Concepts and Practices in the Digital World. 1st ed. Newcastle upon Tyne, England: Cambridge Scholars Publishing, 2015.

Ess, C. (2018). Humanity on the Net: Ethics in the Digital World. London, UK: Bloomsbury Academic. ISBN 9781474236737.

Goetsch, D. L. (2023). The Operational Excellence Library: Mastering Business Ethics in a Digital World. New York, NY: Routledge. ISBN 9781032573921.

Course number **IADO3303**	Course name **Data Mining and Discovery**	
Type of course Professional discipline	Semester 2027/2028 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Nicholas DiReienzo		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

This course introduces students to the theory and practice of data mining for knowledge discovery. This includes methods developed in the fields of statistics, large-scale data analytics, machine learning, and artificial intelligence for automatic or semi-automatic analysis of large quantities of data to extract previously unknown and interesting patterns. Topics include understanding varieties of data, classification, association rule analysis, cluster analysis, and anomaly detection. We will use software packages for data mining, explaining the underlying algorithms and their use and limitations. The course will include laboratory exercises, with data mining case studies using data from biological sequences and networks, social networks, linguistics, ecology, geo-spatial applications, marketing and psychology.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental concepts, techniques, and terminology of data mining and knowledge discovery, including classification, clustering, association analysis, and anomaly detection.

Comprehension: Explain the theoretical foundations of major data mining algorithms and their connections to statistics, machine learning, and artificial intelligence.

Application: Apply data mining tools and software packages to analyze real-world datasets from various domains such as biology, social networks, linguistics, ecology, marketing, and psychology.

Analysis: Evaluate the quality, structure, and patterns within large and complex datasets; interpret results to derive meaningful insights and actionable knowledge.

Synthesis: Integrate multiple data mining techniques and preprocessing methods to design effective analytical workflows and solve domain-specific problems.

Evaluation: Critically assess algorithm performance, model interpretability, and ethical implications of data mining applications, demonstrating awareness of the limitations, biases, and responsibilities in knowledge discovery.

Core readings:

Rokach, Lior, Oded Maimon, and Erez Shmueli. Machine Learning for Data Science Handbook : Data Mining and Knowledge Discovery Handbook. 3rd ed. 2023. Cham: Springer International Publishing, 2023.

Maimon, O., & Rokach, L. (Eds.). (2008). Data Mining and Knowledge Discovery Handbook (3rd ed.). Cham, Switzerland: Springer. ISBN 9783030623738.

Theobald, O. (2021). Machine Learning for Absolute Beginners: A Plain English Introduction (3rd ed.). London, UK: Scatterplot Press. ISBN 9781078051879.

Garreta, Raúl et al. Scikit-Learn : Machine Learning Simplified. 1st edition. Birmingham, UK: Packt Publishing, 2017.

Liu, Yuxi. Python Machine Learning by Example : Build Intelligent Systems Using Python, Tensorflow 2, Pytorch, and Scikit-Learn. Third edition. Birmingham, England ; Packt Publishing, Limited, 2020.

Saragih, Jason. Mastering OpenCV 3: Get Hands-on with Practical Computer Vision Using OpenCV 3. Birmingham, UK: Packt Publishing Limited, 2025.

7-th Semester

Fall Term 2028/2029

Course number **SII4304**	Course name **Artificial Intelligence Systems**	
Type of course Professional discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Data Mining and Discovery	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Rich Thompson		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

A discipline that studies the philosophical aspects of the SII problem, the history of SII development, SII modeling issues, intelligent management, expert system as a type of SII, ES development methodology, knowledge representation models, decision inference and communication models in SII, fuzzy sets, fuzzy relationships, fuzzy statements and fuzzy models of systems, logical and linguistic description of systems, introduction to neural networks.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the philosophical foundations, historical development, and conceptual framework of artificial intelligence systems (SII), including the evolution of expert systems and intelligent management paradigms.

Comprehension: Explain the principles of knowledge representation, decision inference, and communication within intelligent systems, as well as the role of fuzzy logic and neural networks in modeling uncertainty and human reasoning.

Application: Apply theoretical and methodological approaches to the design, modeling, and simulation of simple intelligent systems, utilizing tools of fuzzy modeling and elements of machine learning.

Analysis: Critically evaluate various models of intelligent behavior, reasoning mechanisms, and system architectures, identifying their strengths, limitations, and fields of application.

Synthesis: Integrate knowledge of expert systems, fuzzy logic, and neural networks to conceptualize hybrid intelligent systems capable of adaptive decision-making and linguistic reasoning.

Evaluation: Assess the effectiveness, reliability, and ethical implications of intelligent systems, reflecting on their impact on human cognition, technological progress, and societal development.

Core readings:

Mabrouki, Jamal, Azrour Maroude, and Azeem Irshad, eds. Artificial Intelligence Systems in Environmental Engineering. First edition. Boca Raton, FL: CRC Press, 2024.

