

## **Module Handbook**

Applied Data Analytics

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# 1<sup>st</sup> term

Module name:	History and Philosophy of Science							
Code								
Trimester	1 (all master	1 (all master's level programs)						
Person	Assoc. Prof.	A. Uyzba	yeva, PhD					
responsible								
for the module								
Lecturer(s)	Assoc. Prof.	A. Uyzba	yeva, PhD					
Language	Russian, En	glish						
Relation to	1 0		listory and P	hilosop	hy of S	Science		
curriculum	Compulsory	course.						
Type of	Lectures se	erve to in	troduce nev	v conce	epts a	nd provide	theoretical and	
teaching	methodolog							
	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							
		•	depth of the o					
			• 、	/		•	uding the time	
W/ 11 1 C	required to p	prepare for	and complet	te all co	urse a	ssessments.		
Workload of								
course	ECTS credits	Contact hours ISI SIS Total						
components and credits per	creans	Lecture	Practice	S		hours		
trimester	4	s 20	sessions 20	20	60	120	-	
	<u> </u> →	20	20	20	00	120		

Course					
assessment and	Period	Assessment	Number of	Exam Form	Schedule
forms of		type	points		(Week #)
examination	1 <sup>st</sup>	Oral	35	Oral defense	3 <sup>rd</sup> week
	attestation	presentation			
		Oral	35	Oral defense	4 <sup>th</sup> week
		presentation			
		Mid-term	30	Test	5 <sup>th</sup> week
		MCQ			
		(Multiply			
		Choice Quiz)			
		1 <sup>st</sup>	100		
		attestation			
	2 <sup>nd</sup>	total		0.110	th1
	-	Oral	35	Oral defense	7 <sup>th</sup> week
	attestation	presentation	25	0.110	9 <sup>th</sup> week
		Oral	35	Oral defense	9 <sup>th</sup> week
		presentation	20	T4	10 <sup>th</sup> week
		Mid-term	30	Test	10 <sup>th</sup> week
		MCQ (Multiply			
		Choice Quiz)			
		2nd	100		
		attestation	100		
		total			
	Final Exam I		100	Test	During final
					exam
					session
Requirements	= 100. Course and u	niversity policie	es include:		
according to the examination regulations	grade (or sum Late submissi No cheating, Contacting th	s mandatory. Minmer school). ons are not accep duplication, fals ne Lecturer: stud the teacher durin	oted. Sification of d lents are welc	ata, plagiarism ome to arrange of	, and crib
Recommended prerequisites		S programme)			
Module objectives/inte	By the end of	this course stude	nts will attain	the following lea	arning outcomes.

nded learning outcomes	The student will show a working knowledge in:
	<ul> <li>know the genesis and history of science from the formation of its models, images and styles of thinking;</li> <li>see the relationship of scientific and philosophical thoughts;</li> <li>know the fundamental basis and conceptual apparatus of the history and philosophy of science;</li> <li>understand basic principles of research activities.</li> </ul>
	<ul> <li>Students will have the skill of:</li> <li>Application of philosophical knowledge in complex research;</li> <li>Searching for scientific literature on the philosophy of science;</li> <li>Writing reviews of scientific articles.</li> </ul>
	<ul> <li>In terms of Competences, students will be able to</li> <li>formulate and solve problems that arise in the course of research activities and require in-depth professional knowledge;</li> <li>Give critical analysis and evaluation modern scientific achievements;</li> <li>choose the necessary research methods, modify existing and develop new methods based on the objectives of a particular study;</li> <li>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.</li> </ul>
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	<ul> <li>Basic Literature:</li> <li>1. History and philosophy of science. Ed. Kryaneva Yu.V., Motorina L.E M.: INFRA-M, 2011 416 p.</li> <li>2. Stepin V.S. History and philosophy of science M.: Academic Project, 2011 423 p.</li> <li>3. Khasanov M.Sh., Petrova V.F. History and philosophy of science Almaty: Kazakh University, 2013 150 p.</li> <li>4. Philosophy of science. Edited by A.I. Lipkin M.: Eksmo, 2009 608 p.</li> <li>Supplementary literature:</li> <li>1. Myrzaly S. Philosophy, 2018.</li> <li>2. Lebedev S.A., Ilyin V.V. Introduction to the philosophy and history of science M.: Editorial URSS, 2009 344 p.</li> </ul>

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 Edu	ducation Pedagogy						
Code								
Trimester	1							
Person responsible for the module	onsible						ces	
Lecturer(s)	Assoc. Prof.	Zh.Tlesho	ova, Ca	ndidate	e of P	edagog	ical Sciend	ces
Language	English					00		
Relation to curriculum	Master deg Applied Da Computer Se and Services	ta Analyticience and	tics, 7	M0610	04 C	omputa	tional Sc	, , , , , , , , , , , , , , , , , , ,
Type of teaching	methodologi <b>Practice se</b> confidence t	<b>Lectures</b> serve to introduce new concepts and provide theoretical and methodological foundations. <b>Practice sessions (seminars)</b> are active sessions to develop student's confidence through new examples and discussions on the problems of higher education and didactics.						
	reviewing re greater depth <b>Student's i</b>	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.						igned to explore in ncluding the time
Workload of								
course components and credits per	ECTS credits	Cont Lecture	act hou Practi sessic	ce	ISI S	SIS	Total hours	
trimester	4	20		0	10	70	120	
Course			<u>.</u>					
assessment and forms of	Period			Numl of poi		Exam Form		Schedule (Week #)
examination	1 <sup>st</sup> attestatio n	Reading material discussio	ons	25		and di of ora	•	Once in two weeks

		Quiz	5	Written	5 <sup>th</sup> week		
		1 <sup>st</sup> attestation	30				
		total					
	2nd	Reading	25	Presentation	Once in two		
	attestatio	material	_	and discussion	weeks		
	n	discussions		of oral reports			
				based on the			
				reading			
				material			
		Quiz	5	Written	10 <sup>th</sup> week		
		2 <sup>nd</sup> attestation	30				
		total					
	Final Exan	1	40	Oral	During final		
					exam session		
	Total for th	ie course	100				
	Cumulative = 100.	e total for the cou	rse = 0,3 *	$1^{st}$ Att + 0,3 * $2^{nd}$	Att + 0,4*Final		
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	-	it will show a wo	rking know	ledge in:			
objectives/inte			-	-	ses;		
nded learning outcomes	<ul> <li>Higher education methodology, system, and processes;</li> <li>Management in Higher Education: processes, faculty members and students;</li> <li>educational programs design;</li> </ul>						
	• Teac						
				ning environment	s;		
	•						
	-			ch and the roles of			
		s of IT technolog	• • •		<b>,</b>		
				6			
	• resea	course and a lesson plan design; research questions in higher education teaching and learning problems.					
1							

	Students will have the skill to
	<ul> <li>Give arguments for and against the concepts in higher education methodology, system, and processes and discuss them in the class.</li> <li>Design the content of educational programs.</li> <li>Design assessment forms.</li> <li>Define favorable learning environment.</li> <li>Follow regulations in teaching and learning processes and learning environment.</li> <li>Apply student-centered teaching approach and self-study assignments.</li> <li>Design a course and a lesson plan</li> <li>Research local problems in higher education problems</li> <li>In terms of Competences, students will be able to</li> <li>Critically evaluate the concepts in methodology of pedagogical sciences;</li> <li>Evaluate modern tendencies in higher education</li> <li>Employ modern educational technologies</li> <li>Apply teaching and learning methods</li> <li>Define assessment forms based on the educational program content, goals and objectives;</li> <li>Interpret the findings of research questions on higher education problems.</li> </ul>
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	<ul> <li>Basic Literature: <ol> <li>Hartley, M.&amp;Ruby, A. (2017). <i>Higher Education Reform and Development: The Case of Kazakhstan</i>. Cambridge Press, UK.</li> <li>Silova, <u>I.&amp;Niyozov</u>, S. (2020). <i>Globalization on the Margins. Education and Post-Socialist Transformations in Central Asia.</i> Information Age Publishing Inc., USA.</li> <li>Shunk D. H.(2019). Learning Theories: An Educational Perspective 8th Edition. Pearson</li> <li>OECD. (2017). <i>Higher Education in Kazakhstan. Reviews of National Policies for Education.</i> OECD Publishing, Paris.</li> <li>UNESCO. (2021). Thinking Higher and Beyond. Perspectives on the Futures of Higher Education to 2050.</li> <li>Fry, H., Ketteridge, S.,&amp;Marshal, S. (2009). A Handbook for Teaching and Learning in Higher Education. Taylor&amp;Francis. NY., USA</li> </ol></li></ul>

