Artificial Intelligence Technologies Masters Program
Module Hand Book

The Artificial Intelligence Technologies Master Program comprises courses from of general education sciences, mathematical sciences, and ICT engineering disciplines. The courses are categorized into 6 modules. This handbook presents detailed information on the modules and courses of the program.

A **Module Handbook or collection of module descriptions that is also available for Master's to consult** contain the following information about the individual modules:

Module 1

Module designation	**EDUC 51001 Master's training** *Discipline* - Higher School Pedagogy
Semester(s) in which the module is taught	*1,2*
Person responsible for the module	*Abibulayeva A.B.*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Explanatory-illustrative, Reproductive, Research, Problem-based learning, Heuristic methods, Control tests, Work with a textbook*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Lecture-15 hours, Practical classes – 22 hours, Masters student's independent work – 83 hours.* *Private study including examination preparation, specified in hours[1]:*
Credit points	*4*
Required and recommended prerequisites for joining the module	*Pedagogy* *existing competences in psychology*
Module objectives/intended learning outcomes	*Key question: what learning outcomes should students attain in the module?* Mastering the general theoretical training of a specialist in the pedagogical foundations of the educational process at a university. *in terms of:* *Knowledge: familiarity with information* about the conceptual and terminological apparatus of Higher School pedagogy*, theory and/or subject knowledge of* the main approaches, directions, scientific schools and certain concepts of the educational process, characteristics of the activities of the subjects of the educational process at the university. *Skills: cognitive and practical abilities for which knowledge is used:* to analyze the historical, content characteristics and

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[1] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

	distinctive features of the Kazakhstani and foreign higher professional education, it is advisable to use teaching aids for the implementation of teaching and education methods; to make up characteristics of the types of pedagogical activity and behavior of the subjects of the educational process. *Competences: integration of knowledge* how to possess the basics skills of the analysis of educational situations, *skills* to be able to apply the basic principles of organizing training and education in higher education, *social and methodological capacities in* choosing and applying methods of teaching and upbringing that are adequate to the pedagogical situation, *working or learning situations[2]* *Students know that/know how to/are able to* use methods of diagnostics of training and education; be able to demonstrate the ability and readiness to apply the acquired knowledge in professional activities.
Content	*The description of the contents should clearly indicate focus areas and the level of difficulty.* 1. *General Fundamentals of Pedagogy. Higher School Pedagogy as a branch of pedagogical science.* 2. *Methodological Foundations of Higher School Pedagogy.* 3. *Particular aspects and principles of development of higher education in Kazakhstan.* 4. *Content of Education in Higher School.* 5. *Didactics in the System of Pedagogical Sciences.* 6. *Teaching Process as an Integral System.* 7. *Laws, regularities and principles of teaching in higher school.* 8. *Methods of teaching in higher school.* 9. *Lecture as a form of arrangement of teaching and learning process at higher school.* 10. *Types of forms of education at Higher school: Seminars, Practical classes, Laboratory work, Students' unassisted work.* 11. *Control in higher school.* 12. *Credit technology of education at higher education institutions of Kazakhstan* 13. *Organization of morale building activities in higher school.* 14. *Higher School Teacher.* 15. *Professional competence of a Higher School Teacher.*
Exams and assessment formats	*e.g. two oral Midterm assessments (20 minutes each) and one final oral exam (40 minutes), short computer-based quizzes, take-home written assignments*

[2] Cf. European Commission: Proposal for a Recommendation of the European Parliament and the European Council on the establishment of the European Qualifications Framework for lifelong learning, COM(2006) 479 final, 2006/0163 (COD), Brussels 05/09(2006.

Study and examination requirements	*Requirements for successfully passing the module*
	e.g. the final grade in the module is composed of 60% performance on exams, 10% quizzes, 10% take-home assignments, 10% in-class participation. Students must have a final grade of 60% or higher to pass
Reading list	*1. Zhogary mektep pedagogikasy / K.K. Shalgynbayeva, N.Albytova, T.S. Slambekova. – Almaty: RMEB, 2016*
	2. Kontseptsii sistemnoy modernazatsii vysshego pedagogicheskogo obrazovaniya. – Almaty, 2015 g.
	3. Pedagogika vysshey shkoly: Uchebnik / Okolelov O.P. – M.: NITS INFRA-M, 2017. - 176 s.
	4. K.R. Kalkeeva, and others. Higher School Pedagogy.- Astana, 2015/-252 p.
	5. A.K. Mynbayeva. Basics of Higher School Pedagogy.- Almaty.2008 – 155 p.

Module designation	**EDUC 51001 Master's training methodology**
	Discipline **-** History and Philosophy of Science
Semester(s) in which the module is taught	*Autumn or spring semester of the first year of studies*
Person responsible for the module	*Kazakh – Adayeva G.A., Mamyrbekova A.K., Tursynbayeva A.O.*
	Russian – Aubakirov Ye.N., Fazylova G.R., Sandybayeva U.M.
	English – Bozzhigitova M.M., Ryskulbekova D.A.
Language	*Kazakh, Russian, English*
Relation to curriculum	*General education course*
Teaching methods	*lecture, seminar*
Workload (incl. contact hours, self-study hours)	*Lecture - 15 hours, seminars – 22 hours, MSIW – 83 hours (master's students' independent work)*
Credit points	*4*
Required and recommended prerequisites for joining the module	*Philosophy*
Module objectives/intended learning outcomes	*The purpose of the module: to develop an interest in fundamental knowledge among master's students, to stimulate the need for philosophical assessments of the formation and development of sciences, a critical analysis of modern scientific achievements, to develop a methodological culture of research work.*
	Learning outcomes:
	- understanding the place of one's own specialty in the integral system of science, society and culture;
	- comprehension of the dynamics of the development of science, its impact on the development of the society;
	- formation of a holistic image of science, awareness of various aspects and contexts of the study of science itself;
	- expansion and deepening of the philosophical problems of certain scientific courses;
	- understanding the methodological foundations and

	problems of modern science, mastering the theory of the method as a special teaching about the principles, approaches, techniques, methods of scientific activity, mastering the logic and methodology of science; *- mastering the skills of perception and analysis of texts on philosophical problems of various sciences;* *- critical reflection and comparative analysis of various concepts of the growth of scientific knowledge.*
Content	*1. The relationship between the philosophy of science and the history of science. Philosophical ideas as a heuristic of scientific research. The problem of demarcation in philosophy of science* *22. The genesis of science. Discussions about the origin of science* *3. The problem of scientific rationality. Classical science. Scientific picture of the world. Ethos of classical science.* *4. Non-classical science and post-non-classical science. Scientific picture of the world. Ethos of Science.* *5. Philosophy of science: basic meanings. Problems of the boundaries of scientific knowledge in the philosophy of I. Kant. Positivist tradition* *6. Analytical philosophy and its influence on the philosophy of science. Transition from the logic of science to the history of science.* *7. The structure of scientific knowledge. The main types of sciences. Types of cognitive procedures.* *8. Philosophy of natural sciences. The circle of problems of philosophy of natural science. Philosophical foundations for the formation of classical natural science disciplines.* *9. Philosophical problems of theoretical natural science. Mathematics and Natural Science. The ideological significance of the theory of relativity.* *10. Philosophical aspects of quantum theory, theoretical biology. The picture of the world in global evolutionism.* *11. Philosophy of technology and technical sciences. The role of technology in science. Information and computer technologies in non-classical technical sciences. Environmental aspects of the social assessment of technology.* *12. Specificity of socio-humanitarian knowledge. The problem of the formation of social theory.* *13. The topic of "death of the subject" in postmodern philosophy. Time, space, chronotope. The problem of values. Postcolonial studies* *14. Epistemological characteristics of the social sciences. Explanation. understanding, interpretation. The problem of truth. "Laboratory Life" by B. Latura.* *15. Axiological problems of modern science and the prospects of mankind. Human problem. Possible scenarios for the future development of human civilization.*
Exams and assessment	*Oral exam using exam cards. An examination card is a set*

