Module Handbook

MASTER PROGRAMME

Applied Data Analytics

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STUDY PROGRAMME OVERVIEW

| | Term 1 | 1 | | | | | | | |
|---|--------------|---------|-------------------|------|-----|----------------|--|--|--|
| | Workload | | | | | | | | |
| Module | ECTS credits | Lecture | Practice sessions | ISIS | SIS | Total hours | | | |
| Foreign language (professional) | 4 | 20 | 20 | 20 | 60 | 120 | | | |
| History and philosophy of science | 4 | 20 | 20 | 20 | 60 | 120 | | | |
| Psychology of Management | 4 | 20 | 20 | 20 | 60 | 120 | | | |
| Higher Education Pedagogy | 4 | 20 | 20 | 20 | 60 | 120 | | | |
| Mathematics for data science | 5 | 30 | 20 | 30 | 70 | 150 | | | |
| Programming for data analysis and databases | 5 | 30 | 20 | 30 | 70 | 150 | | | |
| Total | 26 | 140 | 120 | 140 | 380 | 780 | | | |

| Term 2 | | | | | | | | |
|---|--------------|---------|-------------------|------|-----|----------------|--|--|
| | | | Workload | l | | | | |
| Module | ECTS credits | Lecture | Practice sessions | ISIS | SIS | Total hours | | |
| Methods and tools for data analysis | 5 | 30 | 20 | 30 | 70 | 150 | | |
| Case study on data Analytics | 5 | 30 | 20 | 30 | 70 | 150 | | |
| Business process analysis | 5 | 30 | 20 | 30 | 70 | 150 | | |
| Business analytics/Digital Finance/Digital business ecosystem | 5 | 30 | 20 | 30 | 70 | 150 | | |
| Teaching Internship | 4 | - | - | 40 | 80 | 120 | | |
| Master's research work | 6 | - | - | 54 | 126 | 180 | | |
| Total | 30 | 120 | 80 | 214 | 486 | 900 | | |

| | Term 3 | 3 | | | | |
|--|--------------|---------|-------------------|------|-----|----------------|
| | | | Workload | l | | |
| Module | ECTS credits | Lecture | Practice sessions | ISIS | SIS | Total hours |
| Machine learning and artificial intelligence | 4 | 20 | 20 | 20 | 60 | 120 |
| Data Analytics application project | 4 | 20 | 20 | 20 | 60 | 120 |
| Data processing and understanding/Making decisions based on data | 5 | 30 | 20 | 30 | 70 | 150 |
| Product management/Industry 4.0/Information security | 5 | 30 | 20 | 30 | 70 | 150 |
| Master's research work | 4 | - | - | 36 | 84 | 120 |
| Total | 22 | 100 | 80 | 136 | 344 | 660 |

| Term 4 | | | | | | | | | | |
|------------------------|--------------|---------|-------------------|------|-----|----------------|--|--|--|--|
| | | | Workload | l | | | | | | |
| Module | ECTS credits | Lecture | Practice sessions | ISIS | SIS | Total hours | | | | |
| Research practice | 16 | - | - | 144 | 336 | 480 | | | | |
| Master's research work | 4 | - | - | 36 | 84 | 120 | | | | |
| Total | 20 | | | 180 | 420 | 600 | | | | |

| Term 5 | | | | | | | | | |
|--|--------------|---------|-------------------|------|-----|----------------|--|--|--|
| | | | Workload | l | | | | | |
| Module | ECTS credits | Lecture | Practice sessions | ISIS | SIS | Total hours | | | |
| Master's research work (master's thesis) | 10 | | | 90 | 210 | 300 | | | |
| Preparation and defense of a master's thesis | 12 | | | 108 | 252 | 360 | | | |
| Total | 22 | | | 198 | 462 | 660 | | | |

1st term

| Module name: | Foreigi | n Lan | guage (| Prof | essi | onal) | | | | | | | | |
|---|--|---|--------------|--------|-------|------------------------|------|-----------------------|-----------|--|------|----------------|-------|---------|
| Code | | | | | | | | | | | | | | |
| Trimester | 1 | | | | | | | | | | | | | |
| Person responsible for the module | | Aliya Ayazbayeva, Assistant Professor, Candidate pf Philological SciencesElmira Gerfanova, Assistant Professor, PhD | | | | | | | | sElmira | | | | |
| Lecturer(s) | Gerfar | nova, | Assistar | nt Pro | ofess | sor, Phl | D | | date pf I | | _ | | ience | sElmira |
| Language | Englis | sh | | | | | | | | | | | | |
| Relation to curriculum | Comp | ulsory | course | | | | | | | | | | | |
| Type of teaching | founda Practi throug Instru in grea Stude prepar | Lectures serve to introduce new concepts and provide theoretical andmethodological 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 timerequired to prepare for and complete all course assessments. Teaching methods: project-based learning, case study result presentation, task based learning. | | | | | | | | confidence exploration required to | | | | |
| Workload of | | | | | | | | | | | | | | |
| course components and credits per | | | ECTS credits | | Lec | Contactures | Prac | ars ctice sions | ISIS | 5 | SIS | Total hours | | |
| trimester | | | 4 | | | | | 40 | 40 | | 40 | 120 |) | |
| Course assessment and forms of examination | Period | riod Assessment type | | | | | | edule eek #) | | | | | | |
| | | 1 st attes | station | defe | endi | ng and ng ations | 15 | | Preser | | tion | We | ek 3 | |

| | | Quiz | 15 | Computer- based | Week 5 |
|-----------------|------------------------|---------------------|------------|---------------------------------|--------------------------|
| | | 1st | 30 | 0.000 | |
| | | attestation | | | |
| | | total | | | |
| | 2nd | Preparing and | 15 | Presentation | Week 8 |
| | attestation | defending | | defense | |
| | | presentations | | 0.020000 | |
| | | Quiz | 15 | Written | Week 10 |
| | | 2nd | 30 | | |
| | | attestation | | | |
| | | total | | | |
| | Final Exan | 1 | 40 | Oral | During final |
| | | | | | exam sessions |
| | Total for th | | 100 | | |
| | Cumulative | e total for the cou | rse = 0,3 | * 1^{st} Att + 0,3 * 2^{nd} | Att + 0,4*Final = |
| | 100. | 75 11 1 | | | |
| Recommended | Foreign language (| English), English | n for Aca | demic Purposes (Bs | degree) |
| prerequisites | N/ / 1 | 1 . 1 1 | , 1. | 1 (1) | • |
| Recommended | Master's research v | work, including if | nternsnip | s and a master's the | S1S |
| postrequisites | | | | | |
| Module | The student will s | _ | • | 0 | |
| objectives/inte | _ | thentic profession | onally o | riented texts and | identifying reading |
| nded learning | structures | | 11 . | . 1 | . 1 |
| outcomes | _ | - | • | ented texts for unde | erstanding mainideas |
| | 1 | ying supporting d | | 1 1 1 | 1' ' 1 |
| | | ant professional f | | rmai and informat | discussionspresented |
| | | 1 | | lls to communica | te effectively in a |
| | professiona | | Kilig Ski | ns to communica | ic circuivery in a |
| | Students will hav | _ | | | |
| | | | s. evalua | te and discuss idea | s from areading |
| | = | comprehend prof | | | 5 11 0 111 W C W W 111 B |
| | | • • | | | project and answer |
| | questions | gen, er eren pres | | | project and answer |
| | - | itten professional | lv oriente | ed texts | |
| | In terms of comp | | • | | |
| | _ | on professional to | | | |
| | | - | - | bulary and stylistics | s in authenticsources |
| | | | | lated to professiona | |
| | | - | | are and give presen | |
| | | and use grammar | | | |
| | self-reflect and eva | aluate reasoning | | | |
| Content | | | _ | | gram studentsfocus or |
| | basic skills in lister | ning, reading, wri | ting and s | speaking with an em | phasis on professional |

| | English, research and presentation structures, vocabulary and language usage. The | | | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|--|--|--|
| | earning outcomes are designed in a way so that the students can successfully apply | | | | | | | | | | |
| | neir 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 system; | | | | | | | | | | |
| employed | Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | | | | | |
| Reading list | Main: | | | | | | | | | | |
| | Esteras, S.R., & Fabre, E.M. (2010). Professional English in Use –ICT. | | | | | | | | | | |
| | Cambridge University Press | | | | | | | | | | |
| | Additional: | | | | | | | | | | |
| | Paterson, K. (2013). Oxford Grammar for EAP. London: Oxford UniversityPress. | | | | | | | | | | |
| | 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: | History and Philosophy of Science |
|----------------|---|
| Code | |
| Trimester | 1 |
| Person | Assoc. Prof. A. Uyzbayeva, PhD |
| responsible | |
| for the module | |
| Lecturer(s) | Assoc. Prof. A. Uyzbayeva, PhD |
| Language | Russian, English |
| Relation to | Master program: Compulsory course. |
| curriculum | |
| Type of | Teaching methods: Lecture-based learning, class discussions, analysis-based |
| teaching | learning, gamification, teamwork and individual learning. |
| | Forms 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. |

| course | ECTS | Cont | act hours | ISI | SIS | Total | |
|-----------------|-----------------|------------------|-----------|-----------|-----|------------|---------------------------|
| components | credits | Lecture | Practice | S | | hours | |
| and credits per | | S | sessions | | | | |
| trimester | 4 | 20 | 20 | 20 | 60 | 120 | |
| | | | | | | | |
| Course | | | | | | | |
| assessment and | Period | Assess | ment | Number of | Exa | am Form | Schedule |
| forms of | | type | | points | | | (Week #) |
| examination | 1 st | Oral | | 35 | Ora | al defense | 3 rd week |
| | attestation | presen | tation | | | | |
| | | Oral | | 35 | Ora | al defense | 4 th week |
| | | presen | tation | | | | |
| | | Mid-te | erm | 30 | Tes | st | 5 th week |
| | | MCQ | | | | | |
| | | (Multi | | | | | |
| | | | e Quiz) | | | | |
| | | 1 st | | 100 | | | |
| | | attesta | tion | | | | |
| | | total | | | | | |
| | 2 nd | Oral | | 35 | Ora | al defense | 7 th week |
| | attestation | presen | | | | | |
| | | Oral | | 35 | Ora | al defense | 9 th week |
| | | presen | | | | | 41- |
| | | Mid-te | erm | 30 | Tes | st | 10 th week |
| | | MCQ | | | | | |
| | | (Multi | | | | | |
| | | | e Quiz) | 400 | | | |
| | | 2 nd | | 100 | | | |
| | | attesta total | ition | | | | |
| | Final Exam | MCQ | | 100 | Tes | st | During final exam session |

| Γ= . | |
|---|--|
| Requirements according to the examination regulations | Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class. |
| Recommended prerequisites | Philosophy (BS program) |
| Recommended Post-requisites | Research methodology internship, Master thesis writing |
| Module objectives/inte | By the end of this course students will attain the following learning outcomes. |
| nded learning outcomes | The student will show a working knowledge in: |
| | know the genesis and history of science from the formation of its models, images and styles of thinking; see the relationship of scientific and philosophical thoughts; know the fundamental basis and conceptual apparatus of the history and philosophy of science; understand basic principles of research activities. |
| | Students will have the skill of: Application of philosophical knowledge in complex research; Searching for scientific literature on the philosophy of science; Writing reviews of scientific articles. |
| | In terms of Competences, students will be able to formulate and solve problems that arise in the course of research activities and require in-depth professional knowledge; Give critical analysis and evaluation modern scientific achievements; choose the necessary research methods, modify existing and develop new methods based on the objectives of a particular study; analyze and comprehend the realities of modern theory and practice based on the history and philosophy of science, the methodology of natural science, socio-humanitarian and technical knowledge. |
| Content | The course "History and Philosophy of Science" introduces the problem of the phenomenon of science as a subject of special philosophical analysis, forms knowledge about the history and theory of science; the laws of development of science and the structure of scientific knowledge; science as a profession and a social institution; on methods of conducting scientific research; the role of science in the development of society. |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle. |

| Reading list | Basic Literature: |
|--------------|---|
| | 1. History and philosophy of science. Ed. Kryaneva Yu.V., Motorina L.E M.: |
| | INFRA-M, 2011 416 p. |
| | 2. Stepin V.S. History and philosophy of science M.: Academic Project, 2011 |
| | 423 p. |
| | 3. Khasanov M.Sh., Petrova V.F. History and philosophy of science Almaty: |
| | Kazakh University, 2013 150 p. |
| | 4. Philosophy of science. Edited by A.I. Lipkin M.: Eksmo, 2009 608 p. |
| | Supplementary literature: |
| | 1. Myrzaly S. Philosophy, 2018. |
| | 2. Lebedev S.A., Ilyin V.V. Introduction to the philosophy and history of science |
| | M.: Editorial URSS, 2009 344 p. |
| | 3. Kokhanovsky V.P. etc. Fundamentals of philosophy of science M.: Phoenix, |
| | 2010 603 p. |
| | 4. Nurysheva G.Zh. Philosophy Almaty, 2016. |

| Module name: | Psychology of Management |
|---|--|
| Code | |
| Trimester | 1 |
| Person responsible for the module | Assoc. Prof. A. Issakhanova, PhD |
| Lecturer(s) | Issakhanova Assel Alimakhanovna PhD in Pedagogy and psychology |
| Language | Russian |
| Relation to curriculum | Master program: Compulsory course. |
| Type of teaching | Teaching methods: formal and interactive lecturing, gamification, role playing and case study. |
| | Forms of teaching: |
| | Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student's |
| | confidence through new examples and discussions on the problems. |
| | Instructor-supervised independent study (ISIS) comprises review of the professionally oriented material, discussion of issues related to students' professional fields. |