1. Мынбаева, А. (2008). Основы педагогики высшей школы.           Учебное пособие. Алматы., Казахстан.	
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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)	Elmira Gerfa	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	Applied Dat Computer Sc and Services	Master degree programmes: 7M04102 Project Management, 7M06103 Applied Data Analytics, 7M06104 Computational Sciences, 7M06105 Computer Science and Engineering, 7M04102 Digital Public Administration					
Type of teaching	<ul> <li>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.</li> <li>Instructor-supervised independent study (ISIS) comprises review of the professionally-oriented material, discussion of issues related to students' professional fields.</li> <li>Student's independent study (SIS) includes the time required to prepare for and complete all course assignments.</li> </ul>						
Workload of			0				
course components and credits per	ECTS credits	Cont	tact hours Practice sessions		ISIS	SIS	Total hours
trimester	4		40		40	40	120
Course			-				·
assessment and forms of	Period	Assessment type	Number of points	Ex	Exam Form		Schedule (Week #)
examination	1 <sup>st</sup> attestatio n	Preparing and defending presentations			esentati fence	on	Week 3

		Quiz	15	Computer- based	Week 5		
		1 <sup>st</sup> attestation total	30				
	2nd attestatio n	Preparing and defending presentations	15	Presentation defence	Week 8		
		Quiz	15	Written	Week 10		
		2 <sup>nd</sup> attestation	30				
		total	40	0.1			
	Final Exam	1	40	Oral	During final exam sessions		
	Total for th	e course	100				
	Cumulative = 100.	e total for the cou	rse = $0,3^{*}$	* $1^{st}$ Att + 0,3 * $2^{n}$	<sup>d</sup> Att + 0,4*Final		
according to the examination regulations Recommended prerequisites	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 cribContacting the Lecturer: students are welcome to arrange one-to-onemeetings with the teacher during office hours to discuss the class.English for Academic Purposes						
Module objectives/inte nded learning	Upon the completion of the course "Foreign Language (Professional)", MA students will attain the following learning outcomes. <b>The student will show a working knowledge in:</b>						
outcomes	<ul> <li>reading authentic professionally oriented texts and identifying reading structures</li> <li>reading authentic professionally oriented texts for understanding main ideas and identifying supporting details</li> </ul>						
	<ul> <li>listening effectively to a range of formal and informal discussions presented in the relevant professional fields</li> <li>developing adequate speaking skills to communicate effectively in a professional setting</li> </ul>						
	Students will have the skill to:						
	<ul> <li>synthesize, draw conclusions, evaluate and discuss ideas from a reading</li> <li>follow and comprehend professional discourse</li> <li>plan and deliver oral presentations based on course project and answe</li> </ul>						
	ques	tions					

	• analyza yumittan professionally amontal tayta							
	• 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							
	<ul> <li>recognize and use grammar and specific vocabulary</li> </ul>							
	• 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	Multimedia classrooms equipped with computer, projection and audio							
employed	system; Whiteboard; Microsoft Teams; LMS Moodle.							
Reading list	Main:							
Ũ	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

TypeofteachingWorkload ofcoursecomponentsand credits per	Image: The set of the set							
trimester	5	s 30		0	10	90	150	—
		30		0	10	90	130	
Course								
assessment and	Period	Assessm	ent	Num		Exam	Form	Schedule
forms of examination	1 <sup>st</sup>	type		of po	ints	C. l	::	(Week #)
examination	attestatio	laborator work 1-4		60		Submission of written reports		Weekly
	n							
		Mid-tern Exam	n	40		Writte	en	5 <sup>th</sup> week
		1 <sup>st</sup> attest	ation	100				
		total						
	2nd	laboratory		60		Subm	ission of	Weekly
	attestatio	work 5-8				written reports		
	n	End-term	1	40		Writte	en	10 <sup>th</sup> week
		Exam	4 - 4	100				
		2 <sup>nd</sup> attest total	tation	100				
	Final exam			100				During final
		L						exam session
	Cumulativ	e total for t	the cou	rse = (	),3 * 1	st Att +	- 0,3 * 2 <sup>nd</sup>	
	+0,4*Final				,		,	
Requirements	Course and							
according to			•	lissing	30%	of less	sons will r	esult in F (Fail)
the	grade (or sub-		,					
examination regulations	Late submis			+	ion o	f data	nlagiaria	m, and crib
regulations			,			,		rrange one-to-one
	meeting wit							-
L	meeting with			-9 3111	1100	io u		

D 1.1	
Recommended	Linear Algebra, Calculus I, Calculus II, Probability theory and statistics.
prerequisites	
Module	Formation of students' logical thinking and skills in the ability to use statistical
objectives/inte	models and methods in solving applied problems related to the performance
nded learning	of professional functions.
outcomes	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;
	<ul> <li>basics of statistical modeling and forecasting.</li> </ul>
	• 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;
	<ul> <li>Apply appropriate forecasting techniques to time series;</li> </ul>
	<ul> <li>Identify patterns in data and implement dimension reduction techniques.</li> </ul>
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	<ul> <li>Basic Literature:</li> <li>1. Peter Bruce and Andrew Bruce. Practical Statistics for Data Scientists. 2017, 303.</li> <li>2. Paul Orland. Math for Programers. V. 11. 2020</li> <li>3. Trevor Hastie, Robert Tibshirani, Jerome Friedman. The Elements of Statistical Learning. Data Mining, Inference, and Prediction. Second Edition. – Springer. 2017. – 764 с.</li> <li>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.</li> <li>5. Гмурман В. Е. Руководство к решению задач по теории вероятностей и математической статистике / В. Е. Гмурман. – М. : Высшая школа,</li> </ul>
	<ul> <li>a. MarcManufection characteristic / D. L. PMypMan. – W. P. Bitelinda Intona, 2001. – 575 Supplementary literature:</li> <li>6. Ross, Sheldon M. Introduction to probability models / Sheldon M. Ross6th ed. 1997669.</li> <li>7. Gregory Hartman. Fundamentation Matrix Algebra. 2011. 236.</li> </ul>

Module name:	Programming for Data Analysis and Databases
Code	
Trimester	1
Person	Turar Olzhas, PhD
responsible	
for the module	
Lecturer(s)	Turar Olzhas, PhD
Language	English
Relation to curriculum	Master Program: Applied Data Analysis
Type of teaching	<b>Lectures</b> serve to introduce new concepts and provide theoretical and methodological foundations.
C C	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	ECTS	Cont	act hou	rs	ISI	SIS	Total	
components	credits	Lecture Practic			S		hours	
and credits per		s sessio						
trimester	5	30		0	50	50	150	
		50		0	20	00	100	
Course	Period	Assessm	ent	Num	ber	r Exam Form		Schedule
assessment and		type		of po	ints			(Week #)
forms of	1 <sup>st</sup>	Mid-tern	1	100		Submission of		5 <sup>th</sup> week
examination	attestatio	project				the wr	ritten	
	n					projec	t	
		1 <sup>st</sup> attest	ation	100				
		total						
	2nd	End-term	ı	60		Subm	ission of	8 <sup>th</sup> - 9 <sup>th</sup> week
	attestatio	project				the wr	ritten	
	n					projec	t	
		End-term	n Quiz	40		Writte	n	10 <sup>th</sup> week
		2 <sup>nd</sup> attes	tation	100				
		total						
	Final Exam			100		Writte	n	During final
								exam session
	Cumulative total for the course = $0.3 * 1^{st} Att + 0.3 * 2^{nd} Att + 0.4*Final = 100.$						Att + 0,4*Final =	
Requirements	Course and	universit	y polic	ies inc	lude:			
according to	Attendance is mandatory. Missing 30% of lessons will result in F (Fail)							
the	grade (or si							
examination	Late submis			+				
regulations	No cheating		-			-		
	0						•	e one-to-one
D 11	meeting wit				ce hou	ars to d	iscuss the	class.
Recommended	R Studio, py	thon, bash	i scripti	ng				
prerequisites								
Module	By the end	of this cour	rse stud	ents wi	ill atta	in the f	following	learning outcomes.
objectives/inte	The studer						-	U
nded learning				-		-		nguages and their
outcomes		ication to c					-	-
	• proficiency in a programming language, such as Python or R, and							
	apply it to data analysis, data visualization, and database management.							
	Students wi	ill have th	e skill t	to				