Reis, João, Marlene Amorim, and Yuval Cohen. Smart Services: Artificial Intelligence in Service Systems. Basel: MDPI - Multidisciplinary Digital Publishing Institute, 2023.

Narayan, Sanath Raj B, and Nitin Agarwal. Mastering LangChain: A Comprehensive Guide to Building Generative AI Applications. 1st ed. Berkeley, CA: Apress L. P, 2025.

Jay, Rabi. Generative AI Apps with LangChain and Python : A Project-Based Approach to Building Real-World LLM Apps. 1st ed. 2024. Berkeley, CA: Apress, 2024.

Ifrah, Shimon. Getting Started with Azure OpenAI: Deploying and Managing Azure AI and Azure OpenAI Solutions. First Edition edition. Berkeley, CA: Apress L. P, 2024.

Course number **CA4307**	Course name **Computing and the Arts**	
Type of course Professional discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: David Sherman		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

This course examines the ways in which computing and information science support and facilitate the production and creation of art in current society. A particular focus of the course will be to discuss how artists have used advances in technology and computing capacity to explore new ways of making art, and to investigate the relationships between technical innovation and the artistic process.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the key concepts at the intersection of computing, information science, and the arts, including the role of digital tools, algorithms, and data in contemporary creative practice.

- Comprehension: Explain how technological innovations—such as digital imaging, generative algorithms, virtual and augmented reality, and interactive systems—transform artistic methods and aesthetics.

- Application: Use digital and computational tools to create artistic works that integrate visual, auditory, or interactive components, demonstrating technical proficiency and creative intent.

- Analysis: Evaluate the influence of computing technologies on artistic expression, authorship, and audience engagement, identifying emerging trends in digital art and media.

- Synthesis: Combine artistic creativity with computational techniques to design and implement original digital artworks or interactive installations.

- Evaluation: Critically assess the cultural, ethical, and conceptual implications of technology-driven art, reflecting on the evolving relationship between human creativity and machine-assisted production.

Core readings:

Lechner, Patrik. Multimedia Programming Using Max/Msp and Touchdesigner. 1st ed. Birmingham: Packt Publishing, Limited, 2014.

Arslan, Engin. Learn JavaScript with P5.Js : Coding for Visual Learners. 1st ed. 2018. Berkeley, CA: Apress, 2018.

Funk, Mathias, and Yu Zhang. Coding Art: A Guide to Unlocking Your Creativity with the Processing Language and P5.Js in Four Simple Steps, 2nd Edition. 2nd Edition. Place of publication not identified: Apress, 2024.

Meier, Burkhard. “Creating Amazing 3D GUIs with PyOpenGL and PyGLet.” Python GUI Programming Cookbook, Second Edition. United Kingdom: Packt Publishing, Limited, 2017.

Course number **CV4306**	Course name Digital Engagement	
Type of course Professional discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Emily Thomas		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

This course is designed to be a culminating experience for the eSociety degree program, a course that engages students in practical activity as well as prepares learners for contemporary work. eSociety major and minor students as well as other undergraduates preparing for work relating to digital information or related fields can enroll in and will benefit from this course. Students will be given opportunities to discuss, review and reflect on their learning in their undergraduate work relative to an eSociety and will be provided the mechanisms through which their coursework can be applied to `real-world' contexts (e.g., internships, interviews with leaders in their area of study, professional shadowing experiences, service learning projects, or community-based event planning). Ultimately, this course provides students the opportunity to learn about what it means to be prepared in an eSociety as well as reflect on their own skill sets and the professional preparation needed for career satisfaction and success.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the structure and dynamics of contemporary digital society, including how information, communication, and technology shape professional practices and career pathways in the digital era.

- Comprehension: Explain the relationship between academic learning and professional application, connecting theoretical knowledge from the eSociety program to practical experiences in the workplace and community.

- Application: Demonstrate the ability to apply digital, analytical, and communication skills in real-world contexts through internships, service learning projects, or professional collaborations.

- **Analysis:** Critically evaluate one's personal competencies, professional goals, and the skills required to succeed in technology-driven and information-centered environments.

- **Synthesis:** Integrate interdisciplinary knowledge and practical experiences to design and implement community-based or professional projects reflecting eSociety values and objectives.
- **Evaluation:** Reflect on individual growth and readiness for professional life, assessing strengths and areas for improvement while formulating strategies for continued development, ethical engagement, and career success in a digital society.

Core readings:

Staiano, Fabio. Designing and Prototyping Interfaces with Figma : Learn Essential UX/UI Design Principles by Creating Interactive Prototypes for Mobile, Tablet, and Desktop. 1st ed. Birmingham: Packt Publishing, 2022.

Labrecque, Joseph. ADOBE CREATIVE CLOUD CLASSROOM IN A BOOK : The Official Training Workbook from Adobe. Place of publication not identified: ADOBE PRESS, 2023.