formats	*of two or three questions to assess the knowledge of students. Cards for examinations during the intermediate session are developed in advance, teachers can give a list of sample questions to master's students in advance for preparation. However, exam cards become available only during the exam. The questions in the cards cover the material studied during the period of teaching the course and do not go beyond it, the questions are both theoretical and applied in nature (as a rule, one of the questions can be a task or an assignment to complete a drawing, diagram, function, etc.).*
Study and examination requirements	*the final grade in the module is composed of 60% performance on exams, 10% quizzes, 10% take-home assignments, 10% in-class participation. Students must have a final grade of 60% or higher to pass*
Reading list	*1. Kanke V.A. Osnovnyye filosofskiye napravleniya i kontseptsii nauki. – M.,2013* *2. Kokhanovskiy V.A. Istoriya i filosofiya nauki. – M., - 2010* *3. Klyagin, N. Sovremennaya nauchnaya karta mira [Elektronnyy resurs]: uchebnoye posobiye / N. Klyagin.- 1, 02 MB. – M.: Logos, 2017. – 186 s.* *4. Gaydenko, P. Istoriya novoyevropeyskoy filosofii v yeye svyazi s naukoy: uchebnoye posobiye / Piama Gaydenko.- Moskva: PER SE; Sankt-Peterburg: Universitetskaya kniga, 2010. – 455, [1] s. – (Humanitas).* *5. Filosofiya nauki: Obshchiye problemy poznaniya. Metodologiya yestestvennykh i gumanitarnykh nauk: khrestomatiya – M.: Progress-Traditsiya: MPSI : Flinta, 2005. – 992 s.* *6. Nurmanbetova D.N. Istoriya i filosofiya nauki [Tekst] / D.N. Nurmanbetova. – Astana: YENU, 2012.* *7. Koyre A. Ocherki istorii filosofskoy mysli: O vliyanii filosofskikh kontseptsiy na razvitiye nauchnykh teoriy. 3-ye izd., ster. – M.: Yeditorial URSS, 2004. – 269 s.* *8. Khoking S. Chernyye dyry i molodyye Vselennyye / S. Khoking; 11. per. s angl. M. Kononova. – Sankt-Peterburg: Amfora, 2001. – 189 s.* *9. Istoriya i filosofiya nauki (Filosofiya nauki): Uchebnoye posobiye / Ye.YU.Bel'skaya, N.P. Volkova i dr.; - M.: Al'fa, M: INFRA. – M, 2011.*

Module designation	**EDUC 51001 Master's training methodology** Discipline - Management psychology
Semester(s) in which the module is taught	*1,2*
Person responsible for the module	*Mambetalina A.S.* *Baizhumanova B.Sh.*
Language	*Kazakh, Russian and English*
Relation to curriculum	*General education - compulsory component*
Teaching methods	*Lectures, practical and independent work of Master's students*
Workload (incl. contact hours, self-study hours)	*Workload: 60 hours, of which contact hours:* *lectures- 8 hours. practical -15 hours; self-study - 37 hours.*
Credit points	*2*
Required and recommended prerequisites for joining the module	*Computer-based testing*
Module objectives/intended learning outcomes	*Objectives:* *The formation of socio-psychological knowledge in undergraduate students in the context of solving the problems of modernization of social consciousness, defined by the state program " Course towards the future: modernization of Kazakhstan's identity"* *Expected learning outcomes:* *Know:* *- Basic psychological concepts, theories and approaches to the study of personality, society and its subsystems;* *- basic principles of functioning of modern society and its social institutions;* *- The main sources and methods of obtaining psychological information;* *Skills:* *- developing skills in describing and analyzing current psychological problems of modern society, the essence of social processes and relations:* *- formation of critical thinking skills and the ability to apply it in practice.* *- explanation and interpretation of subject knowledge (concepts, ideas, theories) in the field of psychology;* *-analysis of peculiarities of psychological institutions in the context of their role in modernization of Kazakhstani society;* *- Competencies:* *- Use the knowledge gained in the process of learning psychology in professional activities;* *- explain and interpret subject knowledge (concepts, ideas, theories) in the field of psychology;* *- explain socio-ethical values of the society as a product of integration processes in the systems of basic knowledge of the discipline of psychology;* *- analyze different situations in different spheres of communication from the position of correlation with the*

	system of values, social, business, cultural, legal and ethical norms of Kazakhstani society; to present information about different stages of development of Kazakhstani society, culture, language, social and interpersonal relations in a well-reasoned and substantiated manner; - develop programs for solving conflict situations in society, including in professional society.
Content	1. Introduction to Psychology 2. Me and my motivation 3. Emotions and emotional intelligence 4. Human Will and the Psychology of Self-Regulation 5. Individual-typological features of personality 6. Values, Interests and Norms as the Spiritual Basis of a Person 7. Psychology of the meaning of life and professional self-determination 8. Psychology of personal health. 9. Communication of personality and groups. 10. The perceptive side of communication. 11. The interactive side of communication.. 12. Communication as an exchange of information. 13.The concept and structure of socio-psychological conflict 14. Models of personal behavior in a conflict 15. Techniques of effective communication
Exams and assessment formats	Types of control of academic achievements: Rubric 1 oral examination - 50 minutes Final 2 oral questioning - 50 minutes Final: computer-based testing
Study and examination requirements	Required: Participation in all types of control is required: current, intermediate, final, control of independent work of the master's student. A final grade is determined for the discipline, which is made up of the results of the rating control and the exam, with 60% being the rating control and 40% the result of the exam. The exam must be scored at least 50% to successfully complete the course.
Reading list	Primary literature: 1. Nazarbayev N.A. On the Threshold of the XXI Century. - Astana, 2016. 2. Nazarbayev N.A. "Course towards the future: modernization of Kazakhstan's identity". - Astana, AKORDA, 2017 / http://www.akorda.kz/ru. 3. Aronson E. Kopke umtylgan zhalgyz [Mәtin] = The Social Animal: әleumettik psychloga kirispe: [оқулық] / E. Aronson ; aud. D. Duisenbekov [әә t. b.]. - 11-bas. - Astana: "Ұлттық audarma bureaucy" қоғамдуқ kory, 2018. - 407, [2] б. - (Rukhani zhangyru) . 4. Godefroy J. What is psychology. Volume 2. -