	<ul> <li>Create and manipulate data sets using various data types, including structured, semi-structured, and unstructured data.</li> <li>Design, implement and optimize complex database schemas, using SQL and other database management tools.</li> <li>Use data cleaning and data preprocessing techniques to prepare data for analysis, and apply exploratory data analysis techniques to gain insights from data.</li> </ul>
	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	<ul> <li>The "Programming for Data Analysis and Databases" course covers the following topics:</li> <li>Introduction to programming languages for data analysis and databases</li> <li>Data types and structures in Python and R</li> <li>Data cleaning and preprocessing techniques</li> <li>Data visualization and reporting</li> </ul>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<ol> <li>Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2017.</li> <li>Hadley Wickham, "R for Data Science: Import, Tidy, Transform, Visualize, and Model Data", O'Reilly Media, 2017.</li> <li>Jennifer Widom, "Database Systems: The Complete Book (2nd Edition)", Pearson, 2018.</li> <li>Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016.</li> <li>Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, "An Introduction to Statistical Learning:</li> </ol>

#### 2<sup>nd</sup> term

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

Lecturer(s)	Issakhanova Assel Alimakhanovna PhD in Pedagogy and psychology							
Language	Russian							
Relation to	Master prog	Master programmes: all educational programmes						
curriculum								
Type of	Lectures serve to introduce new concepts and provide theoretical and							
teaching	methodolog							
	Practice se	essions (se	eminar	s) are	activ	ve sess	sions to	develop student's
	confidence t	through ne	w exan	nples a	nd dis	cussior	is on the p	oroblems.
	Instructor-	supervised	d indep	oenden	t stu	dy (ISI	S) compr	rises review of the
	professional	lly-oriented	d mate	rial, di	iscuss	ion of	issues re	elated to students'
	professional							
		-		•			•	ncluding the time
	required to j	prepare for	and co	omplete	e all co	ourse as	ssessment	S.
Workload of								
course	ECTS		act hou		ISI	SIS	Total ho	urs
components	credits	Lecture	Practi		S			
and credits per		S	sessio		10			100
trimester	4	20	2	0	10	50 120		120
Course								
assessment and	Period	Assessm	ont	Num	hor	Exam	Form	Schedule
forms of	1 enioù		em	of points				(Week #)
examination	1 <sup>st</sup>	type Problem	Sets	60	mis	Submi	ssion of	Weekly
examination	attestatio	1 IOOICIII	Dets				n reports	Weekiy
	n	Mid-term		40		Writte	•	5 <sup>th</sup> week
		Exam				Individual		5 WOOK
					project			
		1 <sup>st</sup> attest	ation	100				
		total						
	2nd		Problem Sets			Submission of		Weekly
	attestatio					written	n reports	
	n	End-term	<u></u>	40		Writte	- n	10 <sup>th</sup> week
		End-term Exam	1			Indivi		10 WCCK
		L'Adili				projec		
		2 <sup>nd</sup> attes	tation	100		projee	t .	
		total	<i>cacion</i>	100				
	Final Exan			100		Quiz		During final
								exam session
	Cumulative = 100.	e total for t	the cou	rse = (	),3 * 1	<sup>st</sup> Att +	- 0,3 * 2 <sup>nd</sup>	Att + 0,4*Final

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	<ul> <li>By the end of this course students will attain the following learning outcomes.</li> <li>The student will show a working knowledge in: <ul> <li>Know the conceptual apparatus describing management activities;</li> <li>Mastering the theoretical laws of life and dynamics of control systems;</li> </ul> </li> <li>Students will have the skill to <ul> <li>Manage the ways of introspection, self-development and self-organization;</li> <li>The ability to organize methods of organizing teamwork;</li> <li>Apply the techniques of discussions, group work, independent analysis of cases arising in the practical work of a psychologist.</li> <li>Independently navigate the various approaches existing in domestic and world science to psychological processes and phenomena arising in management;</li> <li>Use socio-psychological mechanisms for managing group phenomena and processes; analyze employee motivation.</li> </ul> </li> <li>In terms of Competences, students will be able to <ul> <li>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.</li> </ul> </li> </ul>
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	<ul> <li>Basic Literature:</li> <li>1. Akhtaeva N. S., Abdigapparova A. I., Bekbaeva Z. N. Management psychology Almaty: Kazakh University, 2018.</li> <li>2. Essentials of Organizational Behavior / S. P. Robbins, T. A. Judge. - 14th ed Almaty : National Translation Bureau, 2019</li> </ul>

 1	
3.	Balzac R. Organizational Psychology for Managers / R. Balzac, R. Starker, 2020
	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.
(	<b>▲</b>
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
Supplan	entary 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.
1	psychological approach. Studies.manual Mr. KDO, 2015.
6	Ignator V G. Theory of management: a course of lectures $/VG$
6.	Ignatov V. G. Theory of management: a course of lectures / V.G.
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 Workload of course components and credits per trimester	methodolog Practice so confidence Instructor- exploration	ical founda essions (se through ne supervised in greater independe prepare for	ations. eminar w exam d indej depth o ent stud	s) are pples an pender f the co dy (SI mplete rs ce ms	acti nd dis nt stu ourse S): S	ve sess scussion <b>Idy (IS</b> materia Self-stud	sions to ns on the p SIS) deals Il. dy time in	with review and ncluding the time
	5	50		0	50	50	150	]
Course assessment and forms of examination	Period 1 <sup>st</sup> attestatio n	Assessm type Mid-tern project	n	Numl of po 100		Exam Subm the wr projec	ission of ritten	Schedule (Week #) 5 <sup>th</sup> week
		1 <sup>st</sup> attest total	ation	100				
	2nd attestatio n	End-term project		60		Submission of the written project		8 <sup>th</sup> - 9 <sup>th</sup> week
		End-tern	n Quiz	40		Writte		10 <sup>th</sup> week
		2 <sup>nd</sup> attes total	tation	100				
	Final Exan			100		Writte	en	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	grade (or submised the submised of the submise	e is manda ummer scl ssions are r g, duplicat the Lectu	tory. N hool). not acce tion, fal rer: stu	<b>lissing</b> pted. <b>Isificat</b> idents a	30% ion o are w	<b>o of less</b> <b>f data,</b> elcome	<b>plagiaris</b> to arrange	e one-to-one

