Module Handbook

Applied Data Analytics

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1st term

Module name:	**History and Philosophy of Science**
Code	
Trimester	1 (all master's level programs)
Person responsible for the module	Assoc. Prof. A. Uyzbayeva, PhD
Lecturer(s)	Assoc. Prof. A. Uyzbayeva, PhD
Language	Russian, English
Relation to curriculum	Master programmes: History and Philosophy of Science Compulsory course.
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments**.**
Workload of course components and credits per trimester	

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
4	20	20	20	60	120

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Oral presentation	35	Oral defense	3rd week
		Oral presentation	35	Oral defense	4th week
		Mid-term MCQ (Multiply Choice Quiz)	30	Test	5th week
		1st attestation total	**100**		
	2nd attestation	Oral presentation	35	Oral defense	7th week
		Oral presentation	35	Oral defense	9th week
		Mid-term MCQ (Multiply Choice Quiz)	30	Test	10th week
		2nd attestation total	**100**		
	Final Exam MCQ		100	Test	During final exam session

Cumulative total for the course = $0{,}3 * 1^{st}$ Att + $0{,}3 * 2^{nd}$ Att + $0{,}4*$Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Philosophy (BS programme)
Module objectives/inte	By the end of this course students will attain the following learning outcomes.

nded learning outcomes	**The student will show a working knowledge in:** - know the genesis and history of science from the formation of its models, images and styles of thinking; - see the relationship of scientific and philosophical thoughts; - know the fundamental basis and conceptual apparatus of the history and philosophy of science; - understand basic principles of research activities. **Students will have the skill of:** - Application of philosophical knowledge in complex research; - Searching for scientific literature on the philosophy of science; - Writing reviews of scientific articles. **In terms of Competences, students will be able to** - formulate and solve problems that arise in the course of research activities and require in-depth professional knowledge; - Give critical analysis and evaluation modern scientific achievements; - choose the necessary research methods, modify existing and develop new methods based on the objectives of a particular study; - analyze and comprehend the realities of modern theory and practice based on the history and philosophy of science, the methodology of natural science, socio-humanitarian and technical knowledge.
Content	The course "History and Philosophy of Science" introduces the problem of the phenomenon of science as a subject of special philosophical analysis, forms knowledge about the history and theory of science; the laws of development of science and the structure of scientific knowledge; science as a profession and a social institution; on methods of conducting scientific research; the role of science in the development of society.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** 1. History and philosophy of science. Ed. Kryaneva Yu.V., Motorina L.E. - M.: INFRA-M, 2011. - 416 p. 2. Stepin V.S. History and philosophy of science. - M.: Academic Project, 2011. - 423 p. 3. Khasanov M.Sh., Petrova V.F. History and philosophy of science. - Almaty: Kazakh University, 2013. - 150 p. 4. Philosophy of science. Edited by A.I. Lipkin. - M.: Eksmo, 2009. - 608 p. **Supplementary literature:** 1. Myrzaly S. Philosophy, 2018. 2. Lebedev S.A., Ilyin V.V. Introduction to the philosophy and history of science. - M.: Editorial URSS, 2009. - 344 p.

	3. Kokhanovsky V.P. etc. Fundamentals of philosophy of science. - M.: Phoenix, 2010. - 603 p. 4. Nurysheva G.Zh. Philosophy. - Almaty, 2016.

Module name:	**Higher Education Pedagogy**
Code	
Trimester	1
Person responsible for the module	Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences
Lecturer(s)	Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences
Language	English
Relation to curriculum	Master degree programmes: 7M04102 Project Management, 7M06103 Applied Data Analytics, 7M06104 Computational Sciences, 7M06105 Computer Science and Engineering, 7M04102 Digital Public Administration and Services
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems of higher education and didactics. **Instructor-supervised independent study (ISIS)** focuses on the review of reviewing research papers, theories, and practices. It is designed to explore in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assignments**.**

Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	4	20	20	10	70	120

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Reading material discussions	25	Presentation and discussion of oral reports based on the reading material	Once in two weeks

	Quiz	5	Written	5th week
	1st attestation total	**30**		
2nd attestation	Reading material discussions	25	Presentation and discussion of oral reports based on the reading material	Once in two weeks
	Quiz	5	Written	10th week
	2nd attestation total	**30**		
Final Exam		40	Oral	During final exam session
Total for the course		100		
Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.				

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	History and Philosophy of Education; Psychology; Introduction to Research Methodology
Module objectives/intended learning outcomes	**The student will show a working knowledge in:** • Higher education methodology, system, and processes; • Management in Higher Education: processes, faculty members and students; • educational programs design; • Teaching and learning outcomes, assessment methodology and methods of teaching and learning; • Organization of teaching and learning environments; • Regulation Acts in education on teaching in higher education; • Student-centered teaching approach and the roles of self-study; • Roles of IT technology in teaching and learning; • course and a lesson plan design; • research questions in higher education teaching and learning problems.

	Students will have the skill to • Give arguments for and against the concepts in higher education methodology, system, and processes and discuss them in the class. Design the content of educational programs. • Design assessment forms. • Define favorable learning environment. • Follow regulations in teaching and learning processes and learning environment. • Apply student-centered teaching approach and self-study assignments. • Design a course and a lesson plan • Research local problems in higher education problems **In terms of Competences, students will be able to** • Critically evaluate the concepts in methodology of pedagogical sciences; • Evaluate modern tendencies in higher education • Employ modern educational technologies • Apply teaching and learning methods • Define assessment forms based on the educational program content, goals and objectives; • Interpret the findings of research questions on higher education problems.
Content	The course "Pedagogy of Higher Education" is designed for MA degree students to shape their knowledge about Higher Education systems, paradigm, university teacher competence, teaching and learning theories, assessment methodology and organization of teaching and learning processes.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** 1. Hartley, M.&Ruby, A. (2017). *Higher Education Reform and Development: The Case of Kazakhstan.* Cambridge Press, UK. 2. Silova, I.&Niyozov, S. (2020). *Globalization on the Margins. Education and Post-Socialist Transformations in Central Asia.* Information Age Publishing Inc., USA. 3. Shunk D. H.(2019). Learning Theories: An Educational Perspective 8th Edition. Pearson 4. OECD. (2017). *Higher Education in Kazakhstan. Reviews of National Policies for Education.* OECD Publishing, Paris. 5. UNESCO. (2021). Thinking Higher and Beyond. Perspectives on the Futures of Higher Education to 2050. 6. Fry, H., Ketteridge, S.,&Marshal, S. (2009). A Handbook for Teaching and Learning in Higher Education. Taylor&Francis. NY., USA **Supplementary literature:**