Nhan, Jayven. Mastering ARKit: Apple's Augmented Reality App Development Platform. Second Edition. Berkeley, CA: Apress L. P, 2024.

Dirksen, Jos. Hajimete no Three.js : WebGL no tame no JavaScript 3D raiburari. Trans. by Yasushi Andō. Shohan. Tōkyō-to Shinjuku-ku: Orairī Japan, 2016.

Course number **KM4305**	Course name Quantitative Methods	
Type of course Professional discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Christopher Forsythe		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

This course will explore broad research paradigms and theoretical approaches that inform contemporary social research, varying study designs, as well as the systematic methods utilized in differing types of data analyses. Though this course will introduce research processes across the academic spectrum, quantitative analysis of both small and large data sets will be emphasized. Therefore, students will learn about basic statistical analyses and will be introduced to the emerging worlds of data science and social media analytics. Students will also consider related topics such as data visualization or research presentations.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental paradigms, theoretical frameworks, and methodological approaches that guide contemporary social research, with an emphasis on quantitative analysis and data-driven inquiry.

Comprehension: Explain the principles of research design, sampling, measurement, and data interpretation across various social science contexts, recognizing the differences between qualitative and quantitative methods.

Application: Apply statistical techniques to analyze small and large datasets, using software tools for data management, visualization, and interpretation within social research projects.

Analysis: Evaluate the quality, reliability, and validity of research data, identifying biases, limitations, and ethical considerations in data collection and analysis.

Synthesis: Integrate knowledge from social science theory and data science to design original research studies or data analytics projects, including the presentation of findings through visual and narrative formats.

Evaluation: Critically assess contemporary trends in data science and social media analytics, reflecting on their implications for understanding human behavior, communication, and social dynamics in the digital age.

Core readings:

Danial, Albert. Python for MATLAB Development - Extend MATLAB with 300,000+ Modules from the Python Package Index. 1st ed. Berkeley, CA: Apress, an imprint of Springer Nature, 2022.

Lesmeister, Cory. Mastering Machine Learning with R : Master Machine Learning Techniques with R to Deliver Insights for Complex Projects. Birmingham: Packt Publishing, 2015.

Zumel, Nina, and John Mount. Practical Data Science with R. Second edition. Shelter Island, New York: Manning, 2020.

Pajankar, Ashwin. Hands-on Matplotlib : Learn Plotting and Visualizations with Python 3. New York, New York: Apress Media LLC, 2022.

Nelli, Fabio. Python Data Analytics - With Pandas, NumPy, and Matplotlib (3rd Edition). Third edition. Berkeley, CA: Apress, an imprint of Springer Nature, 2023.

Course number **UIS4220**	Course name Senior Capstone	
Type of course Basic discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Michael McKisson		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The purpose of studying the discipline is the formation of a comprehensive view and systematized knowledge about the essence and content of projects; the acquisition of skills to manage a project at all stages of its life cycle; the ability to make informed organizational and managerial decisions, assess their operational and organizational effectiveness, social significance, ensure their implementation in a complex (including cross-cultural) and a dynamic environment.

Learning goals and qualifications in this module students learn to (national or international):

- **Knowledge:** Understand the fundamental concepts, principles, and methodologies of project management, including the structure, objectives, and stages of a project's life cycle.
- **Comprehension:** Explain the interconnections between project planning, execution, control, and evaluation, as well as the social, cultural, and organizational contexts that influence project success.
- **Application:** Apply modern project management tools and techniques to plan, organize, and monitor projects, ensuring efficiency, risk mitigation, and goal achievement in dynamic environments.
- **Analysis:** Evaluate project performance based on operational, financial, and social criteria, identifying challenges, dependencies, and opportunities for optimization.
- **Synthesis:** Develop comprehensive project plans and management strategies that integrate organizational decision-making, stakeholder communication, and cross-cultural collaboration.
- **Evaluation:** Assess the effectiveness and sustainability of managerial decisions, reflecting on their broader social significance and ethical impact in complex and changing project environments.

Core readings:

Saragih, Jason. Mastering OpenCV 3: Get Hands-on with Practical Computer Vision Using OpenCV 3. Birmingham, UK: Packt Publishing Limited, 2025.

Howse, Joseph. OpenCV for Secret Agents: Use OpenCV in Six Secret Projects to Augment Your Home, Car, Phone, Eyesight, and Any Photo or Drawing. Birmingham, UK: Packt Publishing Limited

Bansal, Jagdish Chand et al. Advances in Data-Driven Computing and Intelligent Systems : Selected Papers from ADCIS 2024, Volume 1. 1st ed. 2025. Singapore: Springer Nature Singapore, 2025.

Deka, Partha Pritam, Joyce Weiner, and Prof. Roberto V Zicari. XGBoost for Regression Predictive Modeling and Time Series Analysis : Learn How to Build, Evaluate, and Deploy Predictive Models with Expert Guidance. 1st ed. Birmingham: Packt Publishing, Limited, 2024.