Recommended	R Studio, python, bash scripting
prerequisites	K Studio, pytholi, ousil scripting
Module objectives/inte nded learning outcomes	<ul> <li>By the end of this course students will attain the following learning outcomes.</li> <li>The student will show a working knowledge in: <ul> <li>solid understanding of the key concepts, methods, and techniques in business analytics and their application to big data analysis.</li> <li>Analysis of large and complex data sets, using a range of statistical and computational techniques, to derive meaningful insights and inform business decision-making.</li> </ul> </li> </ul>
	<ul> <li>Students will have the skill to</li> <li>Select and apply appropriate statistical models, algorithms, and software tools</li> <li>extract insights from structured and unstructured data, including text, image, and video data.</li> </ul>
	In terms of Competences, students will be able to
	<ul> <li>Evaluate the quality and reliability of data, identify data issues and potential biases, and take appropriate steps to address these issues.</li> <li>Communicate insights and recommendations to stakeholders, using appropriate data visualization techniques and effective storytelling.</li> </ul>
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. PrenticeHall, 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, AddisonWesley, 2001.36. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad,and Michael Stal, Pattern'Oriented Software Architecture: A System ofPatterns, Wiley, 1996.37. Douglas Schmidt, Michael Stal, Hans Rohnert, and Frank Buschmann,Pattern'Oriented Software Architecture 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	Turar Olzha	s, Comput	ational	& Data	a Scie	nce De	partment	Dire	ector, PhD
responsible									
for the module									
Lecturer(s)	-								
Language	English	English							
Relation to	Master Prog	ram: Appl	ied Dat	a Anal	ysis				
curriculum	_				•				
Type of	Lectures s	erve to in	troduce	e new	conc	epts a	nd provid	le t	heoretical and
teaching	methodolog	ical founda	ations.						
	Practice se	essions (se	eminar	s) are	activ	ve sess	sions to	dev	elop student's
	confidence t	through ne	w exan	ples a	nd dis	cussior	ns on the p	orob	lems.
	Instructor-	supervised	l inder	oender	nt stu	dy (IS	<b>IS)</b> deals	wi	th review and
	exploration								
	Student's i	ndepende	nt stu	dy (SI	<b>S):</b> S	elf-stud	dy time i	nclı	iding the time
	required to p								_
Workload of									
course	ECTS	Cont	act hou		ISI	SIS	Total		
components	credits	Lecture	Practi	ce	S		hours		
and credits per		S	sessio	ns					
trimester	5	30	2	0	50	50	150		
				1					
Course	Period	Assessm	ent	Num		Exam	Form		chedule
assessment and		type		of points					Week #)
forms of	1 <sup>st</sup>	Mid-tern	1	100		Submission of		5 <sup>t</sup>	<sup>h</sup> week
examination	attestatio	project					the written		
	n	1.01		100		project			
		1 <sup>st</sup> attest	ation	100					
	2 1	total		(0)		<u>a 1</u>		ot	h oth 1
	2nd	End-term	1	60			ission of	8	<sup>h</sup> - 9 <sup>th</sup> week
	attestatio	project				the wr			
	n	End-term Quiz		40		project		1/	) <sup>th</sup> week
		End-term	ı Quiz	40		Writte		10	) week
		and th	4 - 4 •	100				-	
			tation	100					
	Einel E-			100		MI			
	Final Exan	1		100		writte	n		-
								ey	kam session
	Final Exan	2 <sup>nd</sup> attes total	tation	<b>100</b> 100		Writte	n		uring final am 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/inte nded learning	By the end of this course students will attain the following learning outcomes. <b>The student will show a working knowledge in:</b>
outcomes	<ul> <li>Understand the concept of digital business ecosystems and how they are transforming traditional business models.</li> <li>Analyze the key drivers and challenges of digital business ecosystems, including emerging technologies, data analytics, and platform strategies.</li> </ul>
	Students will have the skill to
	<ul> <li>Evaluate the competitive landscape of digital business ecosystems,</li> <li>develop strategies to compete and collaborate within them.</li> </ul>
	In terms of Competences, students will be able to
	<ul> <li>Develop a deep understanding of the role of data and analytics in digital business ecosystems, including data acquisition, analysis, and sharing.</li> <li>Show critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.</li> </ul>
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"
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 Fina	ance						
Code								
Trimester	2							
Person responsible for the module	Turar Olzha	s, Computational & Data Science Department Director, PhD						
Lecturer(s)	-							
Language	English							
Relation to curriculum	Master Prog	Master Program: Applied Data Analysis						
Type of teaching	methodolog Practice se confidence t Instructor-s	ectures serve to introduce new concepts and provide theoretical and hethodological foundations. ractice sessions (seminars) are active sessions to develop student's onfidence through new examples and discussions on the problems. nstructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.						
		-	<b>nt study (S</b> and comple	/	•	time including the time ssments.		
Workload of								
course	ECTS	Contact hours ISIS SIS Total hours						
components and credits per	credits	Lecture Practice s sessions						
trimester	5	30 20 50 50 150						

Course	Period	Assessment	Number	Exam Form	Schedule	
assessment and		type	of points		(Week #)	
forms of examination	1 <sup>st</sup> attestatio n	Mid-term project	100	Submission of the written project	5 <sup>th</sup> week	
		1 <sup>st</sup> attestation total	100			
	2nd attestatio n	End-term project	60	Submission of the written project	8 <sup>th</sup> - 9 <sup>th</sup> week	
		End-term Quiz	40	Written	10 <sup>th</sup> week	
		2 <sup>nd</sup> attestation total	100			
	Final Exan	1	100	Written	During final exam session	
	Cumulative $= 100.$	e total for the cou	rse = $0,3 *$	$1^{st}$ Att + 0,3 * $2^{nd}$	Att + 0,4*Final	
Requirements according to the examination regulations Recommended prerequisites Module objectives/inte nded learning outcomes	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. Business Analytics 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					
	<ul> <li>the financial industry.</li> <li>impact of emerging technologies on financial markets, including blockchain, artificial intelligence, and machine learning.</li> </ul>					
<ul> <li>Students will have the skill to</li> <li>Evaluate the risks and opportunities of digital finance, a strategies to manage and mitigate these risks.</li> <li>Develop a deep understanding of financial data and including data acquisition, analysis, and interpretation.</li> <li>In terms of Competences, students will be able to</li> </ul>						

	• 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	<ol> <li>Don Tapscott and Alex Tapscott, "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World", Penguin Random House, 2016.</li> <li>Marcos Lopez de Prado, "Advances in Financial Machine Learning", Wiley, 2018.</li> <li>Andrew W. Lo, "Adaptive Markets: Financial Evolution at the Speed of Thought", Princeton University Press, 2018.</li> <li>David Easley and Marcos M. Lopez de Prado, "Microstructure and Noise in Financial Markets: A Comprehensive Overview", Elsevier, 2018.</li> <li>Kevin Werbach, "The Blockchain and the New Architecture of Trust", MIT Press, 2018.</li> </ol>

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.

Workload of course	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.							
	ECTS	Contact	hor	irs	ISI	S	SIS	Total hours
components	credits	Lectures Practice			151	0	515	Total Hours
and credits per			sessions					
trimester	5	30				50	50	150
Course	Period	Assessment		Numb	er	Ev	am Form	Schedule
assessment and	1 chibu	type		of poin				(Week #)
forms of	1 <sup>st</sup>	Mid-term		100	105	Sul	omission o	
examination	attestatio	project					written	
	n	1 5				pro	ject	
		1 <sup>st</sup> attestatio total	)n	100				
	2nd	End-term		60		Sul	omission o	f $8^{th} - 9^{th}$ week
	attestatio	project				the	written	
	n					pro	ject	
		End-term Qu	uiz	40		Wr	itten	10 <sup>th</sup> week
		2 <sup>nd</sup> attestation	on	100				
	Final Exam			100	100 Written		itten	During final exam session
Requirements	Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$ Fina 100.						<sup>nd</sup> Att + 0,4*Final =	
-		• •					essons wil	l result in F (Fail)
-		immer school			/ .			
	Č (	sions are not a		pted.				
								ism, and crib
								nge one-to-one
		th the teacher						the class.
	Programmin	g for Data An	aly	sis and ]	Data	base	S	
prerequisites	D 41 1	64	<u> </u>		1		C. 11	. 1
Module abiactives/into	•							g learning outcomes.
objectives/inte nded learning	i ne studen	t will show a	WO:	rking k	110W	leag	ge in:	
outcomes	• kou	nethods and t	مما	of date	and	lvei	including	g data preprocessing,

<ul> <li>feature selection, model training, and evaluation.</li> <li>different data analysis techniques and methods to solve real-world problems, including supervised and unsupervised learning, time series analysis, and text analytics.</li> </ul>							
Students will have the skill to							
<ul> <li>Use data analysis software tools and packages, such as scikit-learn, TensorFlow, and PyTorch, to build and evaluate machine learning models.</li> <li>Evaluate the quality and reliability of data, identify data issues and potential biases, and take appropriate steps to address these issues.</li> </ul>							
In terms of Competences, students will be able to							
<ul> <li>Communicate data analysis results and insights to stakeholders, using appropriate data visualization techniques and effective storytelling.</li> <li>Show critical thinking and problem-solving skills, using data to inform decision-making in a rapidly changing and uncertain environment.</li> </ul>							
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 Multimedia classrooms equipped with computer, projection and audio							
system; Whiteboard; Microsoft Teams; LMS Moodle.							
<ol> <li>Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016.</li> </ol>							
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.							
<ol> <li>Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The</li> </ol>							
Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2017.							
<ol> <li>Max Kuhn and Kjell Johnson, "Applied Predictive Modeling", Springer, 2013.</li> </ol>							
<ol> <li>5. Dan Jurafsky and James H. Martin, "Speech and Language Processing (3rd ed. draft)", Pearson, 2020.</li> </ol>							