	1. Мынбаева, А. (2008). *Основы педагогики высшей школы.* Учебное пособие. Алматы., Казахстан.

Module name:	**Foreign Language (Professional)**					
Code						
Trimester	1					
Person responsible for the module	Aliya Ayazbayeva, Assistant Professor, Candidate pf Philological Sciences Elmira Gerfanova, Assistant Professor, PhD					
Lecturer(s)	Aliya Ayazbayeva, Assistant Professor, Candidate pf Philological Sciences Elmira Gerfanova, Assistant Professor, PhD Diana Zhanabilova, Senior lecturer, MA, Candidate to PhD degree					
Language	English					
Relation to curriculum	Master degree programmes: 7M04102 Project Management, 7M06103 Applied Data Analytics, 7M06104 Computational Sciences, 7M06105 Computer Science and Engineering, 7M04102 Digital Public Administration and Services					
Type of teaching	**Practice sessions (seminars)** are active sessions to develop Master program student skills in interpreting information, understanding spoken and written authentic texts, identifying relevant information, synthesising information from listening and reading professionally oriented texts, understanding the professional context. **Instructor-supervised independent study (ISIS)** comprises review of the professionally-oriented material, discussion of issues related to students' professional fields. **Student's independent study (SIS)** includes the time required to prepare for and complete all course assignments**.**					
Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	4		40	40	40	120
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	
	1st attestation	Preparing and defending presentations	15	Presentation defence	Week 3	

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		Quiz	15	Computer-based	Week 5
		1st attestation total	**30**		
	2nd attestation	Preparing and defending presentations	15	Presentation defence	Week 8
		Quiz	15	Written	Week 10
		2nd attestation total	**30**		
	Final Exam		**40**	Oral	During final exam sessions
	Total for the course		100		

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	English for Academic Purposes
Module objectives/intended learning outcomes	Upon the completion of the course "Foreign Language (Professional)", MA students will attain the following learning outcomes. **The student will show a working knowledge in:** • reading authentic professionally oriented texts and identifying reading structures • reading authentic professionally oriented texts for understanding main ideas and identifying supporting details • listening effectively to a range of formal and informal discussions presented in the relevant professional fields • developing adequate speaking skills to communicate effectively in a professional setting **Students will have the skill to:** • synthesize, draw conclusions, evaluate and discuss ideas from a reading • follow and comprehend professional discourse • plan and deliver oral presentations based on course project and answer questions

	• analyze written professionally oriented texts **In terms of Competences, students will be able to:** • write texts on professional topics • read and understand a range of vocabulary and stylistics in authentic sources • listen to lectures and presentations related to professional fields • participate in group discussions, prepare and give presentations • recognize and use grammar and specific vocabulary • self-reflect and evaluate reasoning
Content	Foreign Language (Professional) is designed to help Master program students focus on basic skills in listening, reading, writing and speaking with an emphasis on professional English, research and presentation structures, vocabulary and language usage. The learning outcomes are designed in a way so that the students can successfully apply their knowledge and skills in professional English in the academic context and demonstrate their professional English language competence.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	*Main:* Esteras, S.R.., & Fabre, E.M. (2010). Professional English in Use –ICT. Cambridge University Press *Additional:* Paterson, K. (2013). Oxford Grammar for EAP. London: Oxford University Press. Chazal, E. &Moore, J. (2022). Oxford EAP. A Course in English for Academic Purposes. London: Oxford University Press. Swales, J.& Feak Ch. (2012). Academic Writing for Graduate Students. Michigan Series in English for Academic and Professional Purposes

Module name:	**Mathematics for Data Science**
Code	
Trimester	1
Person responsible for the module	Prof. Svitlana Biloshchytska, Doctor of Technical Sciences
Lecturer(s)	Prof. Svitlana Biloshchytska
Language	English, Russian
Relation to curriculum	Master programmes: Applied Data Analytics Compulsory course

Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations.
	Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.
	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.
	Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments**.**

Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	10	90	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	laboratory work 1-4	60	Submission of written reports	Weekly
		Mid-term Exam	40	Written	5th week
		1st attestation total	**100**		
	2nd attestation	laboratory work 5-8	60	Submission of written reports	Weekly
		End-term Exam	40	Written	10th week
		2nd attestation total	**100**		
	Final exam		100		During final exam session
	Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att +0,4*Final=100.				

Requirements according to the examination regulations	**Course and university policies include:**
	Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).
	Late submissions are not accepted.
	No cheating, duplication, falsification of data, plagiarism, and crib
	Contacting the Lecturer: students are welcome to arrange one-to-one meeting with the teacher during office hours to discuss the class.

Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Probability theory and statistics.
Module objectives/intended learning outcomes	Formation of students' logical thinking and skills in the ability to use statistical models and methods in solving applied problems related to the performance of professional functions. By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • principles and methods of collecting, processing and visual presentation of statistical information; • the essence of generalizing statistical indicators - absolute, relative and average values, indicators of variation, differentiation and concentration; • statistical indicators of the presence and tightness of the relationship, methods for quantitative description of the relationship of signs; • basics of statistical modeling and forecasting. **Students will have the skill to** • Formulate hypotheses and research questions involving quantitative data; Design experiments and statistical models to represent quantitative research questions; • Apply ways to compare the levels of statistical indicators in time and space using indicators of dynamics and indices; • Select and apply a variety of statistical tools to answer quantitative research questions and formalize certainty in those answers; • Analyze and communicate the findings of statistical tools. **In terms of Competences, students will be able to** • Apply appropriate statistical inference techniques to the analysis of data across a variety of domains; • Interpret the outputs from statistical software packages and programming languages; • Report and communicate statistical results in a comprehensive, ethical and professional manner; • Apply appropriate forecasting techniques to time series; • Identify patterns in data and implement dimension reduction techniques.
Content	Within the framework of the ten-week course, approaches to the description of data obtained in research, the main methods and principles of statistical analysis, interpretation and visualization of the results obtained are considered. Students will get acquainted with such methods of statistical analysis as variance, regression and cluster analysis. Students will learn how to compare groups with each other, calculate correlation coefficients and build regression equations. The main emphasis is on mathematical ideas, intuition and logic, which determine the methods and calculation formulas. The studied material will be applicable to solving a wide range of problems arising in the framework of research work in almost any direction.

Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** 1. Peter Bruce and Andrew Bruce. Practical Statistics for Data Scientists. 2017, 303. 2. Paul Orland. Math for Programers. V. 11. 2020 3. Trevor Hastie, Robert Tibshirani, Jerome Friedman. The Elements of Statistical Learning. Data Mining, Inference, and Prediction. Second Edition. – Springer. 2017. – 764 с. 4. Вентцель Е.С., Овчаров Л.А. Теория вероятностей и ее инженерные приложения / Е.С. Вентцель, Л.А. Овчаров. – 3-е изд., стер. – М.: Академия, 2003. – 464 с. 5. Гмурман В. Е. Руководство к решению задач по теории вероятностей и математической статистике / В. Е. Гмурман. – М. : Высшая школа, 2001. – 575 **Supplementary literature:** 6. Ross, Sheldon M. Introduction to probability models / Sheldon M. Ross.-6th ed. 1997.- 669. 7. Gregory Hartman. Fundamentation Matrix Algebra. 2011. 236.

Module name:	**Programming for Data Analysis and Databases**
Code	
Trimester	1
Person responsible for the module	Turar Olzhas, PhD
Lecturer(s)	Turar Olzhas, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.
Workload of	

course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours	
		Lectures	Practice sessions				
	5	30	20	50	50	150	

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	
	1st attestation	Mid-term project	100	Submission of the written project	5th week	
		1st attestation total	**100**			
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week	
		End-term Quiz	40	Written	10th week	
		2nd attestation total	**100**			
	Final Exam		100	Written	During final exam session	

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meeting with the teacher during office hours to discuss the class.
Recommended prerequisites	R Studio, python, bash scripting
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • Understand the fundamentals of programming languages and their application to data analysis and databases. • proficiency in a programming language, such as Python or R, and apply it to data analysis, data visualization, and database management. **Students will have the skill to**

	• Create and manipulate data sets using various data types, including structured, semi-structured, and unstructured data. • Design, implement and optimize complex database schemas, using SQL and other database management tools. • Use data cleaning and data preprocessing techniques to prepare data for analysis, and apply exploratory data analysis techniques to gain insights from data. **In terms of Competences, students will be able to** critical analysis and reflection on applied machine learning techniques, including supervised and unsupervised learning, to analyze and model complex data sets. selection of methods for applying data visualization tools and techniques to communication of results and insights to stakeholders.
Content	The "Programming for Data Analysis and Databases" course covers the following topics: • Introduction to programming languages for data analysis and databases • Data types and structures in Python and R • Data cleaning and preprocessing techniques • Data visualization and reporting
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2017. 2. Hadley Wickham, "R for Data Science: Import, Tidy, Transform, Visualize, and Model Data", O'Reilly Media, 2017. 3. Jennifer Widom, "Database Systems: The Complete Book (2nd Edition)", Pearson, 2018. 4. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016. 5. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, "An Introduction to Statistical Learning:

2nd term

Module name:	**Management Psychology**
Code	
Trimester	2
Person responsible for the module	Assoc. Prof. A.Issakhanova, PhD

Lecturer(s)	Issakhanova Assel Alimakhanovna PhD in Pedagogy and psychology
Language	Russian
Relation to curriculum	Master programmes: all educational programmes
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** comprises review of the professionally-oriented material, discussion of issues related to students' professional fields. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
4	20	20	10	50	120

Course assessment and forms of examination

Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
1st attestation	Problem Sets	60	Submission of written reports	Weekly
	Mid-term Exam	40	Written. Individual project	5th week
	1st attestation total	**100**		
2nd attestation	Problem Sets	60	Submission of written reports	Weekly
	End-term Exam	40	Written. Individual project	10th week
	2nd attestation total	**100**		
Final Exam		100	Quiz	During final exam session

Cumulative total for the course = $0,3 * 1^{st} Att + 0,3 * 2^{nd} Att + 0,4*Final = 100$.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Psychology, Philosophy, History.
Module objectives/inte nded learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • Know the conceptual apparatus describing management activities; • Mastering the theoretical laws of life and dynamics of control systems; **Students will have the skill to** • Manage the ways of introspection, self-development and self-organization; • The ability to organize methods of organizing teamwork; • Apply the techniques of discussions, group work, independent analysis of cases arising in the practical work of a psychologist. • Independently navigate the various approaches existing in domestic and world science to psychological processes and phenomena arising in management; • Use socio-psychological mechanisms for managing group phenomena and processes; analyze employee motivation. **In terms of Competences, students will be able to** • to organize management activities; to explain the psychological phenomena of management, selection of diagnostic tool and corrective techniques in the analysis of cases arising in the practice of applied psychological work.
Content	This course provides scientifically - based training of highly qualified specialists based on the study and analysis of psychological conditions and features of managerial activity in the process of professional formation within the chosen specialty and orientation on personal self - development.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** 1. Akhtaeva N. S., Abdigapparova A. I., Bekbaeva Z. N. Management psychology. - Almaty: Kazakh University, 2018. 2. Essentials of Organizational Behavior / S. P. Robbins, T. A. Judge. - 14th ed. - Almaty : National Translation Bureau, 2019