Course number **UPPO4220**	Course name Software Project Management	
Type of course Basic discipline	Semester 2028/2029 Fall Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Michael McKisson		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The purpose of studying the discipline is the formation of a comprehensive view and systematized knowledge about the essence and content of projects; the acquisition of skills to manage a project at all stages of its life cycle; the ability to make informed organizational and managerial decisions, assess their operational and organizational effectiveness, social significance, ensure their implementation in a complex (including cross-cultural) and a dynamic environment.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the fundamental concepts, classifications, and methodologies of project management, including the essence, structure, and content of projects across different domains.

Comprehension: Explain the principles and interrelations of project planning, organization, implementation, and control, as well as the factors influencing success throughout the project life cycle.

Application: Apply modern project management tools and techniques to design, manage, and monitor projects, ensuring effective use of resources, timely delivery, and alignment with strategic goals.

Analysis: Evaluate project performance by analyzing operational efficiency, organizational effectiveness, and social impact in both stable and dynamic environments.

Synthesis: Integrate knowledge of management, communication, and decision-making to develop coherent and adaptive project strategies suited to complex and cross-cultural contexts.

Evaluation: Assess the quality and sustainability of managerial decisions, reflect on their long-term outcomes, and ensure ethical, socially significant, and result-oriented project implementation.

Core readings:

Lathkar, Malhar. Modern Django Web Development : With Channels, DRF, GraphQL, and React. 1st ed. 2025. Berkeley, CA: Apress, 2025

Freeman, Adam. Mastering Node. Js Web Development : Go on a Comprehensive Journey from the Fundamentals to Advanced Web Development with Node. Js. First edition. Birmingham, England: Packt Publishing, 2024.

Jain, Drishti. Ultimate Laravel for Modern Web Development : Build Robust and Interactive Enterprise-Grade Web Apps Using Laravel's MVC, Authentication, APIs, and Cloud Deployment (English Edition). First edition. Delhi: Orange Education Pvt Ltd, 2024.

Howse, Joseph. OpenCV for Secret Agents: Use OpenCV in Six Secret Projects to Augment Your Home, Car, Phone, Eyesight, and Any Photo or Drawing. Birmingham, UK: Packt Publishing Limited

Bansal, Jagdish Chand et al. Advances in Data-Driven Computing and Intelligent Systems : Selected Papers from ADCIS 2024, Volume 1. 1st ed. 2025. Singapore: Springer Nature Singapore, 2025.

8-th Semester

Spring Term 2028/2029

Course number **NIOI4313**	Course name Scientific research in information technologies	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Senior Capstone Software Project Management	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The discipline explores the main stages and methodologies of scientific research in the field of information technologies. It focuses on forming students' competencies in identifying relevant research problems, formulating hypotheses, designing experiments, and applying modern methods of data collection and analysis. The course introduces students to research paradigms and projects in areas such as artificial intelligence, data science, software engineering, cybersecurity, and human–computer interaction. Particular attention is paid to the development of research proposals, academic writing, and presentation of results according to international scientific standards. Through practical assignments and case studies, students gain experience in planning, conducting, and evaluating IT research projects that contribute to technological innovation and the advancement of digital society.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental concepts, stages, and methodologies of scientific research in information technologies, including research design, data collection, hypothesis testing, and result interpretation.

- Comprehension: Explain the principles and ethical standards of conducting IT research, recognizing the relevance of different research paradigms across domains such as AI, data science, software engineering, and cybersecurity.

- Application: Apply modern research methods, analytical tools, and software environments to develop and implement research projects in information technology.

- Analysis: Critically analyze scientific literature, research problems, and experimental data, identifying gaps, methodological limitations, and opportunities for innovation.

- Synthesis: Integrate interdisciplinary approaches and emerging technologies to design original research proposals, models, or systems that address complex IT challenges.

- **Evaluation:** Assess the quality, reliability, and societal impact of research outcomes, demonstrating the ability to communicate findings through scientific papers, presentations, and professional discussions in accordance with international standards.

Core readings:

Baykoucheva, Svetla. Managing Scientific Information and Research Data. Waltham, MA: Chandos Publishing, 2015.

Chavan, Pallavi, ed. Data Science : Techniques and Intelligent Applications. First edition. Boca Raton, FL ; CRC Press, 2023.

Memon, Qurban A., and Shakeel Ahmed Khoja, eds. Data Science : Theory, Analysis, and Applications. 1st ed. Boca Raton: CRC Press, 2020.

Testas, Abdelaziz. Distributed Machine Learning with PySpark: Migrating Effortlessly from Pandas and Scikit-Learn. 1st ed. Berkeley, CA: Apress, 2023.