Module name:	Teaching Internship
Code	

Trimester	2								
Person	Assoc. Prof	Zh.Tlesho	ova, Ca	ndidate	e of P	edagog	ical Scien	ces	
responsible			,			00			
for the module									
Lecturer(s)	Assoc. Prof	. Zh.Tlesho	ova, Ca	ndidate	e of P	edagog	ical Scien	ces	
Language	English								
Relation to	Master deg	Aaster degree programmes: 7M04102 Project Management, 7M06103							
curriculum	Applied Da	Applied Data Analytics, 7M06104 Computational Sciences, 7M06105							
	Computer Science and Engineering, 7M04102 Digital Public								
	Administrat	ion and Se	rvices						
Type of teaching	Instructor-	supervised	l teach	ing pr	actice	è			
Workload of									
course components	ECTS	Cont	act hou	irs	ISI	SIS	Total		
and credits per	credits	Lecture	Pract	ice	S		hours		
trimester		s	sessio	ons					
	4	-	-		60	60	8-week	<u>x</u>	
							period o	of	
							internsh	ip	
Course assessment		1.		1	-	[	_		
and forms of	Period	Assessm	ent	Num		Exam Form		Schedule	
examination		type		of po	ınts	<b>D</b>		(Week #)	
	Final	Organizi		100		-	t defense	1-3 weeks	
	grade	tutorial h	our			on a tu	utorial		
		with BA				hour			
		students	1	100		D	. 1.0	1.0 1	
		Class and	d	100		Repor	t defense	1-3 weeks	
		lesson							
		observati		100				4.0.1	
		Three les	ssons	100				4-8 weeks	
		that MA	•						
		students	<b>U</b>	100		<b>W</b> 7 • 44		4.0	
		A teachin	•	100		Writte	en	4-8 weeks	
		Philosop	•						
		statemen		100		<b>W</b> 7 • 44		4.0 1	
		Disciplin		100		Writte	en	4-8 weeks	
		instructo	rs						
Requirements	Course and	grade	u nelle		Inda				
according to the	Course and					0/ 1	ossons	ill result in F	
examination		5 15 manus	atory.	10112211	ig 30	70 UI I	C320112 MI	in result in F	
regulations	(Fail) grade (or s	ummor col	hool)						
	- ·		,	nted					
Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib									
		5, uupiicai	1011, 1 <b>a</b>	isiiicat	.1011 0	i uata,	p1ag1a1 181	in, and CI IV	

	<b>Contacting the Lecturer</b> : students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended	Pedagogy of Higher Education, Psychology of Management;
prerequisites	Methodology and Methods of Research
Module	Upon the completion of "Teaching Internship", MA students will attain
objectives/intended	the following learning outcomes. The student will show a working
learning outcomes	knowledge in:
	<ul> <li>pedagogy of a major discipline;</li> </ul>
	<ul> <li>methodology of teaching a major discipline;</li> </ul>
	<ul> <li>methodology of assessment;</li> </ul>
	<ul> <li>management in Higher Education;</li> </ul>
	<ul> <li>design of educational programs;</li> </ul>
	<ul> <li>teaching and learning outcomes, assessment methodology and methods of teaching and learning;</li> </ul>
	<ul> <li>organization of teaching and learning environments.</li> </ul>
	Students will have the skill to
	<ul> <li>demonstrate hard and soft skills in a major discipline and pedagogy;</li> </ul>
	<ul> <li>apply the principles of learning and teaching processes;</li> </ul>
	• apply methods and approaches in teaching;
	• apply various IT technologies;
	<ul> <li>apply approaches of motivation (engagement) of BA students to study.</li> </ul>
	In terms of Competences, students will be able to
	<ul> <li>work with students as tutors;</li> </ul>
	<ul> <li>evaluate student behaviour and their response to teaching and content;</li> </ul>
	<ul> <li>employ modern educational technologies;</li> </ul>
	<ul> <li>apply teaching and learning methods;</li> </ul>
	• 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
1	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 <u>https://ocw.mit.edu/courses/chemistry/5-95j-</u>
teaching-college-level-science-and-engineering-fall-2015/instructor-insights/

### 3d term

Module name:	Data Proces	ssing and	Unders	standi	ng				
Code									
Trimester	3								
Person	Turar Olzha	s, Computa	ational	& Data	a Scie	ence De	partment	Dire	ector, PhD
responsible									
for the module									
Lecturer(s)	-								
Language	English								
Relation to	Master Prog	Master Program: Applied Data Analysis							
curriculum									
Type of	Lectures serve to introduce new concepts and provide theoretical and								
teaching	methodolog								
	Practice se	essions (se	eminar	s) are	acti	ve ses	sions to	dev	elop student's
	confidence t	hrough nev	w exam	ples a	nd dis	scussion	ns on the p	orob	lems.
	Instructor-	supervised	l indep	oender	nt stu	ıdy (IS	SIS) deals	W	ith review and
	exploration								
									uding the time
	required to p	prepare for	and co	mplete	e all c	ourse a	ssessment	s.	
Workload of		1				1			
course	ECTS	Cont	act hou	rs	ISI	SIS	Total		
components	credits	Lecture	Practi	ce	S		hours		
and credits per		S	sessio	ns					
trimester	5	30	2	0	50	50	150		
Course	Period	Assessme	ent	Num	ber	Exam	Form	S	chedule
assessment and		type		of po	ints			(	Week #)

forms of examination	1 <sup>st</sup> attestatio n	Mid-term project	100	Submission of the written project	5 <sup>th</sup> week			
		1 <sup>st</sup> attestation total	100					
	2nd attestatio n	End-term project	60	Submission of the written project	8 <sup>th</sup> - 9 <sup>th</sup> week			
		End-term Quiz	40	Written	10 <sup>th</sup> week			
		2 <sup>nd</sup> attestation total	100					
	Final Exan	1	100	Written	During final exam session			
	Cumulative = 100.	e total for the cou	rse = $0,3$	* $1^{st}$ Att + 0,3 * $2^{nd}$	Att + 0,4*Final			
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	d Tools of Data A	nalysis					
Module objectives/inte nded learning outcomes	<ul> <li>By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in:</li> <li>fundamental concepts of data processing and how they are used in data analytics.</li> <li>impact of data preprocessing on data quality and the accuracy of machine learning models.</li> <li>Students will have the skill to</li> <li>Evaluate different data processing techniques, including feature selection, feature engineering, and data transformation.</li> <li>Develop a deep understanding of statistical techniques for data processing, including probability distributions, hypothesis testing, and regression analysis.</li> </ul>							

	<ul> <li>In terms of Competences, students will be able to</li> <li>Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.</li> </ul>
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	<ol> <li>Ian H. Witten, Eibe Frank, and Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann Publishers, 2016.</li> <li>Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2009.</li> <li>Dursun Delen, "Predictive Analytics and Data Mining: Concepts and Practice with RapidMiner", Elsevier, 2014.</li> <li>Mark J. Embrechts, Claudia Klüppelberg, and Thomas Mikosch, "Modeling Extremal Events for Insurance and Finance", Springer, 1997.</li> <li>John W. Tukey, "Exploratory Data Analysis", Addison-Wesley, 1977.</li> </ol>

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	Master Program: Applied Data Analysis
curriculum	
Type of	Lectures serve to introduce new concepts and provide theoretical and
teaching	methodological foundations.