	3. Balzac R. Organizational Psychology for Managers / R. Balzac, R. Stephen. 2020
	4. Looij, August van. Series: Psychology of Emotions, Motivations and Actions. New York : Nova. 2019.
	5. Susan W. Weinschenk. 100 Things Every Desinger Needs To Know About People / W. W. Susan. - USA : Pearson, 2020.
	6. Social Psychology: Handbook of Basic Principles / Van Lange A.M. Paul, H.E. Tory, W. A. Kruglanski. - New York : The Guilford Press, 2021.
	7. Psychology/ G.M. David, C. Nathan DeWall. - 13 ed. - New York: Macmillan International Higher Education, 2021.
	8. Susan W. Weinschenk. 100 Things Every Desinger Needs To Know About People / W. W. Susan. - USA: Pearson, 2020
	Supplementary literature: 1. Duane P. Schultz.Theories of Personality / P. S. Duane, E.S. Sydney. - 11 ed. - Mexico : Cengage, 2017. 2. Armstrong M. Strategic human resource management. - M.: INFRA-M., 2014. 3. Bakirova G.H. Human resource management. - St. Petersburg: Speech, 2008. 4. Becker G.S. Human capital: Theoretical and Empirical Analysis. - N-Y., 2011. 5. Dobrenkov V. I. Human resource management: a socio-psychological approach. Studies.manual. - M.: KDU, 2015. 6. Ignatov V. G. Theory of management: a course of lectures / V.G. Ignatov, L.N. Albastova. - M. ICC "March"; Rostov-n/A: Publishing center "March", 2012

Module name:	**Business Analytics**
Code	
Trimester	2
Person responsible for the module	Timur Akhmetov, PhD
Lecturer(s)	Timur Akhmetov, PhD
Language	English
Relation to curriculum	Master Programme: Applied Data Analysis, Compulsory course.

Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations.
	Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.
	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.
	Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester						

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and forms of examination

Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
1st attestation	Mid-term project	100	Submission of the written project	5th week
	1st attestation total	**100**		
2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
	End-term Quiz	40	Written	10th week
	2nd attestation total	**100**		
Final Exam		100	Written	During final exam session

Cumulative total for the course = $0,3 * 1^{st} \text{Att} + 0,3 * 2^{nd} \text{Att} + 0,4*\text{Final} = 100$.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.

Recommended prerequisites	R Studio, python, bash scripting
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • solid understanding of the key concepts, methods, and techniques in business analytics and their application to big data analysis. • Analysis of large and complex data sets, using a range of statistical and computational techniques, to derive meaningful insights and inform business decision-making. **Students will have the skill to** • Select and apply appropriate statistical models, algorithms, and software tools • extract insights from structured and unstructured data, including text, image, and video data. **In terms of Competences, students will be able to** • Evaluate the quality and reliability of data, identify data issues and potential biases, and take appropriate steps to address these issues. • Communicate insights and recommendations to stakeholders, using appropriate data visualization techniques and effective storytelling.
Content	The course is designed to introduce the most important and basic concepts, methods in business analysis. In addition, students will also learn how to compare results between different samples.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** Bertrand Meyer, Object'Oriented Software Construction. Prentice Hall, 2000. 34. James Martin and James J. Odell, Object'Oriented Methods: A Founda' tion (UML Edition), Prentice Hall, 1998. 35. Michael Pont, Patterns for Time'Triggered Embedded Systems, Addi sonWesley, 2001. 36. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, and Michael Stal, Pattern'Oriented Software Architecture: A System of Patterns, Wiley, 1996. 37. Douglas Schmidt, Michael Stal, Hans Rohnert, and Frank Buschmann, Pattern'Oriented Software Archtecture Volume 2: Patterns for Concur' rent and Networked Objects, Wiley, 2000. 38. James Rumbaugh, OMT Insights, SIGS Books, 1996.

Module name:	**Digital Business ecosystem**

Code	
Trimester	2
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Director, PhD
Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and forms of examination

Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
1st attestation	Mid-term project	100	Submission of the written project	5th week
	1st attestation total	**100**		
2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
	End-term Quiz	40	Written	10th week
	2nd attestation total	**100**		
Final Exam		100	Written	During final exam session

	Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$Final = 100.
Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meeting with the teacher during office hours to discuss the class
Recommended prerequisites	-
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • Understand the concept of digital business ecosystems and how they are transforming traditional business models. • Analyze the key drivers and challenges of digital business ecosystems, including emerging technologies, data analytics, and platform strategies. **Students will have the skill to** • Evaluate the competitive landscape of digital business ecosystems, • develop strategies to compete and collaborate within them. **In terms of Competences, students will be able to** • Develop a deep understanding of the role of data and analytics in digital business ecosystems, including data acquisition, analysis, and sharing. • Show critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Introduction to digital business ecosystems Digital platform strategies Data and analytics in digital business ecosystems Managing digital business ecosystems Emerging trends in digital business ecosystems
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	8. Marshall Van Alstyne, Geoffrey G. Parker, and Sangeet Paul Choudary, "Platform Revolution: How Networked Markets Are

Transforming the Economy and How to Make Them Work for You", W. W. Norton & Company, 2016.