| | Student's i | | | | | | | ncluding the time | |
|-------------------------------|---|---------------------------------|----------|------------|----------|-------------------------------|------------------------|---------------------------|--|
| Workload of course | ECTS Contact hours ISI SIS Total hours | | | | | | | | |
| components and credits per | credits | Lecture Practic s session | | | S | | | | |
| trimester | 4 | 20 | 2 | .0 | 20 | 60 | | 120 | |
| Course | | T . | | T | . 1 | _ | _ | | |
| assessment and forms of | Period | Assessment type | | Numl of po | | Exam Form | | Schedule (Week #) | |
| examination | 1 st attestatio | Problem | Sets | 60 | | | ission of n reports | Weekly | |
| | n | Mid-tern Exam | 1 | 40 | | Writte Indivi- projec | dual | 5 th week | |
| | | 1 st attest total | ation | 100 | | ¥ | | | |
| | 2nd attestatio | Problem Sets | | 60 | | Submission of written reports | | Weekly | |
| | n | End-term Exam | | 40 | | Written. Individual project | | 10 th week | |
| | | 2 nd attest | tation | 100 | | | | | |
| | Final Exan | Final Exam | | | | _ | | 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 | Course and | | - | | | of loss | ong will r | regult in F (Fail) | |
| examination regulations | 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. | | | | | | | | |
| | | | | | | e one-to-one | | | |
| Recommended prerequisites | Psychology, Philosophy, History (Bs program modules). | | | | | | | | |
| Post-requisites | Research pr | actice | | | | | | | |
| Module objectives/inte | By the end | of this cou | rse stud | lents wi | ill atta | in the f | Collowing 1 | learning outcomes. | |

| nded learning | The student will show a working knowledge in: | | | | | | |
|---------------|---|--|--|--|--|--|--|
| outcomes | Know the conceptual apparatus describing management activities; | | | | | | |
| | Mastering the theoretical laws of life and dynamics of control systems; | | | | | | |
| | Students will have the skill to | | | | | | |
| | • Manage the ways of introspection, self-development and self- | | | | | | |
| | organization; | | | | | | |
| | The ability to organize methods of organizing teamwork; | | | | | | |
| | Apply the techniques of discussions, group work, independent analysis | | | | | | |
| | of cases arising in the practical work of a psychologist. | | | | | | |
| | Independently navigate the various approaches existing in domestic | | | | | | |
| | and world science to psychological processes and phenomena arising | | | | | | |
| | in management; | | | | | | |
| | Use socio-psychological mechanisms for managing group phenomena | | | | | | |
| | | | | | | | |
| | and processes; analyze employee motivation. | | | | | | |
| | In terms of Competences, students will be able to | | | | | | |
| | • to organize management activities; to explain the psychological | | | | | | |
| | phenomena of management, selection of diagnostic tool and corrective | | | | | | |
| | techniques in the analysis of cases arising in the practice of applied | | | | | | |
| | psychological work. | | | | | | |
| | | | | | | | |
| Content | This course provides scientifically - based training of highly qualified | | | | | | |
| | specialists based on the study and analysis of psychological conditions and | | | | | | |
| | features of managerial activity in the process of professional formation within | | | | | | |
| | the chosen specialty and orientation on personal self - development. | | | | | | |
| Media | Multimedia classrooms equipped with computer, projection and audio | | | | | | |
| employed | system; interactive Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | |
| Reading list | Basic Literature: | | | | | | |
| reading not | 1. Akhtaeva N. S., Abdigapparova A. I., Bekbaeva Z. N. | | | | | | |
| | Management psychology Almaty: Kazakh University, 2018. | | | | | | |
| | 2. Essentials of Organizational Behavior / S. P. Robbins, T. A. Judge. | | | | | | |
| | - 14th ed Almaty : National Translation Bureau, 2019 | | | | | | |
| | 3. Balzac R. Organizational Psychology for Managers / R. Balzac, R. | | | | | | |
| | Stephen. 2020 | | | | | | |
| | 4. Looij, August van. Series: Psychology of Emotions, Motivations | | | | | | |
| | and Actions. New York: Nova. 2019. | | | | | | |
| | 5. Susan W. Weinschenk. 100 Things Every Desinger Needs To | | | | | | |
| | Know About People / W. W. Susan USA: Pearson, 2020. | | | | | | |
| | 6. Social Psychology: Handbook of Basic Principles / Van Lange | | | | | | |
| | A.M. Paul, H.E. Tory, W. A. Kruglanski New York: The | | | | | | |
| | Guilford Press, 2021. | | | | | | |
| | 7. Psychology/ G.M. David, C. Nathan DeWall 13 ed New York: | | | | | | |
| | Macmillan International Higher Education, 2021. | | | | | | |
| | 8. Susan W. Weinschenk. 100 Things Every Desinger Needs To | | | | | | |
| | Know About People / W. W. Susan USA: Pearson, 2020 | | | | | | |
| | Ishow Hoodt Feople / W. W. Susan OSA. Fearson, 2020 | | | | | | |
| | | | | | | | |

| Supplem | 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. |
| 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: | Higher Education Pedagogy |
|-----------------|---|
| Code | |
| Trimester | 1 |
| Person | Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences |
| responsible | |
| for the module | |
| Lecturer(s) | Assoc. Prof. Zh.Tleshova, Candidate of Pedagogical Sciences |
| Language | English |
| Relation to | Master degree program: Compulsory course. |
| curriculum | |
| Type o teaching | Teaching methods: Lecture-based learning, class discussions, analysis-based learning, gamification, teamwork and individual learning, active learning, interrogative teaching methods. |
| | Forms of teaching: Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems of higher education and didactics. Instructor-supervised independent study (ISIS) focuses on the review of reviewing research papers, theories, and practices. It is designed to explore in greater depth the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assignments. |

| Workload of | | | | | | | | | |
|------------------|---|-------------------------|--------|----------|-----------------|-------------------------|------------|-----------------|---------------------------|
| course | ECTS | Contact hours | | ırs | ISIS | SIS | Total | | |
| components | credits | Lectures Pract | | | 1010 | | hours | | |
| and credits per | Credits | sessions | | | | | nours | | |
| trimester | 4 | 20 20 | | 20 | 60 | 120 | | | |
| timester | 4 | 20 | | 20 | 20 | 00 | 120 | | |
| | | | | | | | | | |
| Course | r | T | | 1 | | | | | |
| assessment and | Period | Assessme | Number | | Exam [| Form | Sc | hedule | |
| forms of | | type | | of poi | | | | | Veek #) |
| examination | 1 st | Reading | | 25 |] | Presen | tation | On | ice in two |
| | attestatio | material | | | ; | and dis | scussion | we | eeks |
| | n | discussion | ıs | | (| of oral | reports | | |
| | | | | | 1 | based o | on the | | |
| | | | | | 1 | reading | g | | |
| | | | | | | materi | | | |
| | | Quiz | | 5 | , | Writte | n | 5 th | week |
| | | 1 st attesta | tion | 30 | | ., | - | | .,, 0 0.22 |
| | | total | | | | | | | |
| | 2nd | Reading | | 25 | 1 | Presen | tation | Or | nce in two |
| | attestatio | material | | 23 | | | scussion | | eeks |
| | n | discussion | | | of oral reports | | *** | CKS | |
| | l discus | | 15 | | | based of | | | |
| | | | | | | reading | | | |
| | | | | | | materi | _ | | |
| | | Quiz | | 5 | | Writte | | 10 | th week |
| | | 2 nd attests | ation | 30 | | | | | |
| | | total | | 30 | | | | | |
| | Final Exan | | | 40 | | Oral | | Di | ring final |
| | Tillai Exail | | | 10 | | Oran | | | am session |
| | Total for th | ne course | | 100 | | | | CA | ani session |
| | Total for the course 100 | | | | | | | | |
| | Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$ Final = | | | | | | | | |
| | 100. | C 101a1 101 ll | ic cou | 130 – 0, | <i>J</i> 1 | <i>1</i> 7 111 ⊤ | 0,5 4 1 | ∴ 111 ⊤ | 0, 4 1 111a1 – |
| | 100. | | | | | | | | |
| | | | | | | | | | |
| Requirements | Course and | Lunivanaity | nolio | iog ingl | ndo. | | | | |
| according to the | | • | - | | | of Logg | | 1 | 4 in E (Eail) |
| examination | | | - | ınssıng | 30% | or ress | ons will r | esui | t in F (Fail) |
| regulations | grade (or si | | | . 1 | | | | | |
| 105010110115 | Late submis | | | - | • | 1 4 | | | |
| | No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one | | | | | | | | |
| | _ | | | | | | _ | | |
| | meetings wi | th the teach | er dur | ıng offi | ce hou | irs to d | uscuss the | e cla | SS. |
| | | | | | | | | | |

| Recommended prerequisites | Psychology; Research Methodology (Bs modules) | | | | | |
|--------------------------------|---|--|--|--|--|--|
| Recommended Post-requisites | Teaching practice | | | | | |
| Module | The student will show a working knowledge in: | | | | | |
| objectives/inte | Higher education methodology, system, and processes; | | | | | |
| nded learning outcomes | Management in Higher Education: processes, faculty members and students; educational programs design; | | | | | |
| | Teaching and learning outcomes, assessment methodology and methods of teaching and learning; | | | | | |
| | Organization of teaching and learning environments; Proposition Acts in a description on the binaria binaria description. | | | | | |
| | Regulation Acts in education on teaching in higher education; Standard contained to a bine contained the relationship of the decision. | | | | | |
| | Student-centered teaching approach and the roles of self-study; Roles of IT technology in teaching and learning; | | | | | |
| | • course and a lesson plan design; | | | | | |
| | research questions in higher education teaching and learning problems. | | | | | |
| | Students will have the skill to | | | | | |
| | Give arguments for and against the concepts in higher education methodology, system, and processes and discuss them in the class. Design the content of educational programs. Design assessment forms. Define favorable learning environment. | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | Follow regulations in teaching and learning processes and learning environment. | | | | | |
| | Apply student-centered teaching approach and self-study assignments. | | | | | |
| | Design a course and a lesson plan | | | | | |
| | Research local problems in higher education problems | | | | | |
| | In terms of Competences, students will be able to • Critically evaluate the concepts in methodology of pedagogical | | | | | |
| | sciences; | | | | | |
| | Evaluate modern tendencies in higher education Evaluate modern tendencies in higher education Output Description of the second content of the seco | | | | | |
| | Employ modern educational technologies Apply teaching and learning methods | | | | | |
| | | | | | | |
| | Define assessment forms based on the educational program content, goals and objectives; | | | | | |
| | Interpret the findings of research questions on higher education | | | | | |
| | problems. | | | | | |
| Content | The course "Pedagogy of Higher Education" is designed for MA degree students to shape their knowledge about Higher Education systems, | | | | | |

| | paradigm, university teacher competence, teaching and learning theories, | | | | | | |
|--------------|---|--|--|--|--|--|--|
| | assessment methodology and organization of teaching and learning | | | | | | |
| | processes. | | | | | | |
| Media | Multimedia classrooms equipped with computer, projection and audio | | | | | | |
| employed | system; Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | |
| Reading list | Basic Literature: | | | | | | |
| | 1. Hartley, M.&Ruby, A. (2017). Higher Education Reform and | | | | | | |
| | Development: The Case of Kazakhstan. Cambridge Press, UK. | | | | | | |
| | 2. Silova, <u>I.&Niyozov</u> , S. (2020). <i>Globalization on the Margins</i> . | | | | | | |
| | Education and Post-Socialist Transformations in Central Asia. | | | | | | |
| | Information Age Publishing Inc., USA. | | | | | | |
| | 3. Shunk D. H.(2019). Learning Theories: An Educational | | | | | | |
| | Perspective 8th Edition. Pearson | | | | | | |
| | 4. OECD. (2017). Higher Education in Kazakhstan. Reviews of | | | | | | |
| | National Policies for Education. OECD Publishing, Paris. | | | | | | |
| | 5. UNESCO. (2021). Thinking Higher and Beyond. Perspectives on the | | | | | | |
| | Futures of Higher Education to 2050. | | | | | | |
| | 6. Fry, H., Ketteridge, S.,&Marshal, S. (2009). A Handbook for Teaching | | | | | | |
| | and Learning in Higher Education. Taylor&Francis. NY., USA | | | | | | |
| | Supplementary literature: | | | | | | |
| | 1. Мынбаева, А. (2008). Основы педагогики высшей школы. | | | | | | |
| | Учебное пособие. Алматы., Казахстан. | | | | | | |
| | | | | | | | |

| Module name: | 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 program: Compulsory course |
| Type of teaching | Teaching methods: Problem-based learning (PBL), a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem, group discussion, interactive-communicative learning. |

| | Forms 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 a | | | | | | | |
| | exploration | | | | | | | with review and |
| | | | | | | | | ncluding the time |
| | required to p | - | | • | - | | • | • |
| Workload of | required to p | <u> </u> | una co | прис | un o | suise u | | 5 - |
| course | ECTS | Cont | act hou | rs | ISI | SIS | Total | |
| components | credits | Lecture | Practi | | S | | hours | |
| and credits per | Creares | S | sessio | | | | nours | |
| trimester | 5 | 30 | | 0 | 30 | 70 | 150 | |
| timiester | | 30 | | 0 | 50 | 70 | 130 | |
| | | | | | | | | |
| Course | | | | | | | | |
| assessment and | Period | Assessme | ent | Numl | ner . | Evam | Form | Schedule |
| forms of | 1 CHOC | | CIII | of po | | Exam Form | | (Week #) |
| examination | 1 st | type laborator | X 7 | 60 | iiits | Subm | iccion of | Weekly |
| CXammation | attestatio | work 1–4 | - | 00 | | Submission of | | Weekiy |
| | | WOLK 1—4 | ŀ | ļ | | written reports | | |
| | n | Mid-term | | 40 | | Written | | 5 th week |
| | | Exam 1st attestation | | 40 | | willen | | 3 week |
| | | | | 100 | 100 | | | |
| | | total | auon | 100 | | | | |
| | 2nd | laboratory | | 60 | | Subm | ission of | Weekly |
| | attestatio | work 5-8 | | | | written reports | | |
| | n | End-term | 1 | 40 | | Written | | 10 th week |
| | | Exam | | | | | | |
| | | 2 nd attest | tation | 100 | | | | |
| | | total | | | | | | |
| | Final exam | | | 100 | | | | During final |
| | | | | | | exam session | | |
| | Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$ Final=100. | | | | | | Att | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Requirements | Course and | universit | y polic | ies incl | ude: | | | |
| according to | Attendance | is manda | tory. N | Iissing | 30% | of less | sons will r | result in F (Fail) |
| the | grade (or su | ımmer scl | nool). | | | | | |
| examination | Late submis | sions are n | ot acce | pted. | | | | |
| regulations | No cheating | g, duplicat | ion, fa | lsificat | ion o | f data, | plagiaris | m, and crib |
| | Contacting | the Lect | urer: | studen | ts are | welc | ome to a | rrange one-to-one |
| | meetings wi | th the teac | her dur | ing off | ice ho | ours to | discuss the | e class. |