	Practice se	essions (s	eminar	s) are	acti	ve	sessions	s to	develop stud	lent's
	<b>Practice sessions (seminars)</b> are active sessions to develop student's confidence through new examples and discussions on the problems.									
		<b>Instructor-supervised independent study (ISIS)</b> 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	ECTS	Cont	act hou	rs	ISIS	S	SIS	Tota	ıl hours	1
components	credits	Lecture	Practi							
and credits per		S	sessio	ons						
trimester	5	30		0	5	0	50		150	
				-		-				_1
Course	Period	Assessm	ent	Num	ber	Ex	am Forr	n	Schedule	
assessment and		type		of po	ints				(Week #)	
forms of	1 <sup>st</sup>	Mid-tern	n	100		Su	bmissio	n of	5 <sup>th</sup> week	
examination	attestatio	project				the	written	L		
	n					pro	ject			
		1 <sup>st</sup> attest	ation	100						
		total								
	2nd	End-term	1	60		Submission of			$8^{\text{th}} - 9^{\text{th}} \text{ wee}$	k
	attestatio	project				the written				
	n					project				
		End-term	n Quiz	40	)		Written		10 <sup>th</sup> week	
		2 <sup>nd</sup> attes	totion	100						
		total	tation	100						
	Final Exan			100		W/r	itten		During fina	1
		.1		100			nucii		exam session	
										/11
	Cumulativ	e total for t	the cour	rse=(	)	1 <sup>st</sup> Δ	tt + 0.3	* 2 <sup>nd</sup>	Att + 0.4*Fir	nal
	= 100.				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	I 17		4	· · · · · · · · · · · · · · · · · · ·	141
										I
Requirements	Course and	universit	v polic	ies inc	lude:					
according to			• •				lessons	will r	esult in F (F	ail)
the	grade (or s		-	3	, .,			_	ζ- ·	,
examination	Late submis			pted.						
regulations	No cheating			-	tion o	of da	ta, plag	giarisi	m, and crib	
		-						-	e one-to-one	
	meetings wi									
Recommended	Methods and									
prerequisites										

Module objectives/inte nded learning	By the end of this course students will attain the following learning outcomes. <b>The student will show a working knowledge in:</b>
outcomes	<ul> <li>fundamental concepts of data-driven decision making and how it is used in different industries.</li> <li>impact of data and analytics on decision-making processes, including</li> </ul>
	problem definition, data collection, analysis, and interpretation.
	Students will have the skill to
	<ul> <li>Evaluate different decision-making models and their applications in different domains, including business, healthcare, and social sciences.</li> <li>Develop a deep understanding of statistical techniques for decision making, including probability distributions, hypothesis testing, and regression analysis.</li> </ul>
	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	<ol> <li>W. Edwards Deming, "Out of the Crisis", MIT Press, 1986.</li> <li>Jay Liebowitz, "Big Data and Business Analytics", CRC Press, 2013.</li> <li>Daniel Kahneman, "Thinking, Fast and Slow", Farrar, Straus and Giroux, 2011.</li> <li>Norean R. Sharpe, Richard D. De Veaux, and Paul F. Velleman, "Business Statistics", Pearson, 2019.</li> <li>Gary Klein, "Sources of Power: How People Make Decisions", MIT Press, 1999.</li> </ol>

Module name: Product Management
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Code											
Trimester	3										
Person	Mukhamedl	arimova A	neliva	PhD							
responsible	1110111001	iurinio (ur	menya	, 1 112							
for the module											
Lecturer(s)	Mukhamed	Mukhamedkarimova Aneliya, PhD									
Language	English	English									
Relation to	Master Prog	ram: Appl	ied Dat	ta Anal	ysis						
curriculum	-				•						
Type of	Lectures s	erve to in	ntroduc	e new	conc	epts a	nd provid	le t	heoretical and		
teaching	methodolog										
	Practice se	essions (s	eminar	s) are	acti	ve ses	sions to	deve	elop student's		
	confidence	hrough ne	w exan	ples a	nd dis	cussion	ns on the p	orobl	lems.		
	Instructor-	supervised	d inde	pender	nt stu	dy (IS	SIS) deals	wi	th review and		
	exploration	in greater of	depth o	f the co	ourse	materia	ıl.				
	Student's i	ndepende	nt stu	dy (SI	<b>S):</b> S	elf-stu	dy time i	nclu	ding the time		
	required to	prepare for	and co	mplete	all co	ourse a	ssessment	s.			
Workload of		1			1	-	1				
course	ECTS		act hou		ISI	SIS	Total				
components	credits	Lecture	Practi		S		hours				
and credits per		S	sessio								
trimester	5	30	2	0	50	50	150				
Course	Period	Assessm	ent	Num	ber	Exam	Form	Sc	hedule		
assessment and		type		of points					Week #)		
forms of	1 <sup>st</sup>	Mid-tern	n	100			ission of	5 <sup>th</sup>	<sup>1</sup> week		
examination	attestatio	project					ritten				
	n	1 0				projec	t				
		1 <sup>st</sup> attest	ation	100							
		total									
	2nd	End-term	1	60		Subm	ission of	8 <sup>th</sup>	<sup>1</sup> - 9 <sup>th</sup> week		
	attestatio	project				the wi	ritten				
	n					projec			1		
		End-term	1 Quiz	40		Writte	en	10	<sup>th</sup> week		
		and in		100							
		2 <sup>nd</sup> attes total	tation	100							
	Final Exan			100		Writte	en	Dı	uring final		
		•				,, 1100	***		am session		
				1				1 - 11			
	1										

	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 nded learning	By the end of this course students will attain the following learning outcomes. <b>The student will show a working knowledge in:</b>
outcomes	<ul> <li>fundamental concepts of product management and its role in driving innovation and growth in companies.</li> <li>customer needs and market trends to develop successful product strategies and roadmaps.</li> </ul>
	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
	<ul> <li>Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in product management.</li> <li>Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment.</li> </ul>
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	<ol> <li>Marty Cagan, "Inspired: How to Create Tech Products Customers Love", John Wiley &amp; Sons, 2017.</li> <li>Eric Ries, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses", Crown Business, 2011.</li> <li>Jeff Patton, "User Story Mapping: Discover the Whole Story, Build the Right Product", O'Reilly Media, 2014.</li> <li>Steve Blank and Bob Dorf, "The Startup Owner's Manual: The Step-By- Step Guide for Building a Great Company", K &amp; S Ranch, 2012.</li> <li>Martin Eriksson, "Product Leadership: How Top Product Managers Launch Awesome Products and Build Successful Teams", O'Reilly Media, 2017.</li> </ol>

Module name:	Industry 4.	.0						
Code								
Trimester	3							
Person responsible for the module	Neftissov Alexandr, PhD							
Lecturer(s)	Neftissov Al	Neftissov Alexandr, PhD						
Language	English							
Relation to curriculum	Master Prog	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	Бото	G	. 1	ICI	GIG	TT ( 1	7	
course	ECTS		Contact hours ISI SIS Total					
components and credits per	credits	Lecture s	Practice sessions	S		hours		
trimester	5	30	20	50	50	150		

Course	Period	Assessment	Number	Exam Form	Schedule		
assessment and	Period			Exam Form			
	1 <sup>st</sup>	type	of points	0.1	(Week #)		
forms of	-	Mid-term	100	Submission of	5 <sup>th</sup> week		
examination	attestatio	project		the written			
	n			project			
		1 <sup>st</sup> attestation	100				
		total					
	2nd	End-term	60	Submission of	8 <sup>th</sup> - 9 <sup>th</sup> week		
	attestatio	project		the written			
	n			project			
		End-term Quiz	40	Written	10 <sup>th</sup> week		
		and the training	100				
		2 <sup>nd</sup> attestation	100				
		total					
	Final Exan	1	100	Written	During final		
					exam session		
= 100.							
Requirements	Course and	university polic	ies include:	<u> </u>			
according to		• •		% of lessons will r	esult in F (Fail)		
the		ummer school).			court in 1 (1 un)		
examination		sions are not acce	ented				
regulations			<b>1</b>	of data, plagiaris	m and crib		
regulations				velcome to arrange			
				ours to discuss the			
Recommended	U		<u> </u>	ours to discuss the	e class.		
prerequisites	Methods an	d Tools of Data A	narysis				
Module	By the end	of this course stud	ents will att	ain the following	learning outcomes.		
objectives/inte	•	it will show a wo		•	learning outcomes.		
nded learning	The stude		I KING KIOV	icuge in.			
outcomes	• fundamental concepts of Industry 4.0 and its impact on the future of work.						
	<ul> <li>components of Industry 4.0, including cyber-physical systems, the Internet of Things (IoT), and cloud computing.</li> </ul>						
	Students wil	l 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, stud	ents will be	able to			