Course number **KMDC4313**	Course name Quantitative Methods for the Digital Marketplace	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Quantitative Methods Senior Capstone	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

The purpose of the discipline is to develop students' theoretical knowledge and practical skills necessary for organizing and conducting marketing research and situational analysis of the digital market.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the theoretical foundations, principles, and methodologies of marketing research, with a particular focus on the specifics of the digital market and consumer behavior in online environments.

Comprehension: Explain the processes of data-driven decision-making, market segmentation, and positioning in digital ecosystems, as well as the role of analytics and emerging technologies in marketing strategy.

Application: Apply quantitative and qualitative research methods, digital tools, and data analytics platforms to collect, process, and interpret market information for practical marketing tasks.

Analysis: Evaluate market trends, customer needs, and competitive environments using situational analysis and digital marketing metrics to identify opportunities and threats.

Synthesis: Integrate marketing research findings into the development of strategic recommendations, campaign planning, and optimization of digital marketing initiatives.

Evaluation: Critically assess the reliability, validity, and effectiveness of marketing research and analytical conclusions, demonstrating the ability to make evidence-based managerial decisions in a dynamic digital environment.

Core readings:

Tanaka-Yamawaki, Mieko, and Yumihiko Ikura. Principal Component Analysis and Randomness Test for Big Data Analysis : Practical Applications of RMT-Based Technique. 1st ed. 2023. Singapore: Springer Nature Singapore, 2023.

Serrano, Martín. Concepts and Design Innovations Addressing the Digital Transformation of Data Spaces and Marketplaces: I3-MARKET Book Series - Part I: A Vision to the Future of Data-Driven Economy. Ed. by Achille Zappa et al. 1. Taylor & Francis, 2024.

Munshi, Usha Mujoo., and Neeta. Verma, eds. Data Science Landscape : Towards Research Standards and Protocols. 1st ed. 2018. Singapore: Springer Singapore, 2018.

Klosterman, Stephen. Data Science Projects with Python: A Case Study Approach to Successful Data Science Projects Using Python, Pandas, and Scikit-Learn. 1st ed. Birmingham: Packt Publishing, Limited, 2019.

Walker, Michael. Python Data Cleaning Cookbook : Prepare Your Data for Analysis with Pandas, NumPy, Matplotlib, Scikit-Learn and OpenAI. Second edition. Birmingham, UK: Packt Publishing Ltd., 2024.

Course number **IIS4314**	Course name Intelligent information systems	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Artificial Intelligence Systems	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor:		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

A discipline that studies the basics of intellectualization of information systems for various purposes, problematic areas of artificial intelligence, models of data and knowledge representation, classification of intelligent systems, methods for eliminating uncertainty in the representation of knowledge, their generalization and classification, problems of computer logic and linguistics, intellectualization of applied procedures in the subject area (search, management and control), methodological aspects of construction expert systems.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the fundamental concepts and principles of intelligent information systems, including the structure, functions, and models used in artificial intelligence for data and knowledge representation.

- Comprehension: Explain the main problem areas of artificial intelligence such as reasoning, learning, uncertainty elimination, and natural language processing, as well as their applications in intelligent system design.

- Application: Apply methods of data modeling, knowledge representation, and decision-making to the development and enhancement of intelligent information systems for practical domains such as search, management, and control.

- Analysis: Evaluate different approaches to knowledge formalization, classification, and generalization, identifying sources of uncertainty and methods for improving system reliability and adaptability.

- Synthesis: Integrate computer logic, linguistics, and expert system methodologies to design intelligent components capable of automated reasoning and problem-solving in applied contexts.

- Evaluation: Assess the effectiveness, accuracy, and scalability of intelligent information systems and expert models, reflecting on their methodological, ethical, and practical implications in modern computational environments.

Core readings:

Mikhailovich Koleshko, Vladimir. Intelligent Systems. Ed. by Vladimir M Koleshko. Rijeka, Croatia: IntechOpen, 2012.

Cwik, Cynthia H et al. Artificial Intelligence : Legal Issues, Policy, and Practical Strategies. Ed. by Cynthia H. Cwik, Christopher Suarez, and Lucy L. Thomson. Chicago, Illinois: American Bar Association, Science & Technology Law Section, 2024.

Alto, Valentina. Building LLM Powered Applications : Create Intelligent Apps and Agents with Large Language Models. First edition. Birmingham, England: Packt Publishing Ltd., 2024.

Huang, Ken. LLM Design Patterns : A Practical Guide to Building Robust and Efficient AI Systems. 1st ed. Birmingham: Packt Publishing, Limited, 2025.

Iusztin, Paul, and Maxime Labonne. LLM Engineer's Handbook : Master the Art of Engineering Large Language Models from Concept to Production. First edition. Birmingham, England: Packt Publishing, 2024.

Course number **NS4314**	Course name Neural Networks	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Artificial Intelligence Systems	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Greg Chism		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

Neural networks are a branch of machine learning that combines a large number of simple computational units to allow computers to learn from and generalize over complex patterns in data. Students in this course will learn how to train and optimize feed forward, convolutional, and recurrent neural networks for tasks such as text classification, image recognition, and game playing.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the theoretical foundations of neural networks, including their structure, mathematical principles, and the relationship between biological and artificial learning models.