9. Andreas Kaplan and Michael Haenlein, "Siri, Siri in my hand, who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence", Business Horizons, Vol. 62, No. 1, 2019.

10. Marco Iansiti and Karim R. Lakhani, "Competing in the Age of AI", Harvard Business Review Press, 2020.

11. Andrew McAfee and Erik Brynjolfsson, "Machine, Platform, Crowd: Harnessing Our Digital Future", W. W. Norton & Company, 2017.

12. Michael E. Porter and James E. Heppelmann, "How Smart, Connected Products Are Transforming Competition", Harvard Business Review, November 2014.

Module name:	**Digital Finance**
Code	
Trimester	2
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Director, PhD
Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0{,}3 * 1^{st}\,Att + 0{,}3 * 2^{nd}\,Att + 0{,}4*Final = 100$.				

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Business Analytics
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** fundamental concepts of digital finance and how they are transforming the financial industry. • impact of emerging technologies on financial markets, including blockchain, artificial intelligence, and machine learning. **Students will have the skill to** • Evaluate the risks and opportunities of digital finance, and develop strategies to manage and mitigate these risks. • Develop a deep understanding of financial data and analytics, including data acquisition, analysis, and interpretation. **In terms of Competences, students will be able to**

	• Show critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Introduction to digital finance Digital finance applications and technologies Financial data and analytics Regulatory and ethical considerations Emerging trends in digital finance
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Don Tapscott and Alex Tapscott, "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World", Penguin Random House, 2016. 2. Marcos Lopez de Prado, "Advances in Financial Machine Learning", Wiley, 2018. 3. Andrew W. Lo, "Adaptive Markets: Financial Evolution at the Speed of Thought", Princeton University Press, 2018. 4. David Easley and Marcos M. Lopez de Prado, "Microstructure and Noise in Financial Markets: A Comprehensive Overview", Elsevier, 2018. 5. Kevin Werbach, "The Blockchain and the New Architecture of Trust", MIT Press, 2018.

Module name:	**Methods and Tools of Data Analysis**
Code	
Trimester	2
Person responsible for the module	Nugumanova Aliya, PhD
Lecturer(s)	Nugumanova Aliya, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems.

	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.
Workload of course components and credits per trimester	

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
Course assessment and forms of examination	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.				

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Programming for Data Analysis and Databases
Module objectives/inte nded learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • key methods and tools of data analysis, including data preprocessing,

	feature selection, model training, and evaluation. • different data analysis techniques and methods to solve real-world problems, including supervised and unsupervised learning, time series analysis, and text analytics. **Students will have the skill to** • Use data analysis software tools and packages, such as scikit-learn, TensorFlow, and PyTorch, to build and evaluate machine learning models. • Evaluate the quality and reliability of data, identify data issues and potential biases, and take appropriate steps to address these issues. **In terms of Competences, students will be able to** • Communicate data analysis results and insights to stakeholders, using appropriate data visualization techniques and effective storytelling. • Show critical thinking and problem-solving skills, using data to inform decision-making in a rapidly changing and uncertain environment.
Content	Data preprocessing and feature selection Linear regression and classification Stationarity and autocorrelation Text preprocessing and feature extraction Train-test split and cross-validation Deep learning and neural networks
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016. 2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", O'Reilly Media, 2019. 3. Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2017. 4. Max Kuhn and Kjell Johnson, "Applied Predictive Modeling", Springer, 2013. 5. Dan Jurafsky and James H. Martin, "Speech and Language Processing (3rd ed. draft)", Pearson, 2020.

Module name:	**Teaching Internship**
Code	

Trimester	2
Person responsible for the module	Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences
Lecturer(s)	Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences
Language	English
Relation to curriculum	Master degree programmes: 7M04102 Project Management, 7M06103 Applied Data Analytics, 7M06104 Computational Sciences, 7M06105 Computer Science and Engineering, 7M04102 Digital Public Administration and Services
Type of teaching	**Instructor-supervised teaching practice**

Workload of course components and credits per trimester						
	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	4	-	-	60	60	8-week period of internship

Course assessment and forms of examination					
	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	Final grade	Organizing a tutorial hour with BA students	100	Report defense on a tutorial hour	1-3 weeks
		Class and lesson observation	100	Report defense	1-3 weeks
		Three lessons that MA students give	100		4-8 weeks
		A teaching Philosophy statement	100	Written	4-8 weeks
		Discipline instructor's grade	100	Written	4-8 weeks

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail)** **grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib**

	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Pedagogy of Higher Education, Psychology of Management; Methodology and Methods of Research
Module objectives/intended learning outcomes	Upon the completion of "Teaching Internship", MA students will attain the following learning outcomes. **The student will show a working knowledge in:** • pedagogy of a major discipline; • methodology of teaching a major discipline; • methodology of assessment; • management in Higher Education; • design of educational programs; • teaching and learning outcomes, assessment methodology and methods of teaching and learning; • organization of teaching and learning environments. **Students will have the skill to** • demonstrate hard and soft skills in a major discipline and pedagogy; • apply the principles of learning and teaching processes; • apply methods and approaches in teaching; • apply various IT technologies; • apply approaches of motivation (engagement) of BA students to study. **In terms of Competences, students will be able to** • work with students as tutors; • evaluate student behaviour and their response to teaching and content; • employ modern educational technologies; • apply teaching and learning methods; • assess student knowledge and skills; • define their own teaching philosophy.
Content	Teaching Internship is designed for MA degree students to shape their knowledge and develop their skills of working with students to deliver knowledge, apply various teaching methods and approaches, and cooperate with discipline instructors to develop MA student competences in pedagogy of teaching.
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Main literature:** 1. Оқыту теориясы. Д. Х Шунк. Тараулар 1, 3,4,5,6,7, 8,9,10,11 және 12. Баспа: Pearson, 2019 2. Рефлективті оқыту негіздері. Э.Поллард. Бөлімдер 2, 3, и 4. Баспа: Bloomsbury Academic, 2019