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

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

	Student's i	ndepende	nt stu	dy (SI	<b>S):</b> S	elf-stu	dy time i	ncluding the time	
	required to j								
Workload of									
course	ECTS	Cont	act hou	rs	ISI	SIS	Total		
components	credits	Lecture Practice		ce	S		hours		
and credits per		S	sessic	ons					
trimester	5	30	2	0	50	50	150		
		1						, <u> </u>	
Course	Period	Assessment		Num		Exam Form		Schedule	
assessment and		type		of po	ints			(Week #)	
forms of	1 <sup>st</sup>	Mid-tern	1	100			ission of	5 <sup>th</sup> week	
examination	attestatio	project				the wr	ritten		
	n					projec	t		
		1 <sup>st</sup> attest	ation	100					
		total		(0)		<b>a</b> 1		oth oth 1	
	2nd	End-term	1	60			ission of	8 <sup>th</sup> - 9 <sup>th</sup> week	
	attestatio	project				the written			
	n	<b>D</b> 1 4	0.	10		projec		10 <sup>th</sup> week	
		End-term	i Quiz	40		Writte	n	10 <sup>th</sup> week	
		2 <sup>nd</sup> attes	4.2.4.2.2.2	100					
		total	lation	100					
	Final Exan			100		Writte	'n	During final	
		1		100		** 1100		exam session	
	Cumulative total for the course = $0.3 \times 1^{\text{st}} \text{Att} + 0.3 \times 2^{\text{nd}} \text{Att} + 0.5$					Att + 0,4*Final			
	= 100.								
Requirements	Course and								
according to			•	lissing	30%	of less	sons will r	esult in F (Fail)	
the	grade (or si								
examination	Late submis			1					
regulations	No cheating								
								e one-to-one	
	meetings wi	th the teac	her dur	ing off	ice ho	ours to	discuss the	e class.	
Recommended									
prerequisites									
Module	By the and	of this cour	ee etud	ente m	ill atta	in the f	Collowing	learning outcomes.	
objectives/inte	The studer						•	icanning outcomes.	
nded learning		LU VVIII SIIUV	11 a 110	i Killg I	NII U W	icuge I			
outcomes	• fund	• fundamental concepts of information security and its importance.							
	- Tullu			51 mil	mut		y unu 1	is mipor unice.	

	• 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
	<ul> <li>Develop a deep understanding of data-driven decision making and the role of data and analytics in information security.</li> <li>Develop critical thinking and problem-solving skills, using data and</li> </ul>
	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	Multimedia classrooms equipped with computer, projection and audio
employed	system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<ol> <li>Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", Cengage Learning, 2018.</li> <li>Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", John Wiley &amp; Sons, 1995.</li> <li>Eric Conrad, Joshua Feldman, and Seth Misenar, "CISSP Study Guide", Syngress, 2020.</li> <li>Ross J. Anderson, "Security Engineering: A Guide to Building Dependable Distributed Systems", Wiley, 2008.</li> <li>D. J. Henry and S. R. Simon, "Cybersecurity and Cyberwar: What Everyone Needs to Know", Oxford University Press, 2014.</li> </ol>

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

the module									
eturer(s) T	Timur Akhmetov, PhD								
nguage E	English								
ation to M	Master Programme: Applied Data Analysis, Compulsory course.								
ching m P	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.								
In ez St	<b>nstructor-s</b> xploration i	upervised in greater o ndepende	l inder lepth of nt stud	benden f the co ly (SI	nt stu ourse i S): S	<b>dy (IS</b> materia elf-stuc	IS) deals 1. ly time i	with revie ncluding th	
rkload of									
	ECTS credits	Lecture	act hou Practi	ce	ISI S	SIS	Total hours		
nester	5	s 30	sessio 2		50	50	150		
ırse	Period	Assessme	ent	Numł	ber	Exam	Form	Schedule	
ssessment and forms of attestatio project n		of points 100		Submission of the written project		(Week #) 5 <sup>th</sup> week	)		
		1 <sup>st</sup> attestation total		100		<u> </u>			
2	2nd attestatio n	End-term project		60		Submission of the written project		8 <sup>th</sup> - 9 <sup>th</sup> w	eek
		End-term	n Quiz	40		Writte		10 <sup>th</sup> week	
		2 <sup>nd</sup> attestation total		100					
	Final Exam			100		Writte	n	During fin	
	Final Exam Cumulative = 100.	total		100	),3 * 1			exam s	sess

Requirements	Course and university policies include:
according to	Attendance is mandatory. Missing 30% of lessons will result in F (Fail)
the	grade (or summer school).
examination	Late submissions are not accepted.
regulations	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	R Studio, python, bash scripting
prerequisites	
Module	By the end of this course students will attain the following learning outcomes.
objectives/inte	The student will show a working knowledge in:
nded learning	1. Understand the key concepts and principles of business process
outcomes	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	Multimedia classrooms equipped with computer, projection and audio
employed	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.

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

Module name:	Machine Le	earning an	nd Arti	ficial I	ntelli	gence		
Code								
Trimester	3							
Person	Akhmetov T	Timur, PhD	)					
responsible								
for the module								
Lecturer(s)	Akhmetov T	Timur, PhD	)					
Language	English							
Relation to curriculum	Master Prog	ram: Appl	ied Dat	a Anal	ysis			
Type of				e new	conc	epts a	nd provid	le theoretical and
teaching	methodolog							
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	confidence t	•		-			-	
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	exploration							
								ncluding the time
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Course	Period	Assessm	ent	Numl		Exam	Form	Schedule
assessment and		type		of points		(Week #)		
forms of	1 <sup>st</sup>	Mid-tern	1	100			ission of	5 <sup>th</sup> week
examination	attestatio	project	ect			the written		
	n					projec	t	
		1 <sup>st</sup> attest	ation	100				
		total						

	2nd attestatio n	End-term project	60	Submission of the written project	8 <sup>th</sup> - 9 <sup>th</sup> week		
		End-term Quiz	40	Written	10 <sup>th</sup> week		
		2 <sup>nd</sup> attestation total	100				
	Final Exan	1	100	Written	During final exam session		
	Cumulativ 100.	e total for the cou	rse = 0,3 *	$1^{st}$ Att + 0,3 * 2 <sup>nd</sup>	Att + 0,4*Final =		
Requirements according to the examination regulations	Course and university policies include:Attendance is mandatory. Missing 30% of lessons will result in F (Igrade (or summer school).Late submissions are not accepted.No cheating, duplication, falsification of data, plagiarism, and cribContacting the Lecturer: students are welcome to arrange one-to-onemeetings with the teacher during office hours to discuss the class.						
Recommended prerequisites							
Module objectives/inte nded learning outcomes	<ul> <li>By the end of this course students will attain the following learning outor The student will show a working knowledge in:</li> <li>fundamental concepts of machine learning and artificial intell and their applications in different domains.</li> <li>different machine learning and artificial intelligence algorithm select the most appropriate one for a given task.</li> </ul>						
	<ul> <li>Students will have the skill to</li> <li>Develop and implement machine learning and artificial intelligence models using programming languages and tools.</li> <li>Evaluate the performance of machine learning and artificial intelligence is a statement of machine learning and artificial intelligence.</li> </ul>						
	intelligence models and interpret the results. In terms of Competences, students will be able to						
	<ul> <li>Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in machine learning and artificial intelligence.</li> <li>Demonstrate critical thinking and problem-solving skills, using machine learning and artificial intelligence to inform decision-making</li> </ul>						

	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	<ol> <li>Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2017.</li> <li>Ian Goodfellow, Yoshua Bengio, and Aaron Courville, "Deep Learning", MIT Press, 2016.</li> <li>Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow", Packt Publishing, 2017.</li> <li>Peter Norvig and Stuart Russell, "Artificial Intelligence: A Modern Approach", Pearson, 2021</li> </ol>					