Comprehension: Explain the architecture and functioning of major neural network types — feedforward, convolutional, and recurrent — and their applications in various domains such as natural language processing, computer vision, and reinforcement learning.

Application: Implement, train, and optimize neural network models using modern machine learning frameworks to solve practical tasks like image recognition, text classification, and game simulation.

Analysis: Evaluate model performance, interpret training results, and identify issues such as overfitting, underfitting, and vanishing gradients using appropriate diagnostic techniques.

Synthesis: Combine different neural network architectures and optimization methods to design hybrid or task-specific models capable of handling complex real-world data.

Evaluation: Critically assess the accuracy, efficiency, and ethical implications of neural network applications, demonstrating the ability to improve model design and align it with responsible AI principles.

Core readings:

Srinivasa Rao, Arni S. R, Venugopal Govindaraju, and C. Radhakrishna Rao. Deep Learning. Amsterdam, Netherlands: Elsevier, 2023.

Adam Gibson, Josh Patterson. Deep Learning. O'Reilly Media, Inc., 2024.

Koonce, Brett. Convolutional Neural Networks with Swift for Tensorflow: Image Recognition and Dataset Categorization. 1st ed. Berkeley, CA: Apress, 2021.

Bhalley, Rahul. Deep Learning with Swift for TensorFlow : Differentiable Programming with Swift. 1st ed. 2021. Place of publication not identified: Apress, 2021.

Baranwal, Ajay, Alizishaan Khatri, and Tanish Baranwal. What's New in TensorFlow 2.0 : Use the New and Improved Features of Tensorflow to Enhance Machine Learning and Deep Learning. 1st edition. Birmingham ; Packt Publishing, 2019.

Babcock, Joseph, and Raghav Bali. Generative AI with Python and TensorFlow 2: Create Images, Text, and Music with VAEs, GANs, LSTMs, Transformer Models. 1st ed. Birmingham: Packt Publishing, 2021.

Course number **IB4216**	Course name Information Security	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 6 (77 contact hrs in class +103 hrs of self-study (together 180 hrs)
Module coordinator Senior Instructor: Greg Chism		Semester week hours: 5
Additional teacher involved: -		

Syllabus

Content Description

Studies the conceptual model of information security, review and comparative analysis of information security standards, research of the causes of security violations, the concept of security policy, models of secure subject interaction in a computer system, coupling of protective mechanisms, creation of security mechanisms in a distributed computer system, modern means of building secure virtual networks, methods of unauthorized access to information.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the conceptual model of information security, its principles, objectives, and the structure of modern security standards and frameworks.

- Comprehension: Explain the causes and types of information security violations, the concept of security policy, and models of secure interaction between subjects within computer and distributed systems.

- Application: Apply protective mechanisms and technologies to ensure confidentiality, integrity, and availability of information in both local and virtual network environments.

- Analysis: Conduct comparative analysis of security standards and evaluate system vulnerabilities, identifying risks and methods of unauthorized access to information.

- Synthesis: Design and integrate security policies, authentication models, and access control mechanisms within distributed and cloud-based systems.

- Evaluation: Assess the effectiveness and reliability of implemented information security systems, ensuring compliance with modern standards and ethical principles of cybersecurity.

Core readings:

Lincke, Susan. Information Security Planning : A Practical Approach. 2nd ed. 2024. Cham: Springer International Publishing, 2024.

Scarioni, Carlo, and Massimo Nardone. Pro Spring Security: Securing Spring Framework 5 and Boot 2-Based Java Applications. 2nd ed. Berkeley, CA: Apress L. P, 2019.

Nardone, Massimo, and Carlo Scarioni. Pro Spring Security: Securing Spring Framework 6 and Boot 3-Based Java Applications, 3rd Edition. 3rd Edition. Place of publication not identified: Apress, 2024.

Gutierrez, Felipe. Pro Spring Boot 3: An Authoritative Guide with Best Practices. 3rd ed. Berkeley, CA: Apress L. P, 2024

Springer, Sebastian. Node.Js : The Comprehensive Guide. 1st edition. Boston. MA: Rheinwerk Publishing, 2022.

Course number	Course name Production Practice 3	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Production practice 2	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (0 contact hrs in class +150 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: -
Additional teacher involved: -		

Syllabus

Content Description

Formation of practical professional skills in students, acquisition of initial practical experience in the main types of professional activity for their subsequent acquisition of general and professional competencies in their chosen specialty.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the structure, objectives, and professional standards of work in the chosen specialty, including the roles, functions, and ethical principles of professional activity in the field of information technologies.

Comprehension: Explain how theoretical knowledge acquired during academic training is applied in real-world professional contexts, connecting academic learning with workplace practices.