	Additional resources:
	For the reading list and Resources, please find the attached links. These are the open sources by Massachusetts Institute of Technology (MIT), the US.
	MITOOPENCOURSEWARE https://ocw.mit.edu/courses/chemistry/5-95j-teaching-college-level-science-and-engineering-fall-2015/instructor-insights/

3d term

Module name:	**Data Processing and Understanding**
Code	
Trimester	3
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Director, PhD
Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments**.**

Workload of course components and credits per trimester

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)

forms of examination	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Methods and Tools of Data Analysis
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • fundamental concepts of data processing and how they are used in data analytics. • impact of data preprocessing on data quality and the accuracy of machine learning models. **Students will have the skill to** • Evaluate different data processing techniques, including feature selection, feature engineering, and data transformation. • Develop a deep understanding of statistical techniques for data processing, including probability distributions, hypothesis testing, and regression analysis.

	In terms of Competences, students will be able to • Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Introduction to data processing Feature selection and engineering Data transformation Statistical techniques for data processing Ethics and privacy considerations Case studies in data processing
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Ian H. Witten, Eibe Frank, and Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann Publishers, 2016. 2. Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2009. 3. Dursun Delen, "Predictive Analytics and Data Mining: Concepts and Practice with RapidMiner", Elsevier, 2014. 4. Mark J. Embrechts, Claudia Klüppelberg, and Thomas Mikosch, "Modeling Extremal Events for Insurance and Finance", Springer, 1997. 5. John W. Tukey, "Exploratory Data Analysis", Addison-Wesley, 1977.

Module name:	**Data Driven Decision Making**
Code	
Trimester	3
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Director, PhD
Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations.

	Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments**.**

Workload of course components and credits per trimester						

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = $0,3 * 1^{st}$ Att + $0,3 * 2^{nd}$ Att + $0,4*$Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Methods and Tools of Data Analysis

Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • fundamental concepts of data-driven decision making and how it is used in different industries. • impact of data and analytics on decision-making processes, including problem definition, data collection, analysis, and interpretation. **Students will have the skill to** • Evaluate different decision-making models and their applications in different domains, including business, healthcare, and social sciences. • Develop a deep understanding of statistical techniques for decision making, including probability distributions, hypothesis testing, and regression analysis. **In terms of Competences, students will be able to** • Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Introduction to data-driven decision making; Decision-making models and frameworks; Statistical techniques for decision making; Probability distributions and their applications in decision making; Hypothesis testing for decision making; Regression analysis for decision making; Ethics and privacy considerations; Case studies in data-driven decision making.
Media employed	Multimedia classrooms equipped with computer, projector and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. W. Edwards Deming, "Out of the Crisis", MIT Press, 1986. 2. Jay Liebowitz, "Big Data and Business Analytics", CRC Press, 2013. 3. Daniel Kahneman, "Thinking, Fast and Slow", Farrar, Straus and Giroux, 2011. 4. Norean R. Sharpe, Richard D. De Veaux, and Paul F. Velleman, "Business Statistics", Pearson, 2019. 5. Gary Klein, "Sources of Power: How People Make Decisions", MIT Press, 1999.

Module name:	**Product Management**

Code	
Trimester	3
Person responsible for the module	Mukhamedkarimova Aneliya, PhD
Lecturer(s)	Mukhamedkarimova Aneliya, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	50	50	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

	Cumulative total for the course = $0.3 * 1^{st}$ Att $+ 0.3 * 2^{nd}$ Att $+ 0.4*$Final $= 100$.
Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Methods and Tools of Data Analysis
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • fundamental concepts of product management and its role in driving innovation and growth in companies. • customer needs and market trends to develop successful product strategies and roadmaps. **Students will have the skill to** • Evaluate different product management frameworks and methodologies, including agile and lean development, and apply them to real-world situations. **In terms of Competences, students will be able to** • Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in product management. • Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Overview of product management and its importance in driving innovation and growth The role of product managers in different industries and organizations Analyzing customer needs and market trends to develop successful product strategies and roadmaps Conducting market research and user testing Understanding the competitive landscape and positioning products for success Data-driven decision making in product management Conducting A/B testing and experimentation to validate product ideas Complying with legal and regulatory frameworks Case studies in product management

Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Marty Cagan, "Inspired: How to Create Tech Products Customers Love", John Wiley & Sons, 2017. 2. Eric Ries, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses", Crown Business, 2011. 3. Jeff Patton, "User Story Mapping: Discover the Whole Story, Build the Right Product", O'Reilly Media, 2014. 4. Steve Blank and Bob Dorf, "The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company", K & S Ranch, 2012. 5. Martin Eriksson, "Product Leadership: How Top Product Managers Launch Awesome Products and Build Successful Teams", O'Reilly Media, 2017.

Module name:	**Industry 4.0**
Code	
Trimester	3
Person responsible for the module	Neftissov Alexandr, PhD
Lecturer(s)	Neftissov Alexandr, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>50</td><td>50</td><td>150</td></tr></table>

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Methods and Tools of Data Analysis
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** - fundamental concepts of Industry 4.0 and its impact on the future of work. - components of Industry 4.0, including cyber-physical systems, the Internet of Things (IoT), and cloud computing. **Students will have the skill to** - Evaluate different Industry 4.0 technologies and their applications in different domains, including manufacturing, healthcare, and transportation. **In terms of Competences, students will be able to**

	• Develop a deep understanding of data-driven decision making and the role of data and analytics in Industry 4.0. • Develop critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Introduction to Industry 4.0 Components of Industry 4.0 Industry 4.0 technologies and applications Overview of different Industry 4.0 technologies, including robotics, automation, and artificial intelligence Application of Industry 4.0 technologies to different problem domains, including manufacturing, healthcare, and transportation Industry 4.0 case studies and best practices Future directions of Industry 4.0
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Henning Kagermann, Wolfgang Wahlster, and Johannes Helbig, "Recommendations for Implementing the Strategic Initiative INDUSTRIE 4.0", Springer, 2013. 2. Alp Ustundag and Emre Cevikcan, "Industry 4.0: Managing the Digital Transformation", Springer, 2018. 3. Andreas Tolk, Lakhmi C. Jain, and John R. Hill, "Modeling and Simulation for Industry 4.0 and Beyond", Springer, 2020.