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- exploration Student's i required to	in greater o independe	depth o nt stu	f the co dy (SI	ourse i S): S	materia elf-stuo	ıl. dy time i	ncludii	
Workload of									
course	ECTS	Cont	rs ISI		SIS	Total			
components	credits	Lecture	ce	S		hours			
and credits per		s sessions							
trimester	5	30	2	0	50	50	150		
Course	Period	Assessme	ent	Numl	ber	Exam	Form	Sche	dule
assessment and		type		ofpo				(We	ek #)
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		1 <sup>st</sup> attest total	ation	100					
	2nd	End-term	1	60		Subm	ission of	8 <sup>th</sup> -	9 <sup>th</sup> week
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	n	FJ				project			
		End-term Quiz		40		Written		10 <sup>th</sup>	week
		2 <sup>nd</sup> attest total	tation	100					
	Final Exam			100		Writte	en		ng final
Requirements according to the examination regulations	Cumulative = 100. Course and Attendance grade (or su Late submis No cheating Contacting	l universit e is manda ummer scl sions are n g, duplicat the Lectu	y polic tory. N hool). lot acce ion, fa rer: stu	ies incl Iissing pted. Isificat	ude: 30% ion of	of less f data, elcome	sons will r plagiaris to arrange	<b>result i</b> <b>m, and</b> e one-to	n F (Fail) I crib o-one
Recommended	meetings wi Methods and			U		ours to	uiscuss the	e class.	
prerequisites Module objectives/inte	By the end The studer						-	learnin	g outcome

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	Turar Olzhas, Computational & Data Science Department Director, PhD
responsible	
for the module	

Lecturer(s)       -         Language       English         Relation       to         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       Contact hours       ISI         5       30       20       50       50         Course casessment and forms of examination       Period       Assessment       Number       Exam Form       Schedule         1 <sup>84</sup> Mid-term       100       Submission of the written project       5 <sup>th</sup> week         1 <sup>184</sup> End-term       60       Submission of the written project       5 <sup>th</sup> ogh week         1 <sup>184</sup> End-term       60       Submission of the written project       5 <sup>th</sup> - 9 <sup>th</sup> week         1 <sup>184</sup> End-term       100       Written       10 <sup>th</sup> week									
Language       English         Relation       to         Master Program: Applied Data Analysis         curriculum         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:       Simulate real-world industrial research projects and provide students with experience in conducting research and working with others.         Workload of course components and credits per trimester       ECTS       Contact hours       ISI       SIS       Total hours assessment         Course casesment and forms of examination       Period       Assessment       Number       Exam Form       Schedule (Week #)         1 <sup>st</sup> Mid-term       100       Submission of the written project       5 <sup>th</sup> week         1 <sup>st</sup> End-term       60       Submission of the written project       1 <sup>st</sup> attestation project         1 <sup>st</sup> End-term       60       Submission of the written project       1 <sup>st</sup> attestation project         1 <sup>st</sup> End-term       60       Submission of the written project       1 <sup>st</sup> attestation project         1 <sup>st</sup> End-term       60       Submission of the written project       1 <sup>st</sup> attestation project       1 <sup>st</sup> attestation project       1 <sup></sup>	Lecturer(s)	_							
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curriculum         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       Contact hours       ISI       SIS       Total hours         5       30       20       50       150       Exam Form       Schedule (Week #)         Course assessment and forms of examination       Period       Assessment       Number of points       Exam Form       Schedule (Week #)         1 <sup>st</sup> Mid-term       100       Submission of the written project       5 <sup>th</sup> week         1 <sup>st</sup> Mid-term       100       Submission of the written project       1 <sup>th</sup> attestatio project       1 <sup>th</sup> attestatio       2 <sup>th</sup> attestatio         n       End-term       60       Submission of the written project       1 <sup>th</sup> attestatio       10 <sup>th</sup> week         1 <sup>st</sup> End-term       100       Written       10 <sup>th</sup> week         1 <sup>th</sup> attestation no       100			ram: Appl	ied Dat	a Anal	ysis			
teaching       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 and credits per trimester       ECTS       Contact hours       ISI       SIS       Total hours         5       30       20       50       150       Schedule         Course assessment and forms of examination       Period       Assessment       Number       Exam Form       Schedule         1 <sup>st</sup> Mid-term       100       Submission of sth week       5th week         2nd       End-term       60       Submission of the written project       1st attestation project         1 <sup>st</sup> End-term       60       Submission of the written project       1th week         2nd       End-term       60       Submission of the written project       1th week         Inductive total for the course = 0,3 * 1 <sup>st</sup> Att + 0,3 * 2 <sup>nd</sup> Att + 0,4 * Final = 100.       Inductive total for the course = 0,3 * 1 <sup>st</sup> Att + 0,3 * 2 <sup>nd</sup> Att + 0,4 * Final = 100.	curriculum	C	11			5			
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examination grade (or summer school).	examination	• • • • • • • • • • • • • • • • • • • •							
regulations Late submissions are not accepted.	regulations	<u> </u>		,	pted.				

	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	By the end of this course students will attain the following learning outcomes. <b>The student will show a working knowledge in:</b>
outcomes	<ul> <li>principles of research methodology and design, including qualitative and quantitative research methods.</li> <li>Students will have the skill to</li> </ul>
	• 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
	<ul> <li>Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a research context.</li> <li>Communicate research findings effectively to different audiences, including academic and industry stakeholders.</li> </ul>
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	<ol> <li>Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2008.</li> <li>Thomas K. Landauer, "The Trouble with Computers: Usefulness, Usability, and Productivity", MIT Press, 1995.</li> <li>Paul D. Allison, "Multiple Regression: A Primer", Pine Forge Press, 1999.</li> <li>Andrew Gelman and Jennifer Hill, "Data Analysis Using Regression and Multilevel/Hierarchical Models", Cambridge University Press, 2006.</li> <li>Diana C. Mutz, "Impersonal Influence: How Perceptions of Mass Collectives Affect Political Attitudes", Cambridge University Press, 1998.</li> </ol>

Module name: Research work of master student
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Code								
Trimester	4							
Person responsible for the module	Turar Olzhas, Computational & Data Science Department Direvtor, PhD							
Lecturer(s)	-							
Language	English							
Relation to curriculum	Master Prog	ram: Applied Dat	a Analysis					
Type of teaching	methodolog Practice seconfidence to Instructor- exploration Student's i	ical foundations. essions (seminar hrough new exan supervised indep in greater depth o ndependent stue	rs) are acting the stand dispendent stand f the course dy (SIS): S	ive sessions to scussions on the p udy (ISIS) deals material.	with review and ncluding the time			
Workload of course components and credits per trimester	-							
Course assessment and	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)			
forms of examination	1 <sup>st</sup> attestatio n	Mid-term project	100	Submission of the written project	5 <sup>th</sup> week			
		1 <sup>st</sup> attestation total	100					
	2nd attestatio n	End-term project	60	Submission of the written project	8 <sup>th</sup> - 9 <sup>th</sup> week			
		End-term Quiz	40	Written	10 <sup>th</sup> week			
	Final Exan	2 <sup>nd</sup> attestation total	<b>100</b>	Written	During final			
	rinal Exan	1	100	written	exam session			
	Cumulative $= 100.$	e total for the cou	rse = $0,3 *$	$1^{st}$ Att + 0,3 * $2^{nd}$	Att + 0,4*Final			

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	<ul> <li>By the end of this course students will attain the following learning outcomes.</li> <li>The student will show a working knowledge in: <ul> <li>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</li> </ul> </li> </ul>
	<ul> <li>Students will have the skill to</li> <li>Formulate and develop a research question or problem related to data analysis and apply appropriate research methods to address it.</li> <li>Design and execute a research project, including data collection, analysis, and interpretation.</li> <li>Develop skills in academic writing and presentation, including the ability to write a research paper and present research findings in a public forum.</li> <li>Apply advanced research techniques and methods to a specific research problem or question in the field of data analysis.</li> </ul>
	<ul> <li>In terms of Competences, students will be able to</li> <li>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.</li> </ul>
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	<ol> <li>Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2016.</li> <li>Catherine Dawson, "Introduction to Research Methods: A Practical Guide for Anyone Undertaking a Research Project", How To Books, 2009.</li> </ol>

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.