Application: Perform practical tasks in real or simulated professional environments, demonstrating proficiency in technical tools, documentation, and communication relevant to the chosen specialty.

Analysis: Evaluate work processes, identify challenges and areas for improvement, and apply problem-solving strategies to enhance efficiency and quality of professional outcomes.

Synthesis: Integrate general and specialized competencies to plan, execute, and manage professional tasks or small-scale projects independently and as part of a team.

Evaluation: Reflect on personal performance, professional development, and acquired competencies, assessing readiness for further career growth and continuous learning within the chosen discipline.

Core readings:

Cwik, Cynthia H et al. Artificial Intelligence : Legal Issues, Policy, and Practical Strategies. Ed. by Cynthia H. Cwik, Christopher Suarez, and Lucy L. Thomson. Chicago, Illinois: American Bar Association, Science & Technology Law Section, 2024.

Nardone, Massimo, and Carlo Scarioni. Pro Spring Security: Securing Spring Framework 6 and Boot 3-Based Java Applications, 3rd Edition. 3rd Edition. Place of publication not identified: Apress, 2024.

Alto, Valentina. Building LLM Powered Applications : Create Intelligent Apps and Agents with Large Language Models. First edition. Birmingham, England: Packt Publishing Ltd., 2024.

Klosterman, Stephen. Data Science Projects with Python: A Case Study Approach to Successful Data Science Projects Using Python, Pandas, and Scikit-Learn. 1st ed. Birmingham: Packt Publishing, Limited, 2019.

Howse, Joseph. OpenCV for Secret Agents: Use OpenCV in Six Secret Projects to Augment Your Home, Car, Phone, Eyesight, and Any Photo or Drawing. Birmingham, UK: Packt Publishing Limited

Bansal, Jagdish Chand et al. Advances in Data-Driven Computing and Intelligent Systems : Selected Papers from ADCIS 2024, Volume 1. 1st ed. 2025. Singapore: Springer Nature Singapore, 2025.

Course number	Course name Pre-Diploma Practice	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance Production Practice 3	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 5 (0 contact hrs in class +150 hrs of self-study (together 150 hrs)
Module coordinator Senior Instructor: Kim Gulnar		Semester week hours: -
Additional teacher involved: PhD Celal Ceken		

Syllabus

Content Description

This practice immerses students in a professional information systems environment to develop the practical skills needed to plan, design, and defend their diploma (capstone) thesis. Under the guidance of an academic or industry mentor, students define a research problem relevant to information systems, gather and analyze organizational or technical data, and prepare thesis components such as system requirements, architecture models, and prototype evaluations. The practice emphasizes professional and ethical standards in data management, software documentation, and project reporting. Students also build presentation and defense skills by preparing a structured technical report, visualization materials, and a defense-ready slide deck. The outcome is a comprehensive thesis package that demonstrates the student's readiness to design, analyze, and present an information system solution aligned with real-world needs.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the principles of conducting applied research and development within the field of information systems, including project planning, data modeling, system design, and evaluation.

Comprehension: Explain how theoretical concepts of information systems, databases, and software engineering are applied in professional contexts to solve organizational and technological problems.

Application: Apply research and development methods to design, implement, and test components of an information system, using real or simulated data within a supervised project environment.

Analysis: Evaluate the efficiency, functionality, and scalability of proposed information system solutions, identifying areas for optimization and innovation.

Synthesis: Integrate knowledge of system architecture, data analytics, and user requirements to produce a coherent and defendable diploma project that meets professional and academic standards.

Evaluation: Critically assess project outcomes, demonstrate ethical and methodological rigor in data handling and reporting, and effectively present and justify technical and design decisions during the thesis defense.

Core readings:

Cwik, Cynthia H et al. Artificial Intelligence : Legal Issues, Policy, and Practical Strategies. Ed. by Cynthia H. Cwik, Christopher Suarez, and Lucy L. Thomson. Chicago, Illinois: American Bar Association, Science & Technology Law Section, 2024.

Nardone, Massimo, and Carlo Scarioni. Pro Spring Security: Securing Spring Framework 6 and Boot 3-Based Java Applications, 3rd Edition. 3rd Edition. Place of publication not identified: Apress, 2024.

Alto, Valentina. Building LLM Powered Applications : Create Intelligent Apps and Agents with Large Language Models. First edition. Birmingham, England: Packt Publishing Ltd., 2024.

Klosterman, Stephen. Data Science Projects with Python: A Case Study Approach to Successful Data Science Projects Using Python, Pandas, and Scikit-Learn. 1st ed. Birmingham: Packt Publishing, Limited, 2019.

Howse, Joseph. OpenCV for Secret Agents: Use OpenCV in Six Secret Projects to Augment Your Home, Car, Phone, Eyesight, and Any Photo or Drawing. Birmingham, UK: Packt Publishing Limited

Bansal, Jagdish Chand et al. Advances in Data-Driven Computing and Intelligent Systems : Selected Papers from ADCIS 2024, Volume 1. 1st ed. 2025. Singapore: Springer Nature Singapore, 2025.