Module name:	**Information Security**
Code	
Trimester	3
Person responsible for the module	Begimbayeva Englik, PhD
Lecturer(s)	Begimbayeva Englik, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material.

	Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.					

Workload of course components and credits per trimester							
	ECTS credits	Contact hours		ISIS	SIS	Total hours	
		Lectures	Practice sessions				
	5	30	20	50	50	150	

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	100		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.				

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • fundamental concepts of information security and its importance.

	• components of information security, including threat modeling, risk assessment, and vulnerability management. **Students will have the skill to** • Evaluate different information security technologies and their applications in different domains, including cybersecurity, network security, and cloud security. **In terms of Competences, students will be able to** • Develop a deep understanding of data-driven decision making and the role of data and analytics in information security. • Develop critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.
Content	Components of information security Information security technologies and applications Overview of different information security technologies, including cryptography, firewalls, and intrusion detection systems Application of information security technologies to different problem domains, including cybersecurity, network security, and cloud security The role of data and analytics in information security Future directions of information security
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", Cengage Learning, 2018. 2. Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", John Wiley & Sons, 1995. 3. Eric Conrad, Joshua Feldman, and Seth Misenar, "CISSP Study Guide", Syngress, 2020. 4. Ross J. Anderson, "Security Engineering: A Guide to Building Dependable Distributed Systems", Wiley, 2008. 5. D. J. Henry and S. R. Simon, "Cybersecurity and Cyberwar: What Everyone Needs to Know", Oxford University Press, 2014.

Module name:	**Business Process Analysis**
Code	
Trimester	3
Person responsible	Timur Akhmetov, PhD

for the module	
Lecturer(s)	Timur Akhmetov, PhD
Language	English
Relation to curriculum	Master Programme: Applied Data Analysis, Compulsory course.
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester

ECTS credits	Contact hours		ISIS	SIS	Total hours
	Lectures	Practice sessions			
5	30	20	50	50	150

Course assessment and forms of examination

Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
1st attestation	Mid-term project	100	Submission of the written project	5th week
	1st attestation total	**100**		
2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
	End-term Quiz	40	Written	10th week
	2nd attestation total	**100**		
Final Exam		100	Written	During final exam session

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	R Studio, python, bash scripting
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** 1. Understand the key concepts and principles of business process analytics and their application to big data analysis. 2. Analyze and evaluate the effectiveness and efficiency of business processes, using various data analytics techniques and tools, including process mining, data visualization, and statistical analysis. **Students will have the skill to** 3. Identify and quantify process bottlenecks, inefficiencies, and deviations, and develop actionable recommendations to improve business processes. 4. Apply advanced data analytics methods to identify patterns, trends, and anomalies in business process data, and use this information to optimize and automate business processes. **In terms of Competences, students will be able to** 5. Show critical thinking and problem-solving skills, using data to inform decision-making related to business process management. 6. Evaluate the impact of emerging technologies, such as artificial intelligence and machine learning, on business process analytics and apply best practices to leverage these technologies for process improvement.
Content	The course is designed to introduce the most important and basic concepts, methods in business analysis.In addition, students will also learn how to compare results between different samples.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	**Basic Literature:** 1. Bertrand Meyer, Object'Oriented Software Construction. Prentice Hall, 2000. 2. James Martin and James J. Odell, Object'Oriented Methods: A Founda'tion (UML Edition), Prentice Hall, 1998. 3. Michael Pont, Patterns for Time'Triggered Embedded Systems, AddisonWesley, 2001.

	4. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad,and Michael Stal, Pattern'Oriented Software Architecture: A System ofPatterns, Wiley, 1996.
	5. Douglas Schmidt, Michael Stal, Hans Rohnert, and Frank Buschmann,Pattern'Oriented Software Archtecture Volume 2: Patterns for Concur'rent and Networked Objects, Wiley, 2000.
	6. James Rumbaugh, OMT Insights, SIGS Books, 1996.

Module name:	**Machine Learning and Artificial Intelligence**					
Code						
Trimester	3					
Person responsible for the module	Akhmetov Timur, PhD					
Lecturer(s)	Akhmetov Timur, PhD					
Language	English					
Relation to curriculum	Master Program: Applied Data Analysis					
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments**.**					
Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	50	50	150
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	
	1st attestation	Mid-term project	100	Submission of the written project	5th week	
		1st attestation total	**100**			

	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • fundamental concepts of machine learning and artificial intelligence and their applications in different domains. • different machine learning and artificial intelligence algorithms and select the most appropriate one for a given task. **Students will have the skill to** • Develop and implement machine learning and artificial intelligence models using programming languages and tools. • Evaluate the performance of machine learning and artificial intelligence models and interpret the results. **In terms of Competences, students will be able to** • Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in machine learning and artificial intelligence. • Demonstrate critical thinking and problem-solving skills, using machine learning and artificial intelligence to inform decision-making

	in a rapidly changing and uncertain environment.
Content	Introduction to machine learning and artificial intelligence Supervised learning algorithms, including regression and classification Unsupervised learning algorithms, including clustering and dimensionality reduction Reinforcement learning algorithms and their applications in different domains Natural language processing algorithms and their applications Computer vision algorithms and their applications Deep learning algorithms and their applications in different domains Machine learning and artificial intelligence tools and technologies Data-driven decision making with machine learning and artificial intelligence
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2017. 2. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, "Deep Learning", MIT Press, 2016. 3. Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow", Packt Publishing, 2017. 4. Peter Norvig and Stuart Russell, "Artificial Intelligence: A Modern Approach", Pearson, 2021

Module name:	**Applied Project in Data Analytics**
Code	
Trimester	3
Person responsible for the module	Shomanov Aday, PhD
Lecturer(s)	Shomanov Aday, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems.