| Recommended | Linear Algebra, Calculus I/ II, Probability theory and statistics (Bs modules) |
|-----------------|--|
| prerequisites | Linear Algebra, Calculus I/ II, Probability theory and statistics (Bs inodules) |
| Recommended | Applied Project in Data Analytics |
| Post-requisites | Applied Project in Data Analytics |
| 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; |
| | 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 |
| | • 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. |
| | analyze and communicate the midnigs of statistical tools. |
| | In terms of Competences, students will be able to |
| | Apply appropriate statistical inference techniques to the analysis of data |
| | across a variety of domains; |
| | • Interpret the outputs from statistical software packages and programming languages; |
| | Report and communicate statistical results in a comprehensive, ethical and |
| | professional manner; |
| | Apply appropriate forecasting techniques to time series; |
| | • Identify patterns in data and implement dimension reduction techniques. |
| Content | Within the framework of the ten-week course, approaches to the description of |
| | data obtained in research, the main methods and principles of statistical analysis, |
| | interpretation and visualization of the results obtained are considered. Students |
| | will get acquainted with such methods of statistical analysis as variance, |
| | regression and cluster analysis. Students will learn how to compare groups with |
| | each other, calculate correlation coefficients and build regression equations. |
| | The main emphasis is on mathematical ideas, intuition and logic, which |
| | determine the methods and calculation formulas. The studied material will be |

| | applicable to solving a wide range of problems arising in the framework of research work in almost any direction. | | | | | | | |
|-------------------|---|--|--|--|--|--|--|--|
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; audio-visual software packages such as PowerPoint or pdf to highlight key points of text; Microsoft Teams; LMS Moodle. | | | | | | | |
| Reading list | Basic Literature: | | | | | | | |
| | 1. Peter Bruce and Andrew Bruce. Practical Statistics for Data Scientists. 2017, 303. | | | | | | | |
| | 2. Paul Orland. Math for Programers. V. 11. 2020 | | | | | | | |
| | 3. Trevor Hastie, Robert Tibshirani, Jerome Friedman. The Elements of | | | | | | | |
| | Statistical Learning. Data Mining, Inference, and Prediction. Second Edition. – Springer. 2017. – 764 c. | | | | | | | |
| | 4. Вентцель Е.С., Овчаров Л.А. Теория вероятностей и ее инженерные приложения / Е.С. Вентцель, Л.А. Овчаров. — 3-е изд., стер. — М.: | | | | | | | |
| | Академия, 2003. – 464 с. | | | | | | | |
| | 5. Гмурман В. Е. Руководство к решению задач по теории вероятностей | | | | | | | |
| | и математической статистике / В. Е. Гмурман. – М. : Высшая школа, | | | | | | | |
| | 2001. – 575 | | | | | | | |
| | Supplementary literature: | | | | | | | |
| | 6. Ross, Sheldon M. Introduction to probability models / Sheldon M. Ross | | | | | | | |
| | 6th ed. 1997 669. | | | | | | | |
| | 7. Gregory Hartman. Fundamentation Matrix Algebra. 2011. 236. | | | | | | | |

| Module name: | Programming for Data Analysis and Databases |
|----------------|---|
| Code | |
| Trimester | 1 |
| Person | Turar Olzhas, PhD |
| responsible | |
| for the module | |
| | |
| Lecturer(s) | Turar Olzhas, PhD |
| | |
| Language | English |
| Relation to | Master Program: Compulsory course. |
| curriculum | |
| Type of | Teaching methods: |
| teaching | Problem-based learning (PBL), a student-centered approach in which students |
| | learn about a subject by working in groups to solve an open-ended problem, |
| | group discussion, interactive-communicative learning. |

| Forms of teaching: Lectures serve to introduce new concepts and provide theoretical methodological foundations. | | | | | | | | | | |
|--|---|--|-----------------------|----------------------|-------|-----------------------------------|-------|--|--|--|
| | Practice sessions (seminars) are active sessions to develop student confidence through new examples and discussions on the problems. | | | | | | | | | |
| | | | | | | | | | | |
| | Instructor-supervised independent study (ISIS) deals with review a 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 | | <u>, </u> | | | · | 1 | r | | | |
| course | ECTS | Cont | act hou | rs | ISI | SIS | Total | | | |
| components | credits | Lecture | Practi | ce | S | | hours | | | |
| and credits per | | S | sessio | ons | | | | | | |
| trimester | 5 | 30 | 2 | 0 | 30 | 70 | 150 | | | |
| Course | Period | Assessme | | Numl | har | Evam | Form | Schedule | | |
| assessment and | l l criou | type | CIII | of po | | Exam Form | | (Week #) | | |
| forms of | 1 st | Mid-term | | 100 | IIILS | Submission of | | 5 th week | | |
| examination | attestatio | project | 1 | 100 | | the written | | J WCCK | | |
| Chairman 311 | n | project | | | | project | | | | |
| | | 1 st attestation total | | 100 | | proje- | | | | |
| | 2nd attestatio | End-term project | | 60 | | Submission of the written project | | 8 th - 9 th week | | |
| | | End-term Quiz | | 40 | | Written | | 10 th week | | |
| | | 2 nd attestation total | | 100 | | | | | | |
| | Final Exam | Final Exam | | | | Written | | During final exam session | | |
| | Cumulative total for the course = $0.3 * 1^{st}$ Att + $0.3 * 2^{nd}$ Att + $0.4*$ Final = 100 . | | | | | | | | | |
| Requirements according to the examination regulations | Course and Attendance grade (or su Late submis No cheating | is manda ummer sch sions are n | tory. Mool). not acce | lissing pted. | 30% | | | result in F (Fail) m, and crib | | |

| | Contacting the Lecturer: students are welcome to arrange one-to-one |
|--------------------------------------|--|
| Recommended | meetings with the teacher during office hours to discuss the class. |
| prerequisites | Probability and Statistics (Bs module) |
| Recommended Post-requisites | Business Analytics |
| Module objectives/inte nded learning | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: • Understand the fundamentals of programming languages and their |
| outcomes | application to data analysis and databases. |
| | proficiency in a programming language, such as Python or R, and apply it to data analysis, data visualization, and database management. |
| | Students will have the skill to |
| | Create and manipulate data sets using various data types, including structured, semi-structured, and unstructured data. |
| | Design, implement and optimize complex database schemas, using SQL and other database management tools. |
| | Use data cleaning and data preprocessing techniques to prepare data for analysis and apply exploratory data analysis techniques to gain insights from data. |
| | In terms of Competences, students will be able to |
| | critical analysis and reflection on applied machine learning techniques, including supervised and unsupervised learning, to analyze and model complex data sets. |
| | selection of methods for applying data visualization tools and techniques to communication of results and insights to stakeholders. |
| Content | The "Programming for Data Analysis and Databases" course covers the following topics: |
| | Introduction to programming languages for data analysis and databases |
| | Data types and structures in Python and R |
| | Data cleaning and preprocessing techniques |
| 3.6.1 | Data visualization and reporting |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | 1. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2017. |
| | 2. Hadley Wickham, "R for Data Science: Import, Tidy, Transform, Visualize, and Model Data", O'Reilly Media, 2017. |

- 3. Jennifer Widom, "Database Systems: The Complete Book (2nd Edition)", Pearson, 2018.
- 4. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016.
- 5. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, "An Introduction to Statistical Learning:

2^{nd} term

| Module name: | Methods and Tools for 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: Compulsory course. |
| Type of teaching | Teaching methods: Interactive lecturing: the instructor uses mini-lectures about 20 minutes long and involves students in a range of brief content-related activities in between. Interaction may occur between instructor and students or between and among students. Inquiry-based learning promotes the idea of learning by investigation, where students can complete projects, ask questions and find answers by themselves. While teachers act as resources in these times, the goal is for students to solve problems and discover information on their own. Inquiry Guided Learning – Students learning or applying material to meet a challenge, answer a question, conduct an experiment, or interpret data. Forms of teaching: Lectures serve to introduce new concepts and provide theoretical and |
| | methodological foundations. Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments. |

| Workload of | | | | | | | | | |
|---------------------------|--|--------------------------------|--------|----------------|---------|--------------|------------|---|--|
| course | ECTS | Contac | et hou | ırs | ISI | S | SIS | Total hours | |
| components | credits | Lectures | Pra | ctice | | | | | |
| and credits per | | | ses | sions | | | | | |
| trimester | 5 | 30 | | 20 | 3 | 30 | 70 | 150 | |
| | | 1 | | | | | 1 | <u>'</u> | |
| Course | Period | | | | am Form | Schedule | | | |
| assessment and | | type | | of points | | | | (Week #) | |
| forms of | 1 st | Mid-term | | 100 | | Su | bmission o | of 5 th week | |
| examination | attestatio | project | | | | the | written | | |
| | n | | | | | pro | oject | | |
| | | 1st attestat | ion | 100 | | | | | |
| | | total | | | | | | | |
| | 2nd | End-term | | 60 | | | bmission o | of 8^{th} - 9^{th} week | |
| | attestatio | project | | | | the | written | | |
| | n | | | | | | oject | | |
| | | End-term (| Quiz | 40 | | W | ritten | 10 th week | |
| | | | | | | | | | |
| | | 2 nd attesta | tion | 100 | | | | | |
| | | total | uon | 100 | | | | | |
| | Final Exan | | | 100 | | Written | | During final | |
| | | | | | | exam session | | | |
| | Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100. | | | | | | | | |
| Requirements | | d university | _ | | | | | | |
| according to | Attendance | is mandato | ry. N | Iissing | 30% | o of | lessons wi | ll result in F (Fail) | |
| the | _ | ummer scho | | | | | | | |
| examination | | ssions are not | | - | | | | | |
| regulations | - | _ | | | | | | rism, and crib | |
| | _ | | | | | | | nge one-to-one | |
| D 1 - 1 | | th the teache | | | | | | the class. | |
| Recommended | Frogrammir | ng for Data A | шагу | sis and | Data | เบลร์ | 28 | | |
| prerequisites Recommended | Data Analys | ice applicatio | n n= | oigot N | /Lacto | r'a r | acaarch w | ork, including | |
| Post-requisites | • | | - | | | | | | |
| Module | | | | | | | | se of a master's thesis ng learning outcomes. | |
| objectives/inte | • | of this course it will show | | | | | | ng rearning outcomes. | |
| nded learning | ine studel | it will silon | a WU | r villa i | ZIIUM | ricuş | 5c m. | | |
| outcomes | • low | methods and | tool | of dat | a and | alvei | e includin | g data preprocessing, | |
| outcomes | - | | | | | • | | | |
| | feature selection, model training, and evaluation. | | | | | | | | |

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

| Module name: | Case study on data Analytics | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|--|
| Code | | | | | | | | | | | | |
| Trimester | 2 | | | | | | | | | | | |
| Person responsible for the module | Timur Akhmetov, PhD | | | | | | | | | | | |
| Lecturer(s) | Timur Akhmetov, PhD | | | | | | | | | | | |
| Language | English | | | | | | | | | | | |
| Relation to curriculum | Master program: Compulsory course. | | | | | | | | | | | |
| Type of teaching | Teaching methods: Problem-based learning (PBL), a student-centered approach in which student learn about a subject by working in groups to solve an open-ended problem group discussion, interactive-communicative learning. Forms of teaching: Interactive teaching: the instructor uses mini-lectures about 20 minutes lon and involves students in a range of brief content-related activities in between Interaction may occur between instructor and students or between and amon students. Lecture-demonstration: The content involves a demonstration of a process or activity. The lecture typically proceeds in chronological order, with the demonstration presented in a sequence of events that the lecturer highlight and explains. Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student' 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. | | | | | | | | | | | |
| Workload of | Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments. | | | | | | | | | | | |
| course components | ECTS Contact hours ISI SIS Total credits Lecture Practice S hours | | | | | | | | | | | |
| and credits per | s sessions | | | | | | | | | | | |
| trimester | 5 30 20 30 70 150 | | | | | | | | | | | |
| | | | | | | | | | | | | |

| Course | Period | Assessment | Number | Exam Form | | | | | |
|---|--|--------------------------------------|---------------|-----------------------|--|--|--|--|--|
| assessment and | 1 et | type | of points | 0.1 | (Week #) | | | | |
| forms of | 1 st | Mid-term | 100 | Submission of | 5 th week | | | | |
| examination | attestatio | project | | the written | | | | | |
| | n | 1st 44 4 1 | 100 | project | | | | | |
| | | 1 st attestation total | 100 | | | | | | |
| | 2nd | End-term | 60 | Submission of | 8 th - 9 th week | | | | |
| | attestatio | project | | the written | | | | | |
| | n | | | project | | | | | |
| | | End-term Quiz | 40 | Written | 10 th week | | | | |
| | | 2 nd attestation | 100 | | | | | | |
| | | total | 100 | | | | | | |
| | Final Exan | ı | 100 | Written | During final | | | | |
| | | | | | exam session | | | | |
| 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. | | | | | | | | |
| D 1.1 | D : | C 1 . 1 . | 1 1 . 1 | | | | | | |
| Recommended prerequisites | Programming | g for data analysis a | ma aatabases | S | | | | | |
| Recommended | Data Analyti | cs application proje | ct. Data proc | essing and understa | nding | | | | |
| Post-requisites | | es application proje | , 2 proc | Tooming and understan | B | | | | |
| Module | By the end | of this course stud | ents will att | ain the following | learning outcomes. | | | | |
| objectives/inte | • | nt will show a wo | | | Talling outcomes. | | | | |
| nded learning | | approaches in cl | _ | g | | | | | |
| outcomes | | | _ | oncepts, methods, | and techniques in | | | | |
| | | | | n to big data analy | | | | | |
| | | ysis of large and c | | | • | | | | |
| | | l have the skill to | • | | | | | | |
| | • use a | a range of statistic | al and comp | putational techniq | ues; | | | | |
| | | | propriate s | statistical models | , algorithms, and | | | | |
| | | ware tools; | | | | | | | |
| | differentiate features, correlations, numerical and categorical data; | | | | | | | | |