Moscow: The World, 2005. - 276 pp.
5.   Daniel Goleman. Emotional Intelligence. Why it can mean more than IQ. Mann, Ivanov & Ferber Publishing House: 2018. -560 с.
6. Glukhanyuk, N.S. General psychology: Textbook / N.S. Glukhanyuk. - M.: Academy, 2017. - 272 с.
7. Glukhanyuk, N.S. General psychology / N.S. Glukhanyuk. - M.: Academia, 2016. - 608 с.
8. Enikeev, M.I. General and social psychology: Textbook / M.I. Enikeev. - M.: Norma, 2019. - 224 с.
9. Enikeev M.I. General and social psychology: Textbook / M.I. Enikeev. - M.: Norma, 2017. - 176 с.
10. Ivannikov, V.A. General psychology: Textbook for academic baccalaureate / V.A. Ivannikov. - Lyubertsy: Yurait, 2016. - 480 с.
11. Krysko V.G. General psychology in schemes and comments: Textbook / V.G. Krysko. - Moscow: Vuzovskiy textbook, 2017. - 336 с.
12.   Krysko V.G. General psychology in schemes and comments: textbook / V.G. Krysko. - Moscow: Vuzovskiy textbook, 2019. - 336 с.
13. Nurkova, V.V. General psychology: Textbook / V.V. Nurkova, N.B. Berezanskaya. - Lyubertsy: Yurait, 2016. - 524 с.
14. Rezepov, I.Sh. Cheat sheets: general psychology / I.Sh. Rezepov. - Rn/D: Phoenix, 2018. - 288 с.
15. Rezepov, I.Sh. Cheat sheets: general psychology / I.Sh. Rezepov. - RnD: Phoenix, 2015. - 128 с.
16. Shadrikov V.D. General Psychology: Textbook for Academic Bachelor's Degree / V.D. Shadrikov, V.A. Mazilov. - Lyubertsy: Yurite, 2016. - 411 с.
17. Steinmetz A.E. General psychology: Textbook / A.E. Steinmetz. - M.: Academy, 2018. - 496 с.14
Additional Literature:
1. Makarova I.V. General Psychology: Textbook for the SPO / I.V. Makarova. - Lyubertsy: Yurait, 2016. - 182 с
2. Maklakov, A. General psychology / A. Maklakov. - St. Petersburg: Peter, 2019. - 583 с.
3. Maklakov, A.G. General psychology / A.G. Maklakov. - SPb: Peter, 2019. - 583 с.
4. Nemov, R.S. General psychology in 3 vols. i. Introduction to psychology: Textbook for bachelors / R.S. Nemov. - Lyubertsy: Yurite, 2016. - 726 с.
5. Nemov, R.S. General psychology in 3 vols. volume ii in 4 books. book 2. attention and memory: Textbook and workshop for academic bachelor's degree / R.S. Nemov. - Lyubertsy: Yurite, 2016. - 261 с.
Internet sources:
1. http://www.akorda.kz
2. http://azps.ru/
3. http://psychology.net.ru/articles

	4. http://www.psychology-online.net/ 5. http://psynet.narod.ru/main.htm 6. http://psyfactor.org/

Module designation	**EDUC 51001 Master's training methodology** Discipline -English (Professional)
Semester(s) in which the module is taught	*1/2 semester*
Person responsible for the module	*Kurmanayeva D.K.*
Language	*English*
Relation to curriculum	*General education course*
Teaching methods	*Practical classes*
Workload (incl. contact hours, self-study hours)	*37 practical classes / 83 master's students' independent work*
Credit points	*4*
Required and recommended prerequisites for joining the module	*Foreign language, B2 level*
Module objectives/intended learning outcomes	*Module English (prof) is the transference of a research knowledge system and skills to master students and the acquisition of foreign language communication skills in their professional and scientific fields.* *Knowledge: the functional and stylistic characteristics of the scientific presentation of the material in the studied foreign language; freely reading, translating the original literature in the chosen specialty, followed by analysis and evaluation of the extracted information; making a presentation of scientific research (at seminars, conferences, symposia, forums); listening and comprehension public speaking in direct and indirect communication (lectures, reports, TV and Internet programs)* *Skills: in being able to use general scientific terminology and the terminological sublanguage of the relevant specialty in a foreign language; in making a presentation of scientific research (at seminars, conferences, symposia, forums); in preparation written forms of presentation of information material in the specialty (scientific report, message, abstracts, theses, short description)* *Competencies: to form the intercultural and communicative competence of Master students of non-linguistic specialties in the process of foreign language education at the over-based standard level (C1); to master the principles of academic writing, to develop the skills of critical analysis, to prepare research review and annotations, reports and bibliographies on the subject of*

	ongoing research.
Content	*- Introduction to the course* *- Developing a focus* *- How to write master's dissertation (introductory course)* *- Sourcing information for your project* *- Developing your project* *- Using evidence to support your ideas* *- Avoiding plagiarism* *- Paraphrasing and summarizing* *- Academic Style – some guidelines* *- Writing introductions* *- Incorporating data and illustrations.* *- Writing conclusions* *- Presentation skills. Preparing for conference presentation*
Exams and assessment formats	*Exams and assessment formats: The first midterm control: Performing test tasks on the passed material. / Summarizing the article on scientific topics.* *Second midterm control: Creating a presentation on a scientific topic using graphs and diagrams. / Writing an essay on dissertation research (volume 1200-1500 words)* *Final oral exam*
Study and examination requirements	*Requirements for successfully passing the module:* *the final grade in the module is composed of 60% performance on exams, 10% tests, 10% take-home assignments, 10% presentations/ essay, 10% in-class participation. Students must have a final grade of 50% or higher to pass*
Reading list	*1) Sagimbayeva J.E. Moldakhmetova G.Z, Tazhitova G.Z, Kassymbekova N.S. English course book for Master programme students of "Governmental audit and Financial control" specialty (from extended reading to academic writing) - Eurasian National University. – Astana, 2018. -400 p.* *2) English for Academic Study. Joan McCormack and John Slaght -Extended Writing and Research Skills, University of Reading, 2012 – 152 p.* *3) Tamzen Armer. - Cambridge English for Scientists – Cambridge University Press, 2013 – 128 p.* *4) Martin Hewings – Cambridge Academic English – Upper Intermediate- Cambridge University Press, 2012 – 176 p.* *5) Dorothy E. Zemach, Lisa A. Rumisek - Academic Writing: from paragraph to essay. – London: Macmillan Education, 2016 - 130 p.* *6) Academic Writing. A Handbook for International students. Stephen Bailey. Routledge. 2011* *7) Tussupbekova M.ZH. Professional'nyy angliyskiy yazyk [Elektronnyy resurs]: elektronnoye uchebnoye posobiye dlya studentov filologicheskogo fakul'teta / M.ZH.*

Tusupbekova. - Nur-Sultan: YENU im. L.N. Gumileva,
2020. - 110 s. - Bibliogr.: s. 105
E-resources:
1. https://library.enu.kz/MegaPro/Web
2. https://scopus.com
3. https://webofscience.com
4. https://englishforacademicstudy.com
5. https://garneteducation.com
6. http://presentationexpressions.com
7. http://wiki.ubc.ca/Presentation_Skills
8. https://global.oup.com/?cc=kz,
https://www.macmillanyounglearners.com/macmillanenglish/
9. https://www.britishcouncil.kz/kk
10.   https://edpuzzle.com/

Module designation	**EDUC 51001 Methodology The Master Training:** Scientific-research work of graduate students
Semester(s) in which the module is taught	*1,2,3, 4 semesters*
Person responsible for the module	*Scientific the leader*
Language	*English*
Relation to curriculum	*Reports for 1-4 semesters*
Teaching methods	*A master's student is trained on the basis of an individual curriculum (hereinafter - IC), which is drawn up under the guidance of a scientific supervisor.*
Workload (incl. contact hours, self-study hours)	*The research work of the undergraduate is:* *- 24 academic credits for the scientific and pedagogical direction;* *- 13 academic credits for a specialized direction with a typical study period of 1 year;* *- 18 academic credits for the profile direction with a typical study period of 1.5 years; 1st academic credit corresponds to 30 academic hours.*
Credit points	*1semester- 7, 2 semester – 7, 3 semester-4, 4semester -6 Total-24 credit points*
Required and recommended prerequisites for joining the module	*At the departments, the heads of departments, when planning the research work of a master student in accordance with the IC, carry out the following activities: - drawing up a plan for the implementation of a master's thesis;* *- development of a plan for scientific publications, internships;* *- determination of the direction and content of research work of undergraduates of research and development work in conjunction with the supervisor;* *- consultation of a master's student with a scientific advisor on planning, methodology, registration and presentation of research results;*