	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.

Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	50	50	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = $0{,}3 * 1^{st}$ Att $+ 0{,}3 * 2^{nd}$ Att $+ 0{,}4 * $Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Methods and Tools of Data Analysis
Module objectives/inte	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:**

nded learning outcomes	• Aspects of work in a multidisciplinary team, collaborate with industry partners, and apply project management principles. **Students will have the skill to** • Apply the scientific method to a research problem, including problem identification, hypothesis generation, data collection and analysis, and interpretation of results. **In terms of Competences, students will be able to** • Develop and implement a data-driven solution to a real-world problem, using appropriate statistical and computational tools. • Communicate the results of a data-driven project effectively to a diverse audience, including industry partners, stakeholders, and peers.
Content	Project management principles and best practices Scientific method and research design Data collection and analysis Interpretation of results and drawing conclusions Writing research reports and papers Data-driven solution development Scaling the solution for larger data sets and different problem domains Writing reports and papers for industry partners, stakeholders, and peers Developing and delivering presentations and talks Ethics and privacy considerations
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	The reading list for the "Applied Project in Data Analytics" course will depend on the specific project and the needs of the industry partner. However, students may be required to read relevant research papers, reports, and books in the area of the project. The course instructor and the industry partner will provide guidance on the required reading materials.

Module name:	Research practice
Code	
Trimester	4
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Director, PhD

Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	• **Workshops and seminars:** Workshops and seminars can provide students with practical skills training and information on industry-specific topics. • **Performance of Industrial Practice:** Simulation exercises can be used to simulate real-world industrial research projects and provide students with experience in making decisions and working under time constraints. **Group projects:** Assigning students to work in teams on a research project can provide hands-on experience in conducting research and working with others.

Workload of course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	50	50	150

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session

Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted.

	No cheating, duplication, falsification of data, plagiarism, and crib **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Programming for Data Analysis and Databases
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • principles of research methodology and design, including qualitative and quantitative research methods. **Students will have the skill to** • Formulate research questions and hypotheses related to a data analytics problem. • Develop and implement a research plan, including data collection and analysis. • Evaluate the quality of research and interpret the results of data analysis. **In terms of Competences, students will be able to** • Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a research context. • Communicate research findings effectively to different audiences, including academic and industry stakeholders.
Content	Data collection and analysis Data visualization and presentation of research findings Quality evaluation and interpretation of research Ethics and privacy considerations in research
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2008. 2. Thomas K. Landauer, "The Trouble with Computers: Usefulness, Usability, and Productivity", MIT Press, 1995. 3. Paul D. Allison, "Multiple Regression: A Primer", Pine Forge Press, 1999. 4. Andrew Gelman and Jennifer Hill, "Data Analysis Using Regression and Multilevel/Hierarchical Models", Cambridge University Press, 2006. 5. Diana C. Mutz, "Impersonal Influence: How Perceptions of Mass Collectives Affect Political Attitudes", Cambridge University Press, 1998.

Module name:	**Research work of master student**

Code	
Trimester	4
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Direvtor, PhD
Lecturer(s)	-
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	**Lectures** serve to introduce new concepts and provide theoretical and methodological foundations. **Practice sessions (seminars)** are active sessions to develop student's confidence through new examples and discussions on the problems. **Instructor-supervised independent study (ISIS)** deals with review and exploration in greater depth of the course material. **Student's independent study (SIS):** Self-study time including the time required to prepare for and complete all course assessments.
Workload of course components and credits per trimester	-

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1st attestation	Mid-term project	100	Submission of the written project	5th week
		1st attestation total	**100**		
	2nd attestation	End-term project	60	Submission of the written project	8th - 9th week
		End-term Quiz	40	Written	10th week
		2nd attestation total	**100**		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.				

Requirements according to the examination regulations	**Course and university policies include:** **Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).** Late submissions are not accepted. **No cheating, duplication, falsification of data, plagiarism, and crib** **Contacting the Lecturer**: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Programming for Data Analysis and Databases
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. **The student will show a working knowledge in:** • Subject and publications in the field of his research topic and in the fields of Big Data Analysis, Data Science and Machine Learning in general **Students will have the skill to** • Formulate and develop a research question or problem related to data analysis and apply appropriate research methods to address it. • Design and execute a research project, including data collection, analysis, and interpretation. • Develop skills in academic writing and presentation, including the ability to write a research paper and present research findings in a public forum. • Apply advanced research techniques and methods to a specific research problem or question in the field of data analysis. **In terms of Competences, students will be able to** • Conduct independent research and take responsibility for the entire research process, including defining the problem, identifying the relevant literature, selecting research methods, and presenting the results.
Content	Formulating research questions and hypotheses Research design and execution Writing a research paper Presenting research findings Ethics in research
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	1. Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2016. 2. Catherine Dawson, "Introduction to Research Methods: A Practical Guide for Anyone Undertaking a Research Project", How To Books, 2009.

	3. Alan Bryman and Emma Bell, "Business Research Methods", Oxford University Press, 2019. 4. Margaret Greenhall and Yvonne N. Bui, "A Guide to the Dissertation Process: Practical Wisdom for Planning, Writing, and Defending Your Dissertation", Sage Publications, 2019. 5. Harold Kerzner, "Project Management: A Systems Approach to Planning, Scheduling, and Controlling", Wiley, 2017.