| | extract insights from structured and unstructured data, including text, image, and video data. |
|-------------------|--|
| | In terms of Competences, students will be able to |
| | Evaluate graph construction |
| | select and apply models |
| | • identify the quality and reliability of data, data issues and potential |
| | biases, and take appropriate steps to address these issues. |
| Content | This course aims at discussing the key principles of knowledge discovery process through various case studies arising from different application areas. The students are expected to learn the main steps to traverse when they face new data analytics problems. With each case study, the tools for cleaning, processing and altering the data shall be visited. Particular attention will be given to data inspection, feature reduction and model selection. Each case study will be completed by a thorough discussion and interpretation of the results. |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Basic Literature: C. Andersson. A replicated empirical study of a selection method for software reliability growth models. Empirical Software Engineering, 12(2):161–182, 2007 Bertrand Meyer, Object 'Oriented Software Construction. Prentice Hall, 2000. |

| Module name: | Business Process Analysis |
|---|------------------------------------|
| Code | |
| Trimester | 2 |
| Person responsible for the module | Timur Akhmetov, PhD |
| Lecturer(s) | Timur Akhmetov, PhD |
| Language | English |
| Relation to curriculum | Master Program: Compulsory course. |

| | T1 | • | 411 | | | | | | | | | |
|-----------------|---|--|---------------------|---------------|---------------|---------------|-----------|---------|----------------------|-------------------------------------|---------|--|
| Type of | Teaching methods: Problem-based learning (PBL), a student-centered approach in which students | | | | | | | | | | | |
| teaching | learn about a subject by working in groups to solve an open-ended problem, | | | | | | | | | | | |
| | | group discussion and interactive-communicative learning. | | | | | | | | | | |
| | group | JISCU | ssion ai | iu iiiteracti | ve-commu | пс | alive ie | armne | 3. | | | |
| | Forms 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. | | | | | | | | | | |
| | | | _ | | oendent st | | | | - | | ew and | |
| | | | _ | _ | f the course | • | |) acc | 415 | with icvi | ew and | |
| | | | | | dy (SIS): S | | | time | ine | cluding th | he time | |
| | | | - | | mplete all c | | • | | | _ | | |
| Workload of | 1 | | | | | | | | | | | |
| course | | EC | ΓS | Cont | act hours | | ISIS | SIS | To | otal |] | |
| components | | crec | lits | Lectures | Practice | | | | ho | ours | | |
| and credits per | | | | | sessions | | | | | | | |
| trimester | | | 5 | 30 | 20 | | 30 | 70 | | 150 | | |
| | | | | | | | | | | | _ | |
| | | | | | | | | | | | _ | |
| Course | Period | d | Asses | sment | Number | Е | Exam Form | | | Schedule | | |
| assessment and | | | type | | of points | | | | | (Week #) | | |
| forms of | 1 st | | Mid-t | erm | 100 | Submission of | | f | 5 th week | | | |
| examination | attesta | atio | projec | et | the written | | | | | | | |
| | n | | | | | p | roject | | | | | |
| | | | 1 st att | testation | 100 | | | | | | | |
| | 2nd | | End-t | erm | 60 | S | ubmiss | sion of | f | 8 th - 9 th w | eek | |
| | attesta | atio | projec | et | | tł | ne writt | en | | | | |
| | n | | | | | | roject | | | - | | |
| | | | End-t | erm Quiz | 40 | V | Vritten | | | 10 th week | | |
| | | | | | | | | | | | | |
| | | | | | 100 | | | | | | | |
| | | | | testation | 100 | | | | | | | |
| | E: 1 | F | total | | 100 | ** | 7 | | + | D: C' | 1 | |
| | Final Exam 100 Written During final exam session | | | | | | | | | | | |
| | | | | | | | | | | caili ses | 21011 | |
| | Cumu | llativ | e total f | or the cour | rse = 0.3 * 1 | st , | Δtt ⊥ ∩ | 3 * 71 | nd 🔥 | .tt + ∩ /*I | inal – | |
| | 100. | 11att V | c wai i | or the coul | .sc – 0,5 · 1 | . / | λιι ⊤ U, | ,5 4 | A | 1 0,41 | mai – | |
| | 100. | | | | | | | | | | | |
| | | | | | | | | | | | | |

| Daguiromanta | Course and university policies include: |
|------------------|--|
| Requirements | Attendance is mandatory. Missing 30% of lessons will result in F (Fail) |
| according to 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 |
| D 1.1 | meetings with the teacher during office hours to discuss the class. |
| Recommended | Business analytics. Digital Finance. Digital business ecosystem |
| prerequisites | |
| Recommended | Master's research work, including research internships and a master's thesis |
| post - | writing. |
| requisites | |
| 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 and |
| Content | 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; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Chipioyea | by stern, interactive winterodita, wheresoft Teams, Livis whould. |
| 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. |

| Michael Pont, Patterns for Time'Triggered Embedded AddisonWesley, 2001. | Systems, |
|--|-----------------------|
| Frank Buschmann, Regine Meunier, Hans Rohnert, Pe | eter Sommerlad, and |
| Michael Stal, Pattern'Oriented Software Architecture: | A System of Patterns, |
| Wiley, 1996. | • |
| Douglas Schmidt, Michael Stal, Hans Rohnert, and Fr | ank |
| Buschmann, Pattern' Oriented Software Archtecture Vo | olume 2: Patterns for |
| Concur'rent and Networked Objects, Wiley, 2000. | |
| James Rumbaugh, OMT Insights, SIGS Books, 1996. | |

| Module name: | Business Analytics |
|------------------------|---|
| Code | |
| Trimester | 2 |
| Person | Timur Akhmetov, PhD |
| responsible | |
| for the module | |
| Lecturer(s) | Timur Akhmetov, PhD |
| Language | English |
| Relation to curriculum | Master program: Elective course. |
| Type of teaching | Problem-based learning (PBL), a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem, group discussion, interactive-communicative learning. Forms of teaching: Interactive teaching: the instructor uses mini-lectures about 20 minutes long |
| | and involves students in a range of brief content-related activities in between. Interaction may occur between instructor and students or between and among students. Lecture-demonstration: The content involves a demonstration of a process or activity. The lecture typically proceeds in chronological order, with the demonstration presented in a sequence of events that the lecturer highlights and explains. 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 | Suporvisod | Lindo | ondor | t ctu | dv (IS | (212) doole | with ravious and |
|-----------------|--|-----------------------------|-----------------------|----------|--------|--------------------|----------------|--|
| | 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 | Conta | Contact hours ISI SIS | | | | | |
| components | credits | Lecture | Practi | | S | | hours | |
| and credits per | | S | | | | | | |
| trimester | 5 | 30 | 2 | 0 | 30 | 70 | 150 | |
| | | 1 | | | | 1 | | |
| | | | | | | | | |
| Course | Period | Assessme | ent | Numl | ber | Exam | Form | Schedule |
| assessment and | | type | | of po | ints | | | (Week #) |
| forms of | 1 st | Mid-term | 1 | 100 | | Subm | ission of | 5 th week |
| examination | attestatio | project | | | | the wi | ritten | |
| | n | | | | | projec | t | |
| | | 1st attest | ation | 100 | | | | |
| | | total | | _ | | | | - 41 41 |
| | 2nd | End-term | | 60 | | | ission of | 8 th - 9 th week |
| | attestatio | project | | | | the written | | |
| | n | T. 1. | 0 : | 4.0 | | project Written | | 10th 1 |
| | | End-term | End-term Quiz | | 40 | | en | 10 th week |
| | | | | | | | | |
| | | 2nd . 44 | 4 . 4 • | 100 | | | | |
| | | 2 nd attestation | | 100 | | | | |
| | Final Exam | | total | | | Written | | During final |
| | Filiai Exaii | l | | 100 | | written | | During final exam session |
| | | | | | | | | exam session |
| | Cumulative | e total for t | he com | rse = 0 | 3 * 1 | st Att + | $0.3 * 2^{nd}$ | Att + 0,4*Final = |
| | 100. | 0 10141 101 1 | ne cou | - 0 | ,5 1 | 7 100 | 0,5 2 | |
| | | | | | | | | |
| | | | | | | | | |
| Requirements | Course and | university | y polic | ies incl | lude: | | | |
| according to | Attendance | is manda | tory. N | Iissing | 30% | of less | sons will r | result in F (Fail) |
| the | grade (or su | ımmer sch | nool). | | | | | |
| examination | Late submis | sions are n | ot acce | pted. | | | | |
| regulations | No cheating | g, duplicat | ion, fa | lsificat | ion o | f data, | plagiarisi | m, and crib |
| | | | | | | | | e one-to-one |
| | meetings wi | th the teacl | her dur | ing off | ice ho | ours to | discuss the | e class. |
| D | 3.6.4 | C 1 | • | | | | | |
| Recommended | Mathematic | s tor data s | cience | | | | | |
| prerequisites | D' | | 3 # | 4 - 17 | | | | |
| Recommended | Business pro | ocess analy | 'S1S, Ma | aster th | esis v | vriting | | |
| Post-requisites | | | | | | | | |

| Module | By the and of this course students will attain the following learning outcomes |
|-----------------|--|
| | 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 | • solid understanding of the key concepts, methods, and techniques in |
| outcomes | business analytics and their application to big data analysis. |
| | • Analysis of large and complex data sets, using a range of statistical and |
| | computational techniques, to derive meaningful insights and inform |
| | business decision-making. |
| | business decision making. |
| | Students will have the skill to |
| | • Select and apply appropriate statistical models, algorithms, and |
| | software tools |
| | |
| | • extract insights from structured and unstructured data, including text, |
| | image, and video data. |
| | |
| | In terms of Competences, students will be able to |
| | - Evaluate the quality and reliability of data identify data issues and |
| | • Evaluate the quality and reliability of data, identify data issues and |
| | potential biases, and take appropriate steps to address these issues. |
| | Communicate insights and recommendations to stakeholders, using |
| | appropriate data visualization techniques and effective storytelling. |
| Content | The course is designed to introduce the most important and basic concepts, methods |
| | in business analysis. In addition, students will also learn how to compare results |
| | between different samples. |
| Media | Multimedia classrooms equipped with computer, projection and audio |
| employed | system; Whiteboard; Microsoft Teams; LMS Moodle. |
| 1 3 | |
| Reading list | Basic Literature: |
| | 3. 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, Addi |
| | sonWesley, 2001. |
| | 4. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, |
| | and Michael Stal, Pattern'Oriented Software Architecture: A System of |
| | Patterns, Wiley, 1996. |
| | 5. Douglas Schmidt, Michael Stal, Hans Rohnert, and Frank Buschmann, |
| | Pattern'Oriented Software Archtecture Volume 2: Patterns for Concur' |
| | rent and Networked Objects, Wiley, 2000. |
| | |

| Module name: | Digital Finance |
|--------------|---|
| Code | |
| Trimester | 2 |
| Person | Turar Olzhas, Computational & Data Science Department Director, PhD |

| responsible for the module | | | | | | | | | | |
|----------------------------|---|--|---------------------|-----------|--------|--|------|----------------------|--|-----|
| Lecturer(s) | - | | | | | | | | | |
| Language | English | | | | | | | | | |
| Relation to | Master Prog | ram: Elect | ive cou | rse. | | | | | | |
| curriculum | | | | | | | | | | |
| Type of | Teaching 1 | Teaching methods: | | | | | | | | |
| teaching | and involves Interaction r students. Inquiry-base students can While teach | Interactive lecturing: the instructor uses mini-lectures about 20 minutes long and involves students in a range of brief content-related activities in between. Interaction may occur between instructor and students or between and among | | | | | | | | |
| | Forms of te | aching: | | | | | | | | |
| | methodologi Practice se | Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student's | | | | | | | | |
| | confidence t | hrough nev | w exam | iples ar | nd dis | scussio | ns c | on the p | roblems. | |
| | Instructor-s | supervised | l inde _l | penden | t stu | ıdy (I | SIS |) deals | with review a | ınd |
| | exploration | - | - | | | | | | | |
| | | | | | | | | | ncluding the time | me |
| XX7 11 1 C | required to p | prepare for | and co | mplete | all c | ourse a | asse | ssments | 5. | |
| Workload of | ECTC | Cont | 4 1 | *** | TOTO | r CI | C | Total | la assura | |
| course | ECTS credits | - | act hou Practi | | ISIS | S SI | 2 | Total | nours | |
| and credits per | Credits | Lecture | sessio | | | | | | | |
| trimester | 5 | 30 | | 0 | 30 |) 7 | 70 | | 150 | |
| | | 30 | | 0 | 30 | <u>, </u> | 0 | | 130 | |
| Course | Period | Assessme | ent | Numl | oer | Exan | ı Fo | rm | Schedule | |
| assessment and | | type | | of points | | | | | (Week #) | |
| forms of | 1 st | Mid-term | 1 | 100 | | Submission of 5 th week | | 5 th week | | |
| examination | attestatio | project | | | | the written | | | | |
| | n | | | | | project | | | | |
| | | 1 st attests total | ation | 100 | | | | | | |
| | 2nd | End-term | 1 | 60 | | Submission of | | on of | 8 th - 9 th week | |
| | attestatio | project | | | | the w | | en | | |
| | n | | | | | proje | ct | | | |