Course number	Course name Final Presentation of Writing and Defending a Diploma Thesis	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 8 (0 contact hrs in class +240 hrs of self-study (together 240 hrs)
Module coordinator Senior Instructor: PhD Celal Ceken		Semester week hours: -
Additional teacher involved: Kim Gulnar		

Syllabus

Content Description

This stage involves the full cycle of diploma project development in the field of information systems, focusing on the creation of a specific software or technological product. Students begin with a comprehensive analysis of existing domestic and international information system solutions and analogues to identify functional, architectural, and technological best practices. Based on this analysis, they define system requirements, formulate the project concept, and design the structure, data models, and interfaces of the proposed information system. The process continues with the implementation, testing, and evaluation of the developed system, ensuring compliance with performance, usability, and security standards. The diploma design concludes with the documentation and presentation of results, demonstrating the student's ability to independently plan, develop, and justify an innovative information system solution aligned with professional and industry standards.

Learning goals and qualifications in this module students learn to (national or international):

Knowledge: Understand the full life cycle of information system development within the diploma project framework, including stages of analysis, design, implementation, testing, and documentation.

Comprehension: Explain the principles of analyzing domestic and international analogues, identifying functional and architectural features that inform the design of a new information system.

Application: Apply methodologies and tools for system modeling, database design, software development, and interface creation to produce a functional and efficient information system product.

Analysis: Evaluate existing solutions and project results in terms of performance, usability, reliability, and compliance with industry and academic standards.

Synthesis: Integrate research findings, technical analysis, and user requirements into a coherent system design that demonstrates innovation and problem-solving capabilities.

Evaluation: Assess the quality and effectiveness of the developed information system, present

design decisions with justification, and defend the project outcomes through technical documentation and oral presentation.

Core readings:

Alto, Valentina. Building LLM Powered Applications : Create Intelligent Apps and Agents with Large Language Models. First edition. Birmingham, England: Packt Publishing Ltd., 2024.

Klosterman, Stephen. Data Science Projects with Python: A Case Study Approach to Successful Data Science Projects Using Python, Pandas, and Scikit-Learn. 1st ed. Birmingham: Packt Publishing, Limited, 2019.

Jain, Drishti. Ultimate Laravel for Modern Web Development : Build Robust and Interactive Enterprise-Grade Web Apps Using Laravel's MVC, Authentication, APIs, and Cloud Deployment (English Edition). First edition. Delhi: Orange Education Pvt Ltd, 2024.

Howse, Joseph. OpenCV for Secret Agents: Use OpenCV in Six Secret Projects to Augment Your Home, Car, Phone, Eyesight, and Any Photo or Drawing. Birmingham, UK: Packt Publishing Limited

Bansal, Jagdish Chand et al. Advances in Data-Driven Computing and Intelligent Systems : Selected Papers from ADCIS 2024, Volume 1. 1st ed. 2025. Singapore: Springer Nature Singapore, 2025.

Course number	Course name Preparing and Passing a complex exam	
Type of course Professional discipline	Semester 2028/2029 Spring Term	Student capacity: 90
Teaching methods group projects, self-study, case study	Prerequisites for attendance None	Language English
Type of examination (Final Grade Composition) Written exam (100%) (100 minutes)		**ECTS (+Workload in hrs)** 8 (0 contact hrs in class +240 hrs of self-study (together 240 hrs)
Module coordinator Senior Instructor: PhD Celal Ceken		Semester week hours: -
Additional teacher involved: Kim Gulnar		

Syllabus

Content Description

Formation of professional knowledge, skills and abilities in students for passing a comprehensive exam.

Learning goals and qualifications in this module students learn to (national or international):

- Knowledge: Understand the core concepts, principles, and methodologies of information systems, software engineering, web development, databases, and data science that form the foundation of the comprehensive exam.

- Comprehension: Explain the interconnections between key areas such as system analysis and design, backend and frontend development, database management, cybersecurity, and data analytics within modern digital infrastructures.

- Application: Apply theoretical knowledge to solve integrated practical tasks, including designing web applications, modeling information systems, managing datasets, and developing data-driven solutions.

- Analysis: Evaluate complex information system architectures and software solutions, identifying dependencies, potential risks, and areas for optimization in performance, scalability, and security.

- Synthesis: Combine tools and techniques from various IT disciplines — including programming, data modeling, and visualization — to develop comprehensive solutions to interdisciplinary exam problems.

- Evaluation: Demonstrate professional readiness by critically assessing problem-solving approaches, validating results, and effectively presenting reasoned technical conclusions during the comprehensive exam.

Core readings:

Lathkar, Malhar. Modern Django Web Development : With Channels, DRF, GraphQL, and React. 1st ed. 2025. Berkeley, CA: Apress, 2025

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