	- the formation of the topic of the master's thesis (database of theses topics) in accordance with national priorities, or state programs, or programs of fundamental or applied research (budget programs, development strategy of the University, etc. grounds for research by the issuing department)
	- posting an electronic database on the university website topics of dissertations;
	- annual updating of the general database (list of topics of dissertations), topics of master's theses and approval at a meeting of the department.
Module objectives/intended learning outcomes	*The results of scientific research work of scientific research work or experimental research work of ERWMS at the end of each period (semester) of their passage are drawn up by a master student in the form of a report, and a differentiated credit is taken on it at the end of each period (semester). Forms of NIRM reporting: abstract messages, reports, articles, poster reports, computer programs, video materials, models.*
	4.3 Based on the results of the completed RWMS / ERWMS, the scientific advisor draws up a conclusion (the actual implementation of chapters, sections in the planned time, taking into account their instructions in case of lag). The scientific supervisor assesses the indicators of the completed RWMS / E RWMS of the undergraduate according to the point-rating system.
Content	*Within the framework of RWMS/ERWMS, the individual work plan of a master's student to get acquainted with innovative technologies and new types of production provides for a mandatory scientific internship.*
	Scientific publications should correspond to the topic of the master's thesis.
	The main results of a master's thesis must be presented in at least one publication and / or one presentation at a scientific and practical conference.
Exams and assessment formats	*Every year, at the end of the academic year, the undergraduate undergoes academic certification for the implementation of an individual work plan. The implementation of the RWMS / ERWMS plan is discussed at a meeting of the department. The decision of the department for attestation is reflected in the form of a conclusion in the protocol. An extract from the minutes of the meeting of the department is attached to the master's student's report.*
	The results of scientific research work of scientific research work or experimental research work of ERWMS at the end of each period (semester) of their passage are drawn up by a master student in the form of a report, and a differentiated credit is taken on it at the end of each period (semester). Forms of research work reporting: abstract messages, reports, articles, poster reports, computer

	programs, video materials, models.
Study and examination requirements	*Based on the results of the completed RWMS / ERWMS, the scientific advisor draws up a conclusion (the actual implementation of chapters, sections in the planned time, taking into account their instructions in case of lag). The scientific supervisor assesses the indicators of the completed RWMS / E RWMS of the undergraduate according to the point-rating system.* *Based on the results of the RWMS / ERWMS report of the undergraduate, the scientific advisor fills out a statement. The mark is put on the examination sheet of the master student at the end of each academic period (semester) in accordance with the IC and WC of the specialty.* *The final result of the research or experimental research work of a master student is a master's thesis / master's project, developed in accordance with the Rules for the registration of a master's thesis / project.* *The procedure for registration, requirements for the content and organization of the procedure for defending master's theses are reflected in the methodological guidelines developed and approved at the departments for the preparation of master's theses / projects..*
Reading list	*1.At the Eurasian National University. L.N. Gumilyov, the procedure "Research work of undergraduates and doctoral PhD students" was approved in 2019.* *Law of the Republic of Kazakhstan "On Education".* *2. State compulsory standard of postgraduate education. Master's degree.* *3. State compulsory standard of postgraduate education. Doctorate.* *4. Rules for completing a master's thesis / project.* *5. Regulations on scientific internship.* *6. The procedure for checking the graduation work of students (bachelor's and master's degrees) for plagiarism.*

Module designation	**EDUC 5100 1 Methodology The Master Training** Teaching practice (Teaching internship)
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Practice supervisor from the Information Security Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*e.g. lecture, lesson, lab works, project, seminar etc.*
Workload (incl. contact hours, self-study hours)	*120 hours* (incl. 36 contact hours, 84 self-study hours)
Credit points	*4*
Required and recommended prerequisites for joining the module	*Higher School Pedagogy* *Management psychology*

Module objectives/intended learning outcomes	*The goal of master students' teaching practice is to consolidate and deepen knowledge in general scientific, cultural, psychological, pedagogical, methodological and special disciplines, as well as to form pedagogical skills, skills and competencies on the basis of theoretical knowledge.*
	The main tasks of teaching internship are:
	1) the acquisition of initial experience in teaching;
	2) mastering the teaching and learning methodology;
	3) application of the foundations of pedagogical skills;
	4) instilling the skills and abilities of independent teaching and educational and teaching work;
	5) mastering the skills of scientific, psychological and pedagogical research;
	6) mastering the methodology of educational work;
	7) knowledge of innovative teaching technologies;
	8) implementation of an individual approach to students, students, undergraduates in the course of educational and educational work, taking into account the peculiarities of their development.
	As a result of passing teaching internship, the student must acquire the following practical skills, abilities and general cultural competence:
	GPC 1 - readiness for self-development, self-realization, use
	creativity.
	As a result of mastering the program of teaching internship undergraduate must
	Know:
	- selected subject area of research;
	- forms, methods, techniques of teaching, aimed at the effective achievement of the educational goals of the lesson;
	- active teaching methods, technologies for the development of a student's personality;
	- continuity between topics, types of activities, in the selection of educational material.
	Be able to:
	- to professionally conduct an independent author's scientific research;
	- prepare and conduct training courses on the instructions of the head of the practice
	- classes, attend and review the classes of experienced teachers and their colleagues;
	- formulate and solve their problems arising in the course of pedagogical activity;
	- to work effectively as part of a research team.
	Own:
	- knowledge related to the object of scientific research;
	- methods of methodically grounded use of demonstration and handouts;
	- pedagogical technique of the teacher.

Content	*At the beginning of the Teaching practice, the department holds an orientation conference to familiarize master students with:* *- normative documents for practice (program, guidelines for practice);* *- tasks and goals of practice;* *- safety rules in places of practice (with the obligatory signature of students in the journal of introductory instruction on safety at the department);* *- the requirements for traineres.* *- the procedure for registration and delivery of reporting documentation for practice.* *The orientation conference is formalized by the protocol (F ENU 403-02-14)* *During the practice p, supervisors appointed by order must monitor the progress of practice.* *At the end of the research internship, the master students submit a diary-report to the department, which is checked by the supervisor from the department and defended before the Commission (F ENU 403-02-14).*
Exams and assessment formats	*The practice is assessed by the supervisor based on the report prepared by the master student. Teaching practice report should include a description of the work done by the graduate student. As an attachment to the report, the texts of lectures and / or plans of lectures and / or seminars, tasks, cases, etc., as well as the opinion of the head of the master's program on the participation of the master student in the implementation of tasks in teaching internship should be submitted. The report on the results of the passage of teaching practice includes a description of the work done. As an attachment to the report, the texts of lectures and plans of seminars, tasks, cases, etc. should be submitted.* *Reporting documents on the practice are submitted for control no later than five days after the end of the practice (including weekends and holidays) to the head of the teaching internship and after the defence are handed over to the department. All documents must be printed and presented in a separate folder with a cover page.*
Study and examination requirements	*1. Assessment in Teaching practice (differential credit) is entered in the examination sheet, equated to the grades (credits) in theoretical training and is taken into account when summing up the overall performance of graduates and the appointment for a scholarship in the corresponding semester.* *2. Attestation in the Teaching practice of graduates is carried out in the form of a differentiated credit (letter equivalence, numeric equivalence, traditional equivalence), by giving marks on a 100-point scale in the statement and record book. The assessment takes into account the quality of the reporting materials submitted by the undergraduate and the feedback of the practice leaders.*