| | | End-term Quiz | 40 | Written | 10 th week | | |
|--|---|--------------------------------------|-----------|---------------------------------|--|--|--|
| | | | | | | | |
| | | 2 nd attestation total | 100 | | | | |
| | Final Exam | 1 | 100 | Written | During final exam session | | |
| | Cumulative 100. | e total for the cou | rse = 0,3 | * 1 st Att + 0,3 * 2 | 2 nd Att + 0,4*Final = | | |
| Requirements | | university polic | ies inclu | de: | <u> </u> | | |
| according to | Attendance | is mandatory. M | Iissing 3 | 0% of lessons w | ill result in F (Fail) | | |
| the | | ımmer school). | | | | | |
| examination | | sions are not acce | - | | | | |
| regulations | | g, duplication, fal | | / L | , | | |
| | O | the Lecturer: stu | | | C | | |
| Daggerenandad | | th the teacher dur | | | | | |
| Recommended prerequisites | Psychology | or management, i | rogramii | ning for data ana | lysis and databases | | |
| Recommended | Rusiness nr | ocess analysis, M | acter the | sic writing | | | |
| Post-requisites | Dusiness pr | occss analysis, wi | aster the | sis witting | | | |
| Module | | | | | | | |
| objectives/inte nded learning outcomes | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: | | | | | | |
| outcomes | fundamental concepts of digital finance and how they are transforming the financial industry. | | | | | | |
| | impact of emerging technologies on financial markets, including blockchain, artificial intelligence, and machine learning. | | | | | | |
| | Students wil | l have the skill to | | | | | |
| | Evaluate the risks and opportunities of digital finance and develop strategies to manage and mitigate these risks. Develop a deep understanding of financial data and analytics, including data acquisition, analysis, and interpretation. | | | | | | |
| | | Competences, stud | | - | station. | | |
| | | • , | | | | | |
| | analy | | decision- | _ | skills, using data and apidly changing and | | |
| Content | Introduction | n to digital finance | <u> </u> | | | | |
| | | nce applications a | | ologies | | | |
| | | ata and analytics | | | | | |

| | Regulatory and ethical considerations | | | | | |
|-------------------|---|--|--|--|--|--|
| | Emerging trends in digital finance | | | | | |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; interactive Whiteboard; Microsoft Teams; LMS Moodle. | | | | | |
| Reading list | Don Tapscott and Alex Tapscott, "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World", Penguin Random House, 2016. Marcos Lopez de Prado, "Advances in Financial Machine Learning", Wiley, 2018. Andrew W. Lo, "Adaptive Markets: Financial Evolution at the Speed of Thought", Princeton University Press, 2018. David Easley and Marcos M. Lopez de Prado, "Microstructure and Noise in Financial Markets: A Comprehensive Overview", Elsevier, 2018. Kevin Werbach, "The Blockchain and the New Architecture of Trust", MIT Press, 2018. | | | | | |

| Module name: | Digital Business ecosystem |
|-----------------------------------|---|
| Code | |
| Trimester | 2 |
| Person responsible for the module | Turar Olzhas, Computational & Data Science Department Director, PhD |
| Lecturer(s) | - |
| Language | English |
| Relation to curriculum | Master Program: Elective course |
| Type of teaching | Teaching methods: Interactive teaching: the instructor uses mini-lectures about 20 minutes long and involves students in a range of brief content-related activities in between. Interaction may occur between instructor and students or between and among students. Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. Group discussion and interactive-communicative learning. Forms of teaching: |
| | Lectures serve to introduce new concepts and provide theoretical and methodological foundations. |

| | Practice se | ecione (co | minar | e) ora | activ | 70 000 | sions to | develop student's |
|-----------------|---|------------------------|----------|----------|---------------------|---------------------------|----------------|--|
| | 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 | | <u>F</u> | | | | | | |
| course | ECTS | Cont | act hou | rs | ISI | SIS | Total | |
| components | credits | Lecture | Practi | | | | hours | |
| and credits per | | S | sessio | | | | | |
| trimester | 5 | 30 | 2 | 0 | 30 | 70 | 150 | |
| | | 1 | | | ı | | | |
| | | | | | | | | |
| Course | Period | Assessm | ent | Numl | ber | Exam | Form | Schedule |
| assessment and | | type | | of po | ints | | | (Week #) |
| forms of | 1 st | Mid-term | ı | 100 | | Subm | ission of | 5 th week |
| examination | attestatio | project | | | | the wi | itten | |
| | n | | | | | projec | t | |
| | | 1st attest | ation | 100 | | | | |
| | | total | | | | ~ . | | oth oth |
| | 2nd | End-term | 1 | 60 | | Submission of the written | | 8 th - 9 th week |
| | attestatio | project | | | | | | |
| | n | Г 14 | <u> </u> | | | project | | 10 th week |
| | | End-term | ı Quiz | 40 | | Written | | 10" week |
| | | | | | | | | |
| | | 2 nd attest | tation | 100 | | | | |
| | | total | เสนเบม | 100 | | | | |
| | Final Exam | I | | 100 | | Writte | en . | During final |
| | T mar Exam | 1 | | 100 | | ** 1166 | /II | exam session |
| | | | | I | ı | | | 3.1 50551011 |
| | Cumulative | e total for t | he cou | rse = 0 | ,3 * 1 ^s | st Att + | $0.3 * 2^{nd}$ | Att + 0,4*Final = |
| | 100. | | | | | | , | , |
| | | | | | | | | |
| | | | | | | | | |
| Requirements | Course and | universit | y polic | ies incl | lude: | | | |
| according to | Attendance | is manda | tory. N | Iissing | 30% | of less | ons will r | result in F (Fail) |
| the | grade (or su | | | | | | | |
| examination | Late submis | | | - | | | | |
| regulations | No cheating | _ | | | | | | |
| | Contacting | | | | | | _ | |
| | meetings wi | | | | | | | |
| Recommended | Background knowledge of Management, Psychology of management | | | | | | | |
| prerequisites | | | | | | | | |
| Post-requisites | Sites Business process analysis, Master thesis writing | | | | | | | |

| 36 11 | | | | | | | | | |
|---------------------------|---|--|--|--|--|--|--|--|--|
| 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 outcomes | Understand the concept of digital business ecosystems and how they are transforming traditional business models. Analyze the key drivers and challenges of digital business ecosystems, including emerging technologies, data analytics, and platform strategies. | | | | | | | | |
| | Students will have the skill to | | | | | | | | |
| | Evaluate the competitive landscape of digital business ecosystems, develop strategies to compete and collaborate within them. In terms of Competences, students will be able to | | | | | | | | |
| | | | | | | | | | |
| | Develop a deep understanding of the role of data and analytics in digital business ecosystems, including data acquisition, analysis, and sharing. | | | | | | | | |
| | Show critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment. | | | | | | | | |
| Content | Introduction to digital business ecosystems | | | | | | | | |
| | Digital platform strategies | | | | | | | | |
| | Data and analytics in digital business ecosystems | | | | | | | | |
| | Managing digital business ecosystems | | | | | | | | |
| | Emerging trends in digital business ecosystems | | | | | | | | |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | | | |
| Reading list | Marshall Van Alstyne, Geoffrey G. Parker, and Sangeet Paul Choudary, "Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You", W. W. Norton & Company, 2016. 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. Marco Iansiti and Karim R. Lakhani, "Competing in the Age of AI", Harvard Business Review Press, 2020. Andrew McAfee and Erik Brynjolfsson, "Machine, Platform, Crowd: Harnessing Our Digital Future", W. W. Norton & Company, 2017. | | | | | | | | |

| 5. Michael E. Porter and James E. Heppelmann, "How Smart, |
|---|
| Connected Products Are Transforming Competition", Harvard |
| Business Review, November 2014. |

| Module name: | Teaching In | iternship | | | | | | | |
|-------------------|---|---|---------|---------|----------------|---------|-------------|-----|---------|
| Code | | | | | | | | | |
| Trimester | 2 | | | | | | | | |
| Person | Assoc. Prof. | Zh. Tlesh | ova, Ca | ındidat | e of F | Pedagog | gical Scien | ces | |
| responsible | | | | | | | | | |
| for the module | | | | | | | | | |
| Lecturer(s) | Assoc. Prof. | Zh. Tlesh | ova, Ca | ındidat | e of F | Pedagog | gical Scien | ces | |
| Language | English | | | | | | | | |
| Relation to | Master degr | ee progran | n: Com | pulsory | y coui | se. | | | |
| curriculum | | | | | | | | | |
| Type of teaching | Methods us 1. Analysis disciplines 2. Class vis 3. Organiza 4. Develop practical se | Class visitation and observation of the teaching and learning process. Organization an event/meeting with students on students Developing lesson plans and conducting at least 3 classes (a lecture, practical session, seminar or a lab). Development teaching philosophy statement based on the teaching | | | | | | | |
| Workload of | | | | | | | | | |
| course components | ECTS | Cont | act hou | rs | ISI | SIS | Total | | |
| and credits per | credits | Lecture | Practi | ce | S | | hours | | |
| trimester | | s | sessio | ns | | | | | |
| | 4 | - | - | | 40 | 80 | 120 | | |
| | | | | | | | (8-week | | |
| | | | | | | | period o | f | |
| | internship) | | | | | | | | |
| | | | | | | | | | |
| Course assessment | | | | | | | | | |
| and forms of | Period | Period Assessment Number Exam Form Sched | | | | | hedule | | |
| examination | type of points | | | | | Veek #) | | | |
| | Final | Organizi | ng a | 100 | Report defense | | t defense | | 3 weeks |
| | grade tutorial hour on a tuto | | | | | | | | |
| | _ | | | | | hour | | | |

| | | for BA | | | | | | | |
|-------------------------------|---|--|---|-------------------------|------------------|--|--|--|--|
| | | students | 100 | | | | | | |
| | | Class and | 100 | Report defense | 1-3 weeks | | | | |
| | | lesson | | | | | | | |
| | | observation | 100 | | 4.0 | | | | |
| | | Three lessons | 100 | | 4-8 weeks | | | | |
| | | that MA | | | | | | | |
| | | students give | 100 | TT 7 | 4.0 1 | | | | |
| | | A teaching | 100 | Written | 4-8 weeks | | | | |
| | | Philosophy | | | | | | | |
| | | statement | 100 | XX7 '44 | 4.0 1 | | | | |
| | | Discipline | 100 | Written | 4-8 weeks | | | | |
| | | instructor's | | | | | | | |
| Dagwinsmants | <u> </u> | grade | • | | | | | | |
| Requirements according to the | | university polic | | e: 30% of lessons wi | Il regult in F | | | | |
| examination | (Fail) | is manuatory. | wiissing . | 30 /0 OI IESSOIIS WI | in result in r | | | | |
| regulations | ` / | ımmer school). | | | | | | | |
| | _ | sions are not acce | ented | | | | | | |
| | | | | of data, plagiarisi | m and crib | | | | |
| | | | | welcome to arrange | | | | | |
| | | | | hours to discuss the | | | | | |
| | | on the teacher as | ing office | nodis to discuss the | orass. | | | | |
| Recommended | Pedagogy of | f Higher Education | on, Psycho | ology of Manageme | nt | | | | |
| prerequisites | | C | , , | | | | | | |
| Recommended | Master's rese | earch work, inclu | ding resea | rch internships and | a master's | | | | |
| post -requisites | thesis | | • | - | | | | | |
| Module | Upon the co | ompletion of "Te | aching Int | ternship", MA stude | ents will attain | | | | |
| objectives/intended | the following | the following learning outcomes. The student will show a working | | | | | | | |
| learning outcomes | knowledge in: | | | | | | | | |
| | _ | gogy of a major o | - | | | | | | |
| | • meth | odology of teach | ing a majo | or discipline; | | | | | |
| | | odology of asses | | | | | | | |
| | • mana | agement in Highe | er Educatio | on; | | | | | |
| | desig | gn of educational | programs; | , | | | | | |
| | • teach | ning and learning | outcomes | , assessment method | dology and | | | | |
| | methods of teaching and learning; | | | | | | | | |
| | organization of teaching and learning environments. | | | | | | | | |
| | | | | | | | | | |
| | | ll have the skill | | | , | | | | |
| | | | sott skills | in a major disciplin | ne and | | | | |
| | - | gogy; | C1 . | 1. 1. | | | | | |
| | | | _ | and teaching proces | sses; | | | | |
| | | y methods and ap | - | in teaching; | | | | | |
| | apply various IT technologies; | | | | | | | | |

| | apply approaches of motivation (engagement) of students to study. |
|----------------|--|
| | In terms of Competences, students will be able to |
| | work with students as tutors; |
| | • evaluate student behaviour and their response to teaching and content; |
| | employ modern educational technologies; |
| | apply teaching and learning methods; |
| | assess student knowledge and skills; |
| | define their own teaching philosophy. |
| Content | Teaching Internship is designed for MA degree students to shape their knowledge and develop their skills of working with students to deliver knowledge, apply various teaching methods and approaches, and |
| | cooperate with discipline instructors to develop MA student |
| | competences in pedagogy of teaching. |
| Media employed | Multimedia classrooms equipped with computer, projection, and audio |
| | system; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Main literature: |
| | 1. Оқыту теориясы. Д. Х Шунк. Тараулар 1, 3,4,5,6,7, 8,9,10,11 және |
| | 12. Баспа: Pearson, 2019 |
| | 2. Рефлективті оқыту негіздері. Э.Поллард. Бөлімдер 2, 3, и 4. Баспа: |
| | Bloomsbury Academic, 2019 |
| | Additional resources: |
| | For the reading list and Resources, please find the attached links. These |
| | are the open sources by Massachusetts Institute of Technology (MIT), the |
| | US. |
| | Mito open course ware https://ocw.mit.edu/courses/chemistry/5-95j-teaching- |
| | college-level-science-and-engineering-fall-2015/instructor-insights/ |

3d term

| Module name: | Machine Learning and Artificial Intelligence |
|-----------------------------------|--|
| Code | |
| Trimester | 3 |
| Person responsible for the module | Akhmetov Timur, PhD |
| Lecturer(s) | Akhmetov Timur, PhD |
| Language | English |

| Relation to | Mactar | Droo | rom: C | ompulsory | COURCA | | | | | |
|---------------------------------|------------------------------------|---|---------------|-------------|---------------|-------------------|-----------------------|-------------|--|--|
| curriculum | Master Program: Compulsory course. | | | | | | | | | |
| Type of teaching | Teachi | Teaching methods: | | | | | | | | |
| teaching | | Problem-based learning (PBL), a student-centered approach in which students | | | | | | | | |
| | | learn about a subject by working in groups to solve an open-ended problem, | | | | | | | | |
| | group | discus | ssion, ir | iteractive- | communica | tive | e learni | ing. | | |
| | Forms | Forms of teaching: | | | | | | | | |
| | | | | | e new con | cep | ots and | l prov | ride theoretical and | |
| | | _ | | ndations. | s) are acti | 1VA | ceccio | one to | develop student's | |
| | | | | • | ples and di | | | | - | |
| | | | | | - | | | | ls with review and | |
| | | | _ | _ | f the course | • | | • | is with feview that | |
| | Studer | ıt's i | ndepen | dent stud | dy (SIS): S | Sel | f-study | time | including the time | |
| *** 11 1 0 | require | d to p | orepare | for and co | mplete all c | cou | rse asso | essme | nts. | |
| Workload of course | | EC | ГC | Cont | act hours | | TCTC | CIC | Total | |
| components | | cred | | Lectures | | | | | hours | |
| and credits per | | | 1105 | Lectures | sessions | | | | nours | |
| trimester | | | 4 | 20 | 20 | | | 60 | 120 | |
| | | | | | | | | | | |
| Course | Perio | <u>d</u> | Asses | sment | Number | Е | xam F | orm | Schedule | |
| assessment and | | | type Mid-term | | of points | | Submission of | | (Week #) | |
| forms of | 1 st | | | | 100 | | | | 5 th week | |
| examination | attesta | atio | projec | et | | | he written project | | | |
| | | | 1st att | estation | 100 | Ρ. | roject | | | |
| | | | total | | | | | | | |
| | 2nd | . • | End-to | | 60 | | ubmiss | | 8 th - 9 th week | |
| | attesta | at10 | projec | t | | | the written | | | |
| | n | | End-te | erm Quiz | 40 | | roject Vritten | | 10 th week | |
| | | | | om Quiz | | | , 110011 | | To week | |
| 2 nd attestation 100 | | | | | | | | | | |
| | total | | | | | | | | | |
| | Final | Exan | 1 | | 100 | V | Vritten | | During final | |
| | | | | | | | | | exam session | |
| | Cumi | ılativ | e total f | or the cou | rse = 0.3 * 1 | 1 st / | A tt + 0 | $3 * 2^{n}$ | ad Att + 0,4*Final = | |
| | 100. | | | | | _ ^ | | ,- - | | |
| | | | | | | | | | | |

| Requirements according to the | Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) 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 | Programming for data analysis and databases, Data processing and | | | | | | | | | |
| prerequisites | understanding | | | | | | | | | |
| Recommended | Master's research work, including research internships and a master's thesis | | | | | | | | | |
| post - | writing. | | | | | | | | | |
| requisites | | | | | | | | | | |
| 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 | | | | | | | | | | |
| outcomes | • fundamental concepts of machine learning and artificial intelligence and their applications in different domains. | | | | | | | | | |
| | • different machine learning and artificial intelligence algorithms and select the most appropriate one for a given task. | | | | | | | | | |
| | Students will have the skill to | | | | | | | | | |
| | Develop and implement machine learning and artificial intelligence models using programming languages and tools. Evaluate the performance of machine learning and artificial intelligence models and interpret the results. | | | | | | | | | |
| | In terms of Competences, students will be able to | | | | | | | | | |
| | Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in machine learning and artificial intelligence. | | | | | | | | | |
| | Demonstrate critical thinking and problem-solving skills, using machine learning and artificial intelligence to inform decision-making in a rapidly changing and uncertain environment. | | | | | | | | | |
| Content | Introduction to machine learning and artificial intelligence Supervised learning algorithms, including regression and classification Unsupervised learning algorithms, including clustering and dimensionality reduction | | | | | | | | | |
| | Reinforcement learning algorithms and their applications in different domains Natural language processing algorithms and their applications Computer vision algorithms and their applications | | | | | | | | | |
| | Deep learning algorithms and their applications in different domains | | | | | | | | | |
| | Machine learning and artificial intelligence tools and technologies | | | | | | | | | |
| | Data-driven decision making with machine learning and artificial intelligence | | | | | | | | | |

| Media employed | Multimedia classrooms equipped with computer, projection and audio system; interactive Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|
| Reading list | Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2017. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, "Deep Learning", MIT Press, 2016. Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow", Packt Publishing, 2017. Peter Norvig and Stuart Russell, "Artificial Intelligence: A Modern Approach", Pearson, 2021 | | | | | | | |

| Module name: | Data Analytics application project |
|------------------------|--|
| Code | |
| Trimester | 3 |
| Person | Shomanov Aday, PhD |
| responsible | |
| for the module | |
| Lecturer(s) | Shomanov Aday, PhD |
| Language | English |
| Relation to curriculum | Master Program: Compulsory course. |
| Type of | 0 |
| teaching | Problem-solving, outlining the main problem. |
| | Inquiry Guided Learning – Students learning or applying material to meet a |
| | challenge, answer a question, conduct an experiment, or interpret data. Group discussion and interactive-communicative learning. |
| | Forms 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 | ECTS | | | Cont | act hours | ISIS | SIS | Total | | |
|-----------------------------|-------------------|---------------|--------------------------------------|-------------------------|---------------|-------------------------|---------------------------|---------------------------------------|--------------|--|
| course | credits | | | Lectures | Practice | | | hours | | |
| components | | | | | sessions | | | | | |
| and credits per | | | 4 | 20 | 20 | 20 | 60 | 120 | | |
| trimester | | | 1. | | | T | | Schedule | | |
| Course | Period Assessment | | Number | Exam F | Exam Form | | | | | |
| assessment and forms of | 1 st | | type | | of points | Cularaio | | (Week #) |) | |
| examination | attesta | otio | Mid-t | | 100 | | Submission of the written | | | |
| CAMIMILLION | n | ılıo | projec | ·l | | project | ten | | | |
| | 1 | | 1st att | estation | 100 | project | | | | |
| | | | total | | | | | | | |
| | 2nd | | End-to | erm | 60 | Submiss | sion o | f 8 th - 9 th w | eek | |
| | attesta | atio | projec | t | | the writ | ten | | | |
| | n | | | | | project | | | | |
| | | | End-to | erm Quiz | 40 | Written | | 10 th week | | |
| | | | | | | | | | | |
| | | | and 4 | 4 4 . 4 | 100 | | | | | |
| | | | total | testation | 100 | | | | | |
| | Final | Exam | l | | 100 | Written | Written | | During final | |
| | 1 mai | LAum | L | | 100 | Wilten | | exam session | | |
| | | CAUTI SESSION | | | | | | | | |
| | Cumu | lative | e total f | or the cour | se = 0.3 * 1 | $\int_{0}^{st} Att + 0$ | ,3 * 21 | $^{\text{nd}}$ Att + 0,4*F | inal = | |
| | 100. | | | | | | | | | |
| Requirements | | | | | es include: | | •• | | (T. 11) | |
| according to | | | | | lissing 30% | o of lesso | ns wil | l result in F | (Fail) | |
| the examination | _ | • | | school). Te not acce | ntad | | | | | |
| regulations | | | | | | of data, n | lagiar | ism, and cril |) | |
| regulations | | | | | | | | ige one-to-on | | |
| | | | | | ing office h | | | | | |
| | | | | | | | | | | |
| Recommended | Data pi | rocess | sing and | d understar | nding, Data | Driven D | ecisio | on Making | | |
| prerequisites | 3.4 | • | 1 | 1 ' 1 | 1' | 1 ' | • | 1 | 1 . | |
| Recommended Post requisites | | | earch w | ork, includ | nng researc | n internsl | nps ar | nd a master's t | inesis | |
| Post-requisites Module | writing By the | | of this o | Ource ctud | ents will att | ain the fol | llowin | g learning ou | tcomes | |
| objectives/inte | | | | | rking know | | | ig icariiiig ou | comes. | |
| nded learning | 1110 51 | aucii | ************************************ | | | Touge III. | | | | |
| outcomes | • | Aspe | ects of v | vork in a n | nultidiscipli | nary team | ı, colla | aborate with i | ndustry | |
| | | - | | | oject manag | • | | | J | |
| | g | | | _ | _ | _ | - | | | |
| | Studen | ts will | l have t | he skill to | | | | | | |
| | • | Appl | y the so | cientific m | ethod to a r | esearch p | robler | n, including p | roblem | |

| | 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 | Multimedia classrooms equipped with computer, projection and audio |
| employed | system; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | The reading list for the 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: | Data Processing and Understanding |
|-----------------------------------|-----------------------------------|
| Code | |
| Trimester | 3 |
| Person responsible for the module | Kuchanskiy Alexandr, PhD |
| Lecturer(s) | - |
| Language | English |
| Relation to curriculum | Master Program: Elective course. |
| Type of teaching | Teaching methods: |

Interactive teaching: the instructor uses mini-lectures about 20 minutes long and involves students in a range of brief content-related activities in between. Interaction may occur between instructor and students or between and among students.

Inquiry Guided Learning – Students learning or applying material in order to meet a challenge, answer a question, conduct an experiment, or interpret data

Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem

Forms of teaching:

Lectures serve to introduce new concepts and provide theoretical and methodological foundations.

Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.

Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.

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

Workload of course components and credits per trimester

| ECTS | Conta | ISIS | SIS | Total | |
|---------|-------------------|----------|-----|-------|-------|
| credits | Lectures Practice | | | | hours |
| | | sessions | | | |
| 5 | 30 | 20 | 30 | 70 | 150 |

| Course | |
|-------------|-------|
| assessmen | t and |
| forms | of |
| examination | n |

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

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

| Requirements according to the examination regulations | Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class. |
|---|--|
| Recommended prerequisites | Programming for Data Analysis and Databases |
| Recommended Post-requisites | Master's research work, including research internships and a master's thesis writing; |
| Module objectives/inte nded learning | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: |
| outcomes | fundamental concepts of data processing and how they are used in data analytics. |
| | impact of data preprocessing on data quality and the accuracy of machine learning models. |
| | Students will have the skill to |
| | Evaluate different data processing techniques, including feature selection, feature engineering, and data transformation. Develop a deep understanding of statistical techniques for data processing, including probability distributions, hypothesis testing, and regression analysis. |
| | In terms of Competences, students will be able to |
| | Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment. |
| Content | Introduction to data processing Feature selection and engineering Data transformation Statistical techniques for data processing Ethics and privacy considerations Case studies in data processing |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Ian H. Witten, Eibe Frank, and Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann Publishers, 2016. |

| 2. | Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of |
|----|--|
| | Statistical Learning: Data Mining, Inference, and Prediction", Springer, |
| | 2009. |
| 3. | Dursun Delen, "Predictive Analytics and Data Mining: Concepts and |
| | Practice with RapidMiner", Elsevier, 2014. |
| 4. | Mark J. Embrechts, Claudia Klüppelberg, and Thomas Mikosch, "Modeling |
| | Extremal Events for Insurance and Finance", Springer, 1997. |
| 5. | John W. Tukey, "Exploratory Data Analysis", Addison-Wesley, 1977. |

| Module name: | Making Decision based on data | | | | | | | | |
|-----------------------------------|--|--|--|--|--|--|--|--|--|
| Code | | | | | | | | | |
| Trimester | 3 | | | | | | | | |
| Person responsible for the module | Turar Olzhas, Computational & Data Science Department Director, PhD | | | | | | | | |
| Lecturer(s) | Turar Olzhas | | | | | | | | |
| Language | English | | | | | | | | |
| Relation to curriculum | Master Program: Elective course. | | | | | | | | |
| Type of teaching | Teaching methods: Inquiry Guided Learning – Students learning or applying material in order to meet a challenge, answer a question, conduct an experiment, or interpret data. Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. Group discussion and interactive-communicative learning. | | | | | | | | |
| | Forms of teaching: Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student's | | | | | | | | |
| | · · · · · · · · · · · · · · · · · · · | | | | | | | | |
| | confidence through new examples and discussions on the problems. | | | | | | | | |
| | Instructor-supervised independent study (ISIS) deals with review and | | | | | | | | |
| | exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments. | | | | | | | | |
| Workload of | | | | | | | | | |
| course | Contact hours ISIS SIS Total hours | | | | | | | | |
| components | | | | | | | | | |

| and credits per | ECTS | Lecture | Practi | ice | | | | | | |
|-----------------|-------------------|-----------------------------------|--|----------|-----------|---------------|---------------------|--------------|--|-----|
| trimester | credits | S | sessio | | | | | | | |
| | 5 | 30 | | 0 | 3 | 0 70 | | | 150 | |
| | | | | | • | | | | | |
| Course | Period Assessment | | Number | | Exam Form | | n | Schedule | | |
| assessment and | | type | type | | of points | | | | (Week #) | |
| forms of | 1 st | Mid-term | 1 | 100 | | Submission of | | n of | 5 th week | |
| examination | attestatio n | project | project | | | | the written project | | | |
| | | 1 st attest total | ation | 100 | | | J | | | |
| | 2nd | End-term | 1 | 60 | | Sul | missio | n of | 8 th - 9 th week | - |
| | attestatio | project | _ | | | | written | | | |
| | n | I J | | | | | ject | | | |
| | | End-term | Quiz | 40 | | _ | itten | | 10 th week | |
| | | and 44 | 4 . 4 • | 100 | | | | | | |
| | | 2 nd attestation total | | 100 | | | | | | |
| | Final Exam | | 100 | | Wr | itten | | During final | - | |
| | Filiai Exaili | | | 100 | | VV IIIIIOII | | | exam session | |
| | 100. | | | | | | | | | |
| Requirements | Course and | universit | y polic | ies inc | lude: | | | | | |
| according to | Attendance | is manda | tory. N | Iissing | 30% | of l | essons | will r | result in F (Fail) |) |
| the | grade (or si | ummer sch | nool). | | | | | | | |
| examination | Late submis | | | - | | | _ | | | |
| regulations | No cheating | <i>-</i> | , | | | | / L | , | , | |
| | _ | | | | | | | _ | e one-to-one | |
| Recommended | meetings wi | | | | | | | | | |
| prerequisites | analysis | ig ioi Data | Anary | 515 allC | ıDali | avast | s, meu | ious a | and tools for data | ı |
| Recommended | | earch work | inclu | ding in | terne | hins | and a n | naster | 's thesis writing. | |
| Post-requisites | 14103101 5 105 | caren work | ., 111C1U | unig III | 1113 | mps | unu a m | iasici | s diesis withing. | |
| Module | By the end | of this cour | rse stud | ents w | ill att | ain tł | ne follo | wing | learning outcome | es. |
| objectives/inte | The studen | | | | | | | -0 | 6 | |
| nded learning | | | | J | | 0 | | | | |
| outcomes | | amental co | - | | ta-dri | ven | decisio | n mal | king and how it | is |
| | • impa | act of data | data and analytics on decision-making processes, including efinition, data collection, analysis, and interpretation. | | | | | ng | | |
| | r-00 | | , | | | , | J , • | | r | |