	3. Assessment in Teaching practice has the same status as assessments in other disciplines of the curriculum (it is equated to assessments in the disciplines of theoretical education and is taken into account when summing up the overall performance of undergraduates). Assessment in teaching internship is reflected in the individual plan of the master student and in the report on practice. *4. Master students who have not completed the internship programs for a good reason are sent to internship again, in their free time. Graduate students who fail to complete the internship program for no good reason or receive a negative grade may be expelled from the University as having academic debt.*
Reading list	*Main literature:* *1. Kosherbayeva A.N. and ets. Educational management. Textbook.-Almaty, 2017* *2. Alkozhayeva N. C. Fundamentals of scientific pedagogical research: textbook / The name of Al-Farabi. KazNU. - Almaty: Kazakh University, 2019. - 127 p. (in Kazakh).* *3. Mukhametzhanova A. O. Methods of educational work and technology: textbook / Ministry of Education and Science of the Republic of Kazakhstan, KSTU. - 2nd bass. - Karaganda: "Medet Group », 2019. - 169, [7] p. (in Kazakh).* *4. H.Schunk Dale. Learning Theories. An Educational Perspective / - Seventh ed. - Boston. - ISBN 978-601-7943-22-6 :* *5. Bordovskaya, Nina Valentinovna. Psychology and pedagogy [Text]: textbook / N. V. Bordovskaya, S. I. Rozum. - Moscow; St. Petersburg [and others]: Peter, 2013. - 620, [4] p. (in Russian).* *6. Active and interactive educational technologies (forms of conducting classes) in higher education: textbook / compiled by T.G. Mukhina. - N. Novgorod: NNGASU, 2013 .-- 97 p. (in Russian).* *7. Teaching methodology in higher education: study guide / V. I. Blinov, V. G. Vinenko, I. S. Sergeev. - M.: Yurayt Publishing House, 2014 .-- 315 p. (in Russian).* *Additional literature:* *1. Podlasiy, Ivan Pavlovich. Pedagogy [Text]: textbook / I. P. Podlasy. - 2nd ed., Add. - Moscow: Yurayt: Vyssh. education, 2010. - 574, [2] p. (in Russian).* *2. Pedagogy [Electronic resource]: textbook. manual / ed. P.I. Pidkasistogo. - 2nd ed., Rev. and add. - Electron. text data. - Moscow: Yurayt: ID Yurayt, 2011. - 502, [1] p.Miniurova S. A., & Leonenko N. O. (2015). Pedagogical internship as an innovative project of the University. Higher education in Russia (10), 37-47. (in Russian).* *3. Miniurova, S. A., & Leonenko, N. O. (2016).*

	Pedagogical internship as a form of School-University partnership. Paper presented at the XII international scientific and practical conference "Psychology of personal and professional development: modern challenges and risks", Moscow, Russia.
	Normative references:
	1. F ENU 705-01-19 The program of professional practice of the educational program in the direction of training personnel with higher and postgraduate education.
	2. F ENU 705-02-19 Guidelines for practice for students.
	3. F ENU 705-03-19 Work schedule of professional practice.
	4. F ENU 705-04-19 Cooperation agreement for professional practice.
	5. F ENU 705-04-19 Cooperation agreement for professional practice (with payment).
	6. F ENU 705-04-19 Agreement on joint activities (with payment).
	7. F ENU 705-05-19 Tripartite agreement for professional practice.
	8. F ENU 705-06-19 Schedule of professional practice.
	9. F ENU 705-07-19 Direction to professional practice.
	10. F ENU 705-08-19 Diary-report on the passage of professional practice

Module designation	**EDUC 51001** Methodology The Master Training: *Research practice*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Practice supervisor from the Information Security Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Methods of conducting research*
	- *working with primary sources, monographs, abstracts and dissertation research;*
	- *consultation with the practice supervisor or scientific advisor, teachers of the department.*
	- *seminars.*
Workload (incl. contact hours, self-study hours)	*360 hours (incl. 108 contact hours, 252 self-study hours)*
Credit points	*12*
Required and recommended prerequisites for joining the module	*Computation models, Machine learning and application, Analysis and processing of large amounts of information, Intelligent information systems and technologies for their development*
Module objectives/intended learning outcomes	*The research practice of a master student is carried out with the aim of acquainting with the latest theoretical, methodological and technological achievements of domestic*

	and foreign science, with modern methods of scientific research, processing and interpretation of experimental data. *Research practice objectives:* *- practical approbation of theoretical aspects of the dissertation topic;* *- development of practical skills for the creative implementation of the assigned research tasks;* *- practical mastery of research methods:* *- practical implementation of a creative approach to research methods;* *- practical verification of the research results, its analysis and interpretations;* *- practical test of their readiness for innovative activities in the field of education and science.* *On successful completion of this module the master students will be able to:* *- Know of the main provisions of the methodology of scientific research and apply them when working on the chosen topic of the master's thesis;* *- Use modern methods of collection, analysis and processing of scientific information;* *- Develop a research proposal defining the project aims, objectives and research methodology that will be applied to the research project.* *- Review the current state of the art in the topic related to the proposed research outlining the contribution the research will make to the general field.* *- Evaluate the main research integrity and ethical considerations that need to be considered in the proposed project.* *- Communicate effectively the idea and contribution of the proposed research project.* *- Present scientific knowledge on the problem of research in the form of reports, publications.*
Content	*The base of the research practice of the master students is the implementation place of the dissertation work (research institutes, large companies, department laboratories, research laboratories, educational and innovation centers, other universities).* *At the beginning of the research practice, the department holds an orientation conference to familiarize master students with:* *- normative documents for practice (program, guidelines for practice);* *- tasks and goals of practice;* *- safety rules in places of practice (with the obligatory signature of students in the journal of introductory instruction on safety at the department);* *- the requirements for trainees;*

	- the procedure for registration and delivery of reporting documentation for practice.
	The orientation conference is formalized by the protocol (F ENU 403-02-14)
	During the practice, supervisors appointed by order must monitor the progress of the practice.
	At the end of the research practice, the master students submit a diary-report to the department, which is checked by the supervisor from the department and defended before the Commission (F ENU 403-02-14).
	Research Methods and Methodologies
	Definitions. Knowledge kinds and interrelationships. Empirical Research. Basic Research. Applied Research. Practical Research. Action Research. Parameters of research. Kinds of research: qualitative, descriptive and experimental. Applying research methodologies to computing, software and software development. Case studies and examples.
	Research and Research Strategies
	Constitution of research papers. Standards. Search strategies including: web, library, inter-library loan, databases such as IEEE and ACM, search engines. Literature review and systematic literature review.
	Research Planning
	Issues within a research project that relate specifically to computing/software projects including: problem definition, software planning, specification and system definition, choosing environments for development, timing issues relating to the software process, prototyping, iteration, risk evaluation, slippage, performance issues, evaluations and conclusions.
	Research Documentation
	Documentation appropriate to research and the programme specifications. This includes research proposal documentation, report documentation, research paper formats and citation formats.
	Ethics for Computer Scientists
	Ethics in Information & communication technology. Ethics, privacy and information security. Computer Ethics. Cyber ethics. Social, regulation and legal issues. Ethical design. Impact of IoT on ethics - environment monitoring and data collection. Impact of AI on ethics. Posthuman era, machine ethics, unintended consequences. Case studies - Facebook Mood Manipulation Experiments, Internet of Things, Google Maps.
	Research Ethics & integrity
	Human subjects - ethical, legal, social and political issues. Research ethics committee in CIT. Categories of research ethics - questionnaires/surveys for adults versus children. Consent.
Exams and assessment	*Report - 100%*

formats	*Assessment Breakdown: essay (40%) and research proposal (60%)*
Study and examination requirements	*Requirements for successfully passing the module* 　　1.　*Essay – 40% – week 2* 　　　*The master student will propose an initial research topic and will define some initial context behind the idea. In addition, the master student will define some preliminary research aims and objectives. The master student will then be expected to present their idea with the aim of effectively communicating the broad research topic and context.* 　　2.　*Research proposal – 60% – at the end of the semester* 　　　*The master student will develop the research proposal detailing fully the idea and relevant state of the art, aims, objective, methodologies, work plan schedule and ethical issues that need to be considered. The master student may also be required to present their proposal.* *Master Students must have a final grade of 60% or higher to pass this module*
Reading list	*Normative references:* *1.　F ENU 705-01-19 The program of professional practice of the educational program in the direction of training personnel with higher and postgraduate education.* *2.　F ENU 705-02-19 Guidelines for practice for students.* *3.　F ENU 705-03-19 Work schedule of professional practice.* *4.　F ENU 705-04-19 Cooperation agreement for professional practice.* *5.　F ENU 705-04-19 Cooperation agreement for professional practice (with payment).* *6.　F ENU 705-04-19 Agreement on joint activities (with payment).* *7.　F ENU 705-05-19 Tripartite agreement for professional practice.* *8.　F ENU 705-06-19 Schedule of professional practice.* *9.　F ENU 705-07-19 Direction to professional practice.* *10. F ENU 705-08-19 Diary-report on the passage of professional practice* *Book Resources:* *11. Zina O'Leary 2020, The essential guide to doing your research project [in Kazak version], 3 Ed., Almaty: - National Translation Bureau. ISBN: 9786017943981* *12. Steven J. Taylor, Robert Bogdan, Marjorie DeVault 2016, Introduction to Qualitative Research Methods: A Guidebook and Resource, 4 Ed., Wiley. ISBN: 9781118767214* *13. Nick Bostrom 2016, Superintelligence: Paths, Dangers, Strategies, OUP Oxford. ISBN: 9780198739838* *14. Prabhat Pandey, Meenu Mishra Pandey 2015, Research*

	Methodology: Tools and Techniques, 1 Ed., Bridge Center. *ISBN: 9786069350270* *Recommended Article/Paper Resources* 15. *Francine Berman and Vinton G. Cerf 2017,* Social and Ethical Behavior in the Internet of Things, *Communications of the ACM, 60(2)* 16. *Nick Bostrom, Eliezer Yudkowsky 2014,* The Ethics of Artificial Intelligence, *The Cambridge handbook of artificial intelligence, 316-3* *Other Resources* 17. https://library.enu.kz/MegaPro/Web *ENU Library* 18. http://nabrk.kz *National Academic Library of Republic of Kazakhstan* 19. https://www.acm.org/ *Association for Computing Machinery* 20. https://dl.acm.org/ *ACM Digital library* 21. https://ieeexplore.ieee.org/ *IEEE Xplore* 22. https://www.scopus.com/ *Scopus* 23. https://webofknowledge.com/ *Web of Science*

Module 2

Module designation	**COMS 53002 Algorithms and computation models**
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Razakhova B*
Language	*Russian, Kazakh*
Relation to curriculum	Major courses, university component *for Artificial Intelligence Technologies Master educational program and other Master Program in the IT faculty*
Teaching methods	*Lecture, seminars, master's student's independent work (MSIW)*
Workload (incl. contact hours, self-study hours)	*Lecture - 15 hours, seminars – 30 hours, self study – 105 hours*
Credit points	*5*
Required and recommended prerequisites for joining the module	*Algorithms and data structure*
Module objectives/intended learning outcomes	*The main purpose of the discipline "Computational models" is at sfudying computational models of algorithms to teach masters about the problems of formalization of algorithms, the direction of development of algorithm theory and computational models, methods of constructing algorithms; to introduce them to practical applications in the construction of various programming systems.* *Objectives of mastering the discipline:* *- studying the basic principles of constructing computational models and analyzing the results obtained;* *- using the acquired knowledge and practical skills in the study of the disciplines of the basic and variable parts, as well as in the writing of master's theses;* *- formation of algorithmic thinking;* *- familiarization with the basic concepts of algorithm theory, computational models, methods of analysis and construction of various computational models;* *- training and development of skills in applying methods for constructing computational models for conducting scientific research.* *Know: theories of computational models: Turing machine, Post machine, recursive functions, normal Markov algorithms and others.;* *Skiils: the ability to define a computational model in terms of permitted primitive operations with unit cost, or simply operations with unit cost, to obtain models from computational experiments.* *Competences: apply computational models for processing and analyzing big data in artificial intelligence*

Content	*Discipline will make it possible to study the compuйtional models and their peculiarities (Turing machines, Post, recursive functions, normal Markoval orithms etc.) aphlied in practice.*
	1. *Introduction to the theory of algorithms. The concept of formalization of algorithms. Classification of algorithms. Basic computational models.*
	2. *Turing machine. Church-Turing thesis. Variants and schemes of the Turing machine.*
	3. *The method of proving the correctness of the program. Set numbering, algorithmic properties.*
	4. *Recursive functions. Lambda calculation.*
	5. *Verbal algorithms. Normal Markov Algorithms.*
	6. *Post's Algorithm.*
	7. *Procedural computational models.*
	8. *Functional computational models.*
	9. *Graph algorithms. Graphical analysis. Search by schedule. Efficient algorithms for constructing a graph. Algorithms of Dijkstra, Prim and Kraskal.*
	10. *Logical computational models, production computational models.*
	11. *Neural network computing models.*
	12. *Parallel algorithms. Polynomial and exponential algorithms.*
	13. *Greedy algorithms.*
	14. *Algorithms for primes and random numbers.*
	15. *Genetic algorithms. Ant algorithms.*
Exams and assessment formats	*Two oral Midterm assessments and one final Written exam*
Study and examination requirements	*The final mark will be weighted as follows:* *-20 degrees for assignments, seminars and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a test.* *Final written examination (90 min.) have short answer questions, covering around half the marks, and then one problem-solving practice task. On the written exam students are demonstrating their understanding of the course outline through the completion of tasks.*
Reading list	*1. Semenova T.I., Kravchenko O.M., Shakin V.N. Computational models and algorithms for solving problems by numerical methods. Study guide: MTUCI. - M .: 2017 .-- 84 p.* *2. Stephen Skien. Algorithms. Development Guide. 2nd edition, 720 pages, BHV-Petersburg, 2011* *3. Krupskiy V.N. Theory of algorithms: teaching aid for students. universities. - M .: Publishing house. Center "Academy", 2009. -208 p.* *4. Aho A., Hopcroft J., Ullman J. Data structures and algorithms. - M .: Publishing house "Williams", 2012. - 384p.*

	5. .Michael Sipser (2013).Introduction to the Theory of Computation (3rd ed.). Cengage Learning. 480 Pages, Published 2013 by Hsm Management. ISBN 978-1-133-18779-0
	6. Mohr, Austin."Quantum Computing in Complexity Theory and Theory of Computation"(PDF). p.2. Retrieved 7 June 2014.

Module 3

Module designation	**COMS 52003 Natural language processing resources and methods**
Semester(s) in which the module is taught	*1 (Formal Grammars, Ontologies, Semantic Technologies),* *2 (Statistical methods in Natural Language Processing, Speech Processing),* *3 (Methods of processing text corpora, Natural language processing software development methods)*
Person responsible for the module	*Yergesh B. Zh.*
Language	*Russian, Kazakh*
Relation to curriculum	*Elective courses for 7M06112-Artificial Intelligence Technologies educational program and other graduate Program in the IT faculty*
Teaching methods	*Lecture, seminars, master's students' independent work (MSIW)*
Workload (incl. contact hours, self-study hours)	*Lecture : 1 semestr – 30, 2 semestr – 30, 3 semestr -60;* *Seminars: 1 semestr – 30, 2 semestr – 30, 3 semestr -60;* *MSIW: 1 semestr – 210, 2 semestr – 210, 3 semestr -240.*
Credit points	*1 semestr – 10, 2 semestr – 10, 3 semestr -12*
Required and recommended prerequisites for joining the module	*Algorithms and data structure, Theory of languages and automata, Computation models, Information and communication technologies, Intelligent information systems and technologies for their development*
Module objectives/intended learning outcomes	*Module consists of several disciplines (Formal Grammars Ontologies, Semantic Technologies, Statistical methods in Natural Language Processing, Speech Processing, Methods of processing text corpora, Natural language processing software development methods).* Formal Grammars: *Statistical methods in Natural Language Processing, Speech Processing, Methods of processing text corpora, Natural language processing software development methods* *Students know how to provide introduction to key ideas and issues of computational linguistics from the perspective of formal grammar, Introduce the fundamental concepts of formal language, formal grammar, and automata theory. Students know how to familiarize with the standard terminology and the most important theoretical tools and concepts related to formal grammar. Students are able to classify machines by their power to recognize languages, employ automata to solve problems in computational linguistics.* Ontologies, Semantic Technologies: *Students know the theory of ontological engineering. Students are able to study the methodological and technological bases of semantic technologies design. Students are able to to create an ontological model of the selected subject area* Statistical methods in Natural Language Processing: *Students are able to study of methods for collecting,*

	organizing and processing linguistic statistical data to identify existing patterns. Students know the methodology of the linguistic mathematical-statistical method and its application;
	Speech Processing: *Students are able to express the speech signal in terms of its time domain and frequency domain representations and the different ways in which it can be modelled; derive expressions for simple features used in speech classification applications; synthesise block diagrams for speech applications, explain the purpose of the various blocks, and describe in detail algorithms that could be used to implement them; implement components of speech processing systems.*
	Methods of processing text corpora: *Students know the tasks, methods and conceptual (terminological) apparatus of corpus linguistics*
	Students are able to form knowledge about the computer tools of corpus linguistics, apply corpora in linguistic research, use the metalanguage for marking up texts of the Kazakh language.
	Natural language processing software development methods*: Students know the Natural language processing software development methods*
Content	*Mathematical foundations for formal grammar and automation. Elements of mathematical logic. Elements of the theory of languages. Language Generation Mechanisms Formal Probabilistic Grammar. Language recognition mechanisms. Automata and their classification.*
	Information, data and knowledge. The main ways of presenting knowledge: frames, scenarios, products. Semantic networks. Frame model. Ontology. RDF data representation format . SPARQL query language. OWL language constructs. Syntax. EL and al descriptive logic. Knowledge base. Axioms and TBox. Approvals and ABox. Logical analysis.
	Probability theory and mathematical statistics in linguistics. Random value. Fundamentals of Mathematical Statistics. Sample. Subject of Mathematical Statistics. Statistical observation. Summary and grouping of statistical materials in linguistics. Basic selection methods. General and special methods used in linguistics. Practical use of statistical methods for linguistic research. Hypotheses and their application in linguistics. Types of statistical hypotheses. The level of statistical significance and quantitative assessment of the reliability of the established connection. Markov chains and processes in linguistics. Processes in linguistics in the language of Markov chains. Hidden Markov Models in Speech Recognition. Problem of machine learning in a probabilistic setting. Speech Fundamentals. Acoustics Of Speech Production. Physical feasibility, sustainability. Intro to "H – L" - processing. Signal

	smoothing. Using special tools. Overview of algorithms of continuous speech recognition. Intro of recognition using hidden Markov models, neural networks. *The concept of a linguistic corpus. Correlation of corpus linguistics and computational linguistics. General characteristics of linguistic corpora. Linguistic annotation and metadata. Methods of extracting information from the corpus. Annotating the corpus. Methods for processing texts stored in a text corpus: frequency computation of characters and words, lexical matching, word matching, keyword in context, local word grouping and lemmatization. Using information and data extracted through text processing techniques in language description, analysis in application. Actual problems of corpus linguistics of the Kazakh language.* *NLP tools: OpenNLP and CoreNLP. Using UML's class diagram in generation of natural language text. UMGAR for generating UML's analysis. Word Net, Java RAP, SPIDER tool, OpenNLP, RAPID, nlrpBENCH, BrainTool.*
Exams and assessment formats	*Two oral Midterm assessments and one final Written exam*
Study and examination requirements	*The final mark will be weighted as follows:* *-20 degrees for assignments, seminars and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a test.* *Final written examination (90 min.) have short answer questions, covering around half the marks, and then one long problem-solving practice task. On the written exam students are demonstrating their understanding of the course outline through the completion of tasks.*
Reading list	*7. Pentus AE, Pentus MR Theory of formal languages: textbook. - M .: Publishing house of the Central Polytechnic Institute at the Mechanics and Mathematics Faculty of Moscow State University, 2004. - 80 p.* *8. Willem J.M. Levet. An Introduction to the Theory of Formal Languages and Automata. Max Planck Institute for Psycholinguistics, Nijmegen. John Benjamins Publishing Company. Amsterdam / Philadelphia, 2008, -404 p.* *9. Gavrilova T. A., Kudryavtsev D. V., Muromtsev D. I. Engineering of knowledge. Models and methods: textbook. SPb., 2016. pp. 300-301.* *10. Semantic network for the working ontologist / ed. by D.Allemang, J. Hendler. Elsevier, 2011. 330 p.* *11. Statistical Methods in Language and Linguistic Research Paperback E. Publisher: Equinox Publishing Limited, October 2020 - 256 p.* *12. Desagulier, Guillaume. Corpus Linguistics and Statistics with R. Springer International Publishing, -2020 - 353 p.*

	13. Olifer V.G., Olifer N.A. Computer networks. Principles, technologies, protocols. - SPb.: Peter, 2016 - 944p.
	14. 2. Kurose, D. Computer networks. Top-down approach / D. Kurose, K. Ross. - M.: Eksmo, 2016 .- 912 p.
	15. Actual problems of modern linguistics: a textbook. - Moscow: Flinta; Nauka, 2017 – - 412 p. (Electronic resource.- Accessmode:http://biblioclub.ru/index.php?page=book&id=103797&sr=1).
	16. Kopotev M. Introduction to Corpus Linguistics. Prague: Animedia Company, 2014. – 195 p.

Module 4

Module designation	**COMS 52004 Technologies for machine learning**
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Mukanova A*
Language	*Russian, Kazakh*
Relation to curriculum	Basic courses, elective component
Teaching methods	*lecture, seminar.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *Contact hours: lecture – 30; seminars – 60;* *self-study hours: 210* *Private study including examination preparation, specified in hour*
Credit points	*10*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*Module consists of several disciplines (Analysis and processing of large amounts of information, Machine learning and application)* *Master students receive the following learning outcomes:* *Knowledge: the main stages of analyzing and processing large amounts of data, common data mining techniques and tools* *Skills: use different algorithms for data processing and analysis, apply computational models for processing and analyzing big data in artificial intelligence* *Competences:* apply developed technologies for machine learning and development
Content	*Distributed file systems and map - reduce technology) as a means of creating parallel algorithms that successfully cope with very large amounts of data. Similarity search, algorithms like MinHash, and locality sensitive hashing. Processing data streams and specialized algorithms for working with data that arrives so fast that it is either processed immediately or lost. The principles of search engines, including the Google PageRank algorithm, link spam recognition, and the method of authoritative and hub documents. Frequent subject sets, including association rule search, basket analysis, Apriori algorithm, and its advanced variants:Ad management and recommendation systems. Algorithms for analyzing the structure of very large graphs, especially social network graphs. Methods for obtaining important properties of a large data set using dimensionality reduction, including singular value decomposition and latent semantic indexing.* *General information about Machine Learning, Supervised Learning,Unsupervised Learning, Machine Learning*

	Ingredients, Binary Classification and Related Problems, Conceptual Learning, Tree Models, Decision Trees, Ranking and Probability Estimation Trees, Learning Trees as Variance Reduction, Rule-based Models, Learning Disordered Rule Sets, Learning Descriptive Models Based on Rules, Linear Models, Metric Models, Probability Models, Features, Model Ensembles, Ensemble Landscape Map, Experiments in Machine Learning
Exams and assessment formats	*Final written examination (90 min.) have short answer questions, covering around half the marks, and then one long problem-solving practice task. On the written exam students are demonstrating their understanding of the course outline through the completion of tasks. The next aspects of learning to program or an intellectual system development are assessed: the algorithms design, description of algorithms, the use of a programming environment to enter, edit, and debug cod.*
Study and examination requirements	*To attend at least 75% of lecture and laboratory study.* *The final mark will be weighted as follows:* *-20 degrees for assignments, laboratory reports and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium (a discussion of the course content) and a submission of an essay on a topic within the course.*
Reading list	*1. F. N. Afrati, V. Borkar, M. Carey, A. Polyzotis, J.D. Ullman «Cluster computing, recursion, and Datalog», Proc. Datalog 2.0 Workshop, Elsevier, 2011.* *2. A. Andoni, P. Indyk «Near-optimal hashing algorithms for approximate nearest neighbor in high dimensions», Comm. ACM 51:1, pp. 117–122, 2008.* *3. B. Babcock, S. Babu, M. Datar, R. Motwani, J. Widom «Models and issues in data stream systems» Symposium on Principles of Database Systems, pp. 1–16, 2002* *4. Mayer-Schoenberger V., Kukier K. Big data. The revolution that will change the way we live, work and think-Moscow: Publishing House "Mann, Ivanov and Ferber", 2014. - 240 p. - EBS " Lan»* *Brandt Sigmund. Data analysis [Electronic resource]: statistical and computational methods for researchers and engineers / Brandt Sigmund; translated from English by O. I. Volkova; edited by E. V. Chepurin. - Moscow: Mir: AST, 2003. - 686, [1] p. - ISBN 5-03-003478-1. - ISBN 5-17-019778-0. (Library of the L. N. Gumilyov ENU)*

Module 5

Module designation	***COMS 53005 Creation of artificial intelligence systems***
Semester(s) in which the module is taught	*2, 3*
Person responsible for the module	*Kudubayeva S.A.*
Language	*Russian, Kazakh*
Relation to curriculum	*Elective course for 7M06112-Artificial Intelligence Technologies educational program and other graduate Program in the IT faculty*
Teaching methods	*Lecture, seminars, master's students' independent work (MSIW)*
Workload (incl. contact hours, self-study hours)	*Lecture - 90 hours, seminars – 120 hours, MSIW – 450 hours*
Credit points	*22*
Required and recommended prerequisites for joining the module	*To attend at least 75% of lecture and laboratory study.*
Module objectives/intended learning outcomes	*Module consists of several disciplines(Intelligent information systems and technologies for their development, Decision support systems, Soft computing, Design and creation of artificial intelligence systems)* *Students have knowledge in the field of artificial intelligence systems and decision making, studied software for building intelligent systems for various subject areas.* *The student can analyze, design, implement and test Intelligent Decision Support Systems (IDSS).* *Students know soft computing technologies that are focused on solving control problems with poorly structured control objects; know how to use soft computing tools - the technique of fuzzy systems (fuzzy sets, fuzzy logic, fuzzy controllers), artificial neural networks, genetic algorithms and evolutionary modeling.*
Content	*Classification of systems with artificial intelligence. The problem of knowledge representation in information systems. Production model of knowledge representation. Basics of designing expert systems. Fuzzy sets and fuzzy logic. Frames and Semantic Networks. Ontological approach.* *Fuzzy decision-making methods. Hierarchy analysis method. Decision support system. Mathematical and software for decision support systems. Mathematical model of the rating model of product competitiveness.* *Fuzzy systems. Models and methods for making decisions with fuzzy information. Linguistic variable. Fuzzy sets. Membership functions. Basic definitions and operations on fuzzy sets. Basic operations and relations of fuzzy logic. Approximate inference scheme, interpolation problem. Fuzzy inference algorithms Mamdani and Sugeno. Fuzzy databases.*

	The Brain as a Biological Computer. Knowledge Representation Models. Intelligent systems and means of protection. Software agent and multi-agent system. Multi-agent IC architecture. Stages of IS development.
Exams and assessment formats	*Final written examination (90 min.) have short answer questions, covering around half the marks, and then one long problem-solving practice task. On the written exam students are demonstrating their understanding of the course outline through the completion of tasks. The next aspects of learning to program or an intellectual system development are assessed: the algorithms design, description of algorithms, the use of a programming environment to enter, edit, and debug cod.*
Study and examination requirements	*Compulsory attendance of classroom lessons, active participation in the discussion of issues, preliminary preparation for lectures based on teaching aids and basic references, high-quality and timely accomplishment of MSIW tasks, participation in all types of assessment (current assessment, MSIW assessment, midterm assessment, final assessment). Exam form – computer-based testing.*
Reading list	*1. Chan, K.C.C., 2004, Intelligent Information Systems: Course Notes, Department of Computing, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.* *2. Miller, T.W., 2005, Data and Text mining: A Business Application Approach, Prentice Hall* *3. Dorogov V.G. Introduction to methods and algorithms for decision making: textbook. manual for university students / VG Dorogov, Ya. O. Teplova; ed. L.G. Gagarina. - M.: FORUM: INFRA-M, 2014 .-- 240 p.* *4. Zakharova A.A., Mitsel A.A. Mathematical and instrumental methods of decision support: methodological instructions for laboratory work in the course "Mathematical and instrumental methods of decision support" for undergraduates studying in the direction 09.04.01 "Informatics and computing" (profile Automated information processing and management systems in economics). - Tomsk: TUSUR, 2019.- 102 p.* *5. B. G. Kukharenko Intelligent systems and technologies: textbook / B.G. Kukharenko; - Moscow: Altair: MGAVT, 2015. –115 p.* *6. V.V. Kruglov Fuzzy logic and artificial neural networks. – M.- Fizmat- 2015.-224 p.*

Module 6

Module designation	**COMS 52006 Data analysis and processing**
Semester(s) in which the module is taught	*2, 3*
Person responsible for the module	*Mukanova A.S..*
Language	*Russian, Kazakh*
Relation to curriculum	*Elective course for 7M06112-Artificial Intelligence Technologies educational program and other graduate Program in the IT faculty*
Teaching methods	*Lecture, seminars, master's students' independent work (MSIW)*
Workload (incl. contact hours, self-study hours)	*Lecture - 105 hours, seminars – 150 hours, MSIW – 555 hours*
Credit points	*27*
Required and recommended prerequisites for joining the module	*To attend at least 75% of lecture and laboratory study.*
Module objectives/intended learning outcomes	*Module consists of several disciplines (Machine learning algorithms for data processing, Programming languages for data analysis and data processing, Fuzzy modeling techniques, Artificial intelligence in project management, Development of algorithms for the implementation of machine learning methods)* *Students will acquire the skills