| | Students will have the skill to | | | | | | | | |
|--------------|---|--|--|--|--|--|--|--|--|
| | Evaluate different decision-making models and their applications i different domains, including business, healthcare, and social sciences Develop a deep understanding of statistical techniques for decision making, including probability distributions, hypothesis testing, an regression analysis. | | | | | | | | |
| | In terms of Competences, students will be able to | | | | | | | | |
| | • Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment. | | | | | | | | |
| Content | Introduction to data-driven decision making; | | | | | | | | |
| | Decision-making models and frameworks; Statistical techniques for decision making; | | | | | | | | |
| | Probability distributions and their applications in decision making; | | | | | | | | |
| | Hypothesis testing for decision making; | | | | | | | | |
| | Regression analysis for decision making; | | | | | | | | |
| | Ethics and privacy considerations; | | | | | | | | |
| | Case studies in data-driven decision making. | | | | | | | | |
| Media | Multimedia classrooms equipped with computer, projector and audio system; | | | | | | | | |
| employed | Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | | | |
| Reading list | W. Edwards Deming, "Out of the Crisis", MIT Press, 1986. Jay Liebowitz, "Big Data and Business Analytics", CRC Press, 2013. Daniel Kahneman, "Thinking, Fast and Slow", Farrar, Straus and Giroux, 2011. Norean R. Sharpe, Richard D. De Veaux, and Paul F. Velleman, "Business Statistics", Pearson, 2019. Gary Klein, "Sources of Power: How People Make Decisions", MIT Press, 1999. | | | | | | | | |

| Module name: | Product Management |
|---|-------------------------------|
| Code | |
| Trimester | 3 |
| Person responsible for the module | Mukhamedkarimova Aneliya, PhD |

| Lecturer(s) | Mukhamedkarimova Aneliya, PhD | | | | | | | | |
|---------------------------------------|--|--------------------------|---------|---------------|------|--|--------------|----------------------|--|
| Language | English | | | | | | | | |
| Relation to curriculum | Master Program: Elective course | | | | | | | | |
| Type of teaching | Teaching methods: Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. Inquiry Guided Learning — Students learning or applying material to meet a challenge, answer a question, conduct an experiment, or interpret data Forms 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 | | | | | | | | |
| Workload of | required to p | nepare for | and co | mpiete | ance | Juise as | 868811161113 |)• | |
| course | ECTS | Cont | act hou | *** | ISI | SIS | Total | | |
| components | credits | Lecture | Practi | | S | 313 | hours | | |
| and credits per | cicuits | S | sessio | | 3 | | nours | | |
| trimester | 5 | 30 | | 0 | 30 | 70 | 150 | | |
| | | 1 | • | | l | 1 | | | |
| Course assessment and | Period | Assessm type | ent | Numl of po | | Exam | Form | Schedule (Week #) | |
| forms of examination | 1 st attestatio n | Mid-tern project | า | 100 | | Submission of the written project 5 th week | | | |
| 1 st attestation 100 total | | | | | | | | | |
| | 2nd attestatio | End-term project | 1 | 60 | | Submission of the written project 8th - 9th week | | | |
| | | End-term Quiz 40 Written | | | | 10 th week | | | |
| | 2 nd attestation 100 total | | | | | | | | |

| | Final Exam | 100 | Written | During final exam session | | | | | |
|--|--|-----------------------|---|---------------------------|--|--|--|--|--|
| | Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100. | | | | | | | | |
| Requirements according to the examination regulations | Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class. | | | | | | | | |
| Recommended prerequisites | Psychology of Management, | | | | | | | | |
| Recommended post-requisites | Master's research work, inclu | | <u>-</u> | | | | | | |
| Module objectives/inte nded learning outcomes | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: fundamental concepts of product management and its role in driving innovation and growth in companies. customer needs and market trends to develop successful product strategies and roadmaps. | | | | | | | | |
| | Students will have the skill | to | | | | | | | |
| | • Evaluate different product management frameworks and methodologies, including agile and lean development, and apply them to real-world situations. | | | | | | | | |
| | In terms of Competences, st | tudents wi | ill be able to | | | | | | |
| | Demonstrate a deep understanding of data-driven decision making and the role of data and analytics in product management. Demonstrate critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and uncertain environment. | | | | | | | | |
| Content | Overview of product manager and growth The role of product managers Analyzing customer needs an strategies and roadmaps Conducting market research | s in differend market | ent industries and trends to develop | l organizations | | | | | |

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

| Module name: | Industry 4.0 |
|------------------------|---|
| Code | |
| Trimester | 3 |
| Person | Neftissov Alexandr, PhD |
| responsible | |
| for the module | |
| | |
| Lecturer(s) | Neftissov Alexandr, PhD |
| Language | English |
| Relation to curriculum | Master Program: Elective course |
| Type of | Methods of teaching: |
| teaching | Inquiry Guided Learning – Students learning or applying material to meet a challenge, answer a question, conduct an experiment, or interpret data |
| | Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. Group discussion and interactive-communicative learning. |
| | Forms of teaching: |

| | Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments. | | | | | | | |
|---|---|--|--------------------------------|--|-----------------|------------------|--|--|
| Workload of course components and credits per | ECTS credits | Cont Lecture s | rs ce ons | ISI S | SIS Total hours | | | |
| trimester | 5 | 30 |] 2 | 0 | 30 | 70 | 150 | |
| Course assessment and forms of examination | Period 1st attestatio n 2nd attestatio n Final Exam | Assessm type Mid-tern project 1st attest total End-term project End-term | ation | Numl of po 100 100 60 100 100 100 | | the wr projec | ission of itten t ission of itten t en | Schedule (Week #) 5 th week 8 th - 9 th week 10 th week |
| Requirements according to the | = 100. Course and Attendance grade (or su | universit is manda ımmer scl | y polic tory. N hool). | ies incl Iissing | lude: | | | exam session Att + 0,4*Final result in F (Fail) |
| examination regulations | Late submis No cheating Contacting meetings wi | g, duplicat the Lectu | t ion, fa l rer: stu | lsificat idents a | are we | elcome | to arrange | e one-to-one |

| Recommended | Programming for Data Analysis and Databases | | | | | | | |
|-----------------|--|--|--|--|--|--|--|--|
| prerequisites | 1 Togramming for Data Analysis and Databases | | | | | | | |
| Recommended | Master's research work, including research internships and a master's thesis | | | | | | | |
| post-requisites | writing. | | | | | | | |
| Module 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 | The student will show a working knowledge in. | | | | | | | |
| outcomes | • fundamental concepts of Industry 4.0 and its impact on the future of | | | | | | | |
| outcomes | work. | | | | | | | |
| | | | | | | | | |
| | • components of Industry 4.0, including cyber-physical systems, the Internet of Things (IoT), and cloud computing. | | | | | | | |
| | internet of Timigs (101), and cloud computing. | | | | | | | |
| | Students will have the skill to | | | | | | | |
| | - Evaluate different Industry 4.0 technologies and their applications in | | | | | | | |
| | • Evaluate different Industry 4.0 technologies and their applications in different domains, including manufacturing, healthcare, and | | | | | | | |
| | transportation. | | | | | | | |
| | u ansportation. | | | | | | | |
| | In terms of Competences, students will be able to | | | | | | | |
| | Develop a deep understanding of data-driven decision making and the | | | | | | | |
| | role of data and analytics in Industry 4.0. | | | | | | | |
| | Develop critical thinking and problem-solving skills, using data and | | | | | | | |
| | analytics to inform decision-making in a rapidly changing and | | | | | | | |
| | uncertain environment. | | | | | | | |
| Content | Introduction to Industry 4.0 | | | | | | | |
| | Components of Industry 4.0 | | | | | | | |
| | Industry 4.0 technologies and applications | | | | | | | |
| | Overview of different Industry 4.0 technologies, including robotics, automation, | | | | | | | |
| | and artificial intelligence | | | | | | | |
| | Application of Industry 4.0 technologies to different problem domains, including | | | | | | | |
| | manufacturing, healthcare, and transportation Industry 4.0 case studies and best practices | | | | | | | |
| | Future directions of Industry 4.0 | | | | | | | |
| Media | Multimedia classrooms equipped with computer, projection and audio | | | | | | | |
| employed | system; Whiteboard; Microsoft Teams; LMS Moodle. | | | | | | | |
| | | | | | | | | |
| Reading list | 1. Henning Kagermann, Wolfgang Wahlster, and Johannes Helbig, | | | | | | | |
| | "Recommendations for Implementing the Strategic Initiative | | | | | | | |
| | INDUSTRIE 4.0", Springer, 2013. | | | | | | | |
| | 2. Alp Ustundag and Emre Cevikcan, "Industry 4.0: Managing the Digital | | | | | | | |
| | Transformation", Springer, 2018. | | | | | | | |
| | 3. Andreas Tolk, Lakhmi C. Jain, and John R. Hill, "Modeling and | | | | | | | |
| | Simulation for Industry 4.0 and Beyond", Springer, 2020. | | | | | | | |

| Module name: | Inforn | nation | Secur | rity | | | | | | | |
|---|--|---|------------------|-------------|-----------|----------|---|----------------------|---|--|---|
| Code | | | | | | | | | | | |
| Trimester | 3 | | | | | | | | | | |
| Person responsible for the module | Begim | Begimbayeva Englik, PhD | | | | | | | | | |
| Lecturer(s) | Begim | bayev | a Engli | ik, PhD | | | | | | | |
| Language | English | 1 | | | | | | | | | |
| Relation to curriculum | Master | Progr | ram: El | lective cou | rse | | | | | | |
| Workload of course components and credits per trimester | Forms Lectur method Practic confide Instruct explora Studen | Teaching methods: Group discussion, project-based approach, problem- solving. Forms 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. ECTS | | | | | | | | | |
| Course | Period | 1 | Asses | sment | Number | Es | xam F | orm | | Schedule | |
| assessment and | 1 51100 | - | type | | of points | 1 | imili I | V1111 | | (Week #) | , |
| forms of examination | of 1 st Mid-term 100 Submission of 5 th we | | | | | | | 5 th week | | | |
| | 1 st attestation 100 total | | | | | | | | | | |
| | 2nd End attestatio pro | | End-to projec | et | 60 | th pr | Submission of the written project | | f | 8 th - 9 th week | |
| | | | End-to | erm Quiz | 40 | W | ritten | | | 10 th week | |

| | | 2 nd attestation | 100 | | | | | |
|--|---|--|------------|------------------------------|---|--|--|--|
| | | total | 100 | | | | | |
| | Final Exam | | 100 | Written | During final exam session | | | |
| | Cumulative 100. | e total for the coun | rse = 0.3 | * 1^{st} Att + 0.3 * 2 | 2 nd Att + 0,4*Final = | | | |
| Requirements according to the | Attendance | university polici is mandatory. M immer school). | | | ill result in F (Fail) | | | |
| examination regulations | 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 | Programmin | g for data analysi | s and data | abases | | | | |
| Recommended post-requisites | Master's rese | earch work, include | ding resea | arch internships a | and a master's thesis | | | |
| Module objectives/inte nded learning | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: | | | | | | | |
| outcomes | • comp | - | nation sec | curity, including | nd its importance. threat modeling, risk | | | |
| | Students will | have the skill to | | | | | | |
| | appli | | ent doma | • | hnologies and their ybersecurity, network | | | |
| | In terms of Competences, students will be able to | | | | | | | |
| | Develop a deep understanding of data-driven decision making and the role of data and analytics in information security. Develop critical thinking and problem-solving skills, using data and analytics to inform decision-making in a rapidly changing and | | | | | | | |
| | unce | rtain environmen | t . | | | | | |
| Content | Components of information security Information security technologies and applications Overview of different information security technologies, including cryptography, firewalls, and intrusion detection systems | | | | | | | |
| | | of information secu persecurity, networ | | | t problem domains, | | | |

| | 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 | 1. Michael E. Whitman and Herbert J. Mattord, "Principles of Information | | | | | | | |
| | Security", Cengage Learning, 2018. | | | | | | | |
| | 2. Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and | | | | | | | |
| | Source Code in C", John Wiley & Sons, 1995. | | | | | | | |
| | 3. Eric Conrad, Joshua Feldman, and Seth Misenar, "CISSP Study Guide", | | | | | | | |
| | Syngress, 2020. | | | | | | | |
| | 4. Ross J. Anderson, "Security Engineering: A Guide to Building | | | | | | | |
| | Dependable Distributed Systems", Wiley, 2008. | | | | | | | |
| | 5. D. J. Henry and S. R. Simon, "Cybersecurity and Cyberwar: What | | | | | | | |
| | Everyone Needs to Know", Oxford University Press, 2014. | | | | | | | |

4th term

| Module name: | Research practice | |
|----------------|---|-------------|
| Code | | |
| Trimester | 4 | |
| Person | Turar Olzhas, PhD | |
| responsible | | |
| for the module | | |
| Lecturer(s) | - | |
| Language | English | |
| Relation to | Master Program: Compulsory module. | |
| curriculum | | |
| Type of | Methods used: | |
| teaching | Performance of Research Practice: Simulation exercises can be used to six world industrial research projects and provide students with experience | |
| | 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. | can provide |
| | Workshops and seminars: Workshops and seminars can provide stu | idents with |
| | practical skills training and information on industry-specific topics. | |
| | | |
| Workload of | ECTS Contact hours ISIS SIS Total | |
| course | credits Lectures Practice hours | |
| components | sessions | |

| and credits per trimester | | 1 | 16 | - | - | | 90 | 33 0 | | 420 | |
|---|--|--|---------|-------------|----------------------|-----|-----------|---------|-----|---------------------------------|-----------------|
| Course assessment and forms of examination | Period Assessmentype | | | sment | Number of points (%) | Е | Exam Form | | | Schedule | |
| | 4 th semes | ter | Repor | | 100 | de | efense | | | 2 nd year (sem.) | 4 th |
| Requirements according to the examination regulations | confere conductorganiz | The defense of the practice report is carried out in the form of a miniconference. Each master student makes a presentation of the results of the conducted research. The practice is assessed by the teacher responsible for organizing the research practice of master - students, based on the submitted: report, review of the supervisor of the practice. | | | | | | | | of the ible for | |
| Recommended prerequisites | Program analysis | • | g for D | ata Analys | sis and Data | bas | ses, Mo | ethods | and | tools for | data |
| Recommended Post-requisites | Master' | s rese | | | master's the | | | | | | |
| Module objectives/inte nded learning outcomes | By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: principles of research methodology and design, including qualitative and quantitative research methods. Students will have the skill to Formulate research questions and hypotheses related to a data analytics problem. Develop and implement a research plan, including data collection and analysis. Evaluate the quality of research and interpret the results of data analysis. | | | | | | | | | | |
| | | | | | | | | ion and | | | |
| | In term | s of C | ompet | ences, stud | ents will be | abl | e to | | | | |
| | Demonstrate critical thinking and problem-solving skills, using d and analytics to inform decision-making in a research context. Communicate research findings effectively to different audience including academic and industry stakeholders. | | | | | | | | | | |
| Content | The purpose of research practice is to ensure continuity and consistency in the acquisition of professional skills by master students in accordance with the requirements for the level of training program, the formation of professional competencies of master – students in: • 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; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2008. Thomas K. Landauer, "The Trouble with Computers: Usefulness, Usability, and Productivity", MIT Press, 1995. Paul D. Allison, "Multiple Regression: A Primer", Pine Forge Press, 1999. Andrew Gelman and Jennifer Hill, "Data Analysis Using Regression and Multilevel/Hierarchical Models", Cambridge University Press, 2006. Diana C. Mutz, "Impersonal Influence: How Perceptions of Mass Collectives Affect Political Attitudes", Cambridge University Press, 1998. |

| Module name: | Master's research work | | | | | | |
|------------------------|--|--|--|--|--|--|--|
| Code | | | | | | | |
| Trimester | 2, 3, 4, 5 | | | | | | |
| Person | Turar Olzhas, Computational & Data Science Department Director, PhD | | | | | | |
| responsible | | | | | | | |
| for the module | | | | | | | |
| Lecturer(s) | - | | | | | | |
| Language | English | | | | | | |
| Relation to curriculum | Master Program: Compulsory module. | | | | | | |
| Type of | Methods used: | | | | | | |
| teaching | Problem-solving, outlining the main problem; | | | | | | |
| | • literature review; | | | | | | |
| | quantitative and qualitative methods; | | | | | | |
| | • comparative analysis | | | | | | |
| | Forms used: | | | | | | |
| | • 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 | | | Con | itac | t hours | ISIS | SIS | Total hours | |
| components | credits | | credits Lectur Practice | | | | | | | |
| and credits per | | | | | | es | | essions | | |
| trimester | | 24 | | - | | - | 220 | 500 | 720 | |
| | | | | • | | | | • | | |
| Course | D | eriod | A gg/ | essment | | Number | Evom | Form | Schedule | |
| assessment and | 1 (| 5110 u | | | | of points | Lam | Exam Form Schedule | | |
| forms of | | | type | , | | (%) | | | | |
| examination | 1 ^s | st | 1 st a | ttestatio | n | 100 | Subm | ission c | of 1 st year | |
| | at | testation | | | | | the re | | , | |
| | | | | | | | | | | |
| | 21 | nd | 2 nd a | attestatio | n | 100 | Subm | ission c | of 2 nd year | |
| | at | testation | | | | | the re | port | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Requirements | | | | | | | | | ntire period of study | |
| according to | | | | | | | d and a | ssessed | by the scientific | |
| the | sup | pervisor (a | a grad | le is awar | de | d) | | | | |
| examination | 33 71 | | | | | | | -4 41 £ | -11ii | |
| regulations | | ien assess isidered: | ang a | research | WC | ork of maste | er studei | nt, the i | ollowing is | |
| | COI | isidered. | | | | | | | | |
| | - n | reparation | of ar | ticles/rer | ori | ts: | | | | |
| | - | eaking at | | - | | | | | | |
| | | | | | | rch work of | f master | studen | t; | |
| | | _ | | | | | | | | |
| | | | | | | | | | nge one-to-one | |
| | me | etings wi | th the | teacher o | lur | ing office h | ours to | discuss | the class. | |
| Recommended | A11 | courses | of the | program | | | | | | |
| prerequisites | | 3001000 | | r | | | | | | |
| Recommended | Ma | ster's rese | earch | work, inc | clu | ding researc | h interr | ships a | nd a master's thesis | |
| Post-requisites | | iting. | | , | | U | | 1 | | |
| Module | | | of this | course st | tud | ents will att | ain the | followii | ng learning outcomes. | |
| objectives/inte | Tl | ne studen | t will | show a | wo | rking knov | vledge i | n: | | |
| nded learning | | | | | | | | | opic and in the fields of | |
| outcomes | | Big I | Oata A | nalysis, D | ata | Science and | l Machin | e Learn | ing in general | |
| | Str | ıdents will | have | the skill | to | | | | | |
| | 5.0 | | | | | n a research | anesti | on or nr | oblem related to data | |
| | | | | | | - | - | _ | to address it. | |
| | | - | | | | - | | | ding data collection, | |
| | | | _ | nd interp | | | 1 3 | | 2 | |
| | | - | | - | | | ing and | preser | ntation, including the | |

| | ability to write a research paper and present research findings in a public forum. |
|--------------|--|
| | • Apply advanced research techniques and methods to a specific research problem or question in the field of data analysis. |
| | In terms of Competences, students will be able to |
| | Conduct independent research and take responsibility for the entire research process, including defining the problem, identifying the relevant literature, selecting research methods, and presenting the results. Plan experiment with selection of necessary research methods, Modify existing methods and develop new ones, necessary for obtaining specific results; Conduct theoretical and experimental research using modern methods and technologies in science and technology; Find the best approach to solving practical issues; Analyze the discussion and evaluation of obtained results; Formulate conclusions and recommendations based on theresearch results; |
| | results; Present results of educational and research work (reviews,reports, articles, abstracts, presentations); Participate in scientific discussion. |
| Content | Preparatory session (choosing the direction of scientific research, defining the problem and the resulting goals and objectives, proposing a hypothesis for their solution, discussion of research methods). |
| | Planning, preparation and carrying out experiments on the chosen topics. Discussion of the obtained results (data analysis). Formulating conclusions on the work. Drawing up a report and preparing presentation material. |
| | Defending the results of the research work: Formulating research questions and hypotheses Research design and execution |
| | Writing a research paper Presenting research findings Ethics in research |
| Media | Multimedia classrooms equipped with computer, projection and audio |
| employed | system; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, "The Craft of Research", University of Chicago Press, 2016. Catherine Dawson, "Introduction to Research Methods: A Practical Guide for Anyone Undertaking a Research Project", How to Books, 2009. 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. |

 Harold Kerzner, "Project Management: A Systems Approach to Planning, Scheduling, and Controlling", Wiley, 2017.

Term 5

| Module name: | The Master thes | sis/ project | work prepa | ration a | and do | efense |
|------------------------|---|----------------|----------------|-----------|-------------|-----------------------|
| Code | | | | | | |
| Trimester | 5 | | | | | |
| Person | Turar Olzhas, Ph | D | | | | |
| responsible | | | | | | |
| for the module | | | | | | |
| Lecturer(s) | - | | | | | |
| Language | English | | | | | |
| Relation to curriculum | Master Program: | Compulsor | ry. | | | |
| Type of | Teaching and tr | raining met | thods: | | | |
| teaching | Mastar Thasas/r | السمينية عملية | . : | | J., a 1 a., | |
| | Master Theses/ p • Writing of a sci | • | | ı inaivic | iuai st | ipervision: |
| | • Quantitative an | | | | | |
| | • Comparative an | | e memous, | | | |
| | * | • | eate and disci | uss the f | inding | 16. |
| | Presentations to communicate and discuss the findings; Individual review and feedback on papers and presentations | | | | | |
| | Forms of instru | ction• | | | | |
| | | | enendent st | ndv (IS | SIS) d | leals with review and |
| | Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the research work. | | | | | |
| | Student's independent study (SIS): Self-study time including the time | | | | | |
| | required to prepa | | | | | |
| Workload of | required to prope | | omprove um | | 80415 | <u> </u> |
| course | ECTS | Conta | act hours | ISIS | SIS | Total hours |
| components | credits | Lectures | Practice | | | |
| and credits per | | | sessions | | | |
| trimester | 12 | - | - | 110 | 250 | 360 |
| Course | The results of the | master's th | nesis/project | defense | are as | sessed using a point- |
| assessment and | | | | | | of master - students. |
| forms of | ruting system for | assessing t | ne academie | ucine ve | ATTICITES. | of master stadents. |
| examination | Grade by N | umerical | | | 1. | 4 4141 |
| | | uivalent of | %-content | Gi | rade by | traditional system |
| | system | grades | | | | |

| A- 3.67 90-94 Excellent | A- 3.67 99.94 Excellent B+ 3.33 85-89 B 3.0 80-84 B- 2.67 75-79 C+ 2.33 70-74 C 2.0 65-69 C- 1.67 60-64 Satisfactory D+ 1.33 55-59 D 1,0 50-54 F 0 0-49 Fail When assessing a master's thesis/project work, the following is considered: examination regulations When assessing a master's thesis/project work, the following is considered: - the volume of work performed; - independence of research; - use of new technologies in the work; - completeness of the literature review and the relevance of the sources used; - novelty of research results; - literacy and clarity of material presentation; - compliance with the requirements for design; - quality of the presentation at the dissertation/project defense (clarity, literacy, ability to use professional terms, quality of demonstration material, etc.); - correctness and completeness of answers to questions asked during the defense and to the reviewer's comments; - the number of publications on the work, including those published abroad, the master's student's reports at scientific conferences; - a review by the supervisor, which provides a reasoned conclusion indicating the assessment according to the point-rating letter system for assessing knowledge; - a decision by the coordinator of the educational program on a recommended program of the fresh to plagiarism. Recommended Post-requisites Recommended Post-requisites Recommended Post-requisites By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: - state of the art in a certain scientific field - opicitives/inte nded learning - open research questions in this field | | | | I | | | |
|--|--|--------------|---------------------------------------|---------------------------------------|-----------------|---|--|--|
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| C+ 2,33 70-74 C 2,0 65-69 C- 1.67 60-64 D+ 1,33 55-59 D 1,0 50-54 F 0 0-49 Fail Requirements according to the examination regulations C completeness of the literature review and the relevance of the sources used; novelty of research results; literacy and clarity of material presentation; compliance with the requirements for design; quality of the presentation at the dissertation/project defense (clarity, literacy, ability to use professional terms, quality of demonstration material, etc.); correctness and completeness of answers to questions asked during the defense and to the reviewer's comments; the number of publications on the work, including those published abroad, the master's student defends the thesis/project if he/she receives: a review by the supervisor, which provides a reasoned conclusion "admitted to defense"; a review of the thesis (project), which provides a comprehensive description of the thesis (project) submitted for defense and a reasoned conclusion indicating the assessment according to the point-rating letter system for assessing knowledge; a decision by the coordinator of the educational program on a recommendation for defense (an order on admission to defense); a certificate (in any form) on passing the check of the thesis (project) for plagiarism. Recommended Post-requisites Recommended Post-requisites By the end of this course students will attain the following learning outcomes. | C | | | · · · · · · · · · · · · · · · · · · · | | Good | | |
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| | nded learning outcomes • state of the art in a certain scientific field • open research questions in this field | | | | | | | |
| • state of the art in a certain scientific field | outcomes • open research questions in this field | | | | | | | |
| a compared the field | | | | | | | | |
| • relevant literature | - Torovant incrature | outcomes | | | | | | |

| | methodology and tools to execute project how to document new findings according to scientific standards Students will have the skill to Formulate and develop a research question or problem related to data analysis and apply appropriate research methods to address it. Design and execute a research project, including data collection, analysis, and interpretation. |
|-------------------|--|
| | Develop skills in academic writing and presentation, including the ability to write a research paper and present research findings in a public forum. Apply advanced research techniques and methods to a specific research problem or question in the field of data analysis. |
| | In terms of Competences, students will be able to |
| | • Conduct independent research and take responsibility for the entire research process, including defining the problem, identifying the relevant literature, selecting research methods, and presenting the results. |
| Content | The Master thesis/research project is intended to introduce master - students into scientific research work in a bigger context. The starting point is the definition of the research questions they want to answer and the selection of the appropriate methodology. The master - students will plan and execute their thesis/project independently with regular review and consulting. They will summarize their findings in a research project thesis (project report). The intention of the thesis/research project is to familiarize with the research methodology in a certain scientific field and to formulate the scientific state of the art and the research questions. The master - students prove the ability to execute their own and independent research on master level and with a certain complexity. |
| Media employed | Multimedia classrooms equipped with computer, projection and audio system; interactive Whiteboard; Microsoft Teams; LMS Moodle. |
| Reading list | Academic policy of «Astana IT University» LLP, Astana 2022. Rules for students' final certification in "Astana IT University" LLP, Astana 2022. References: According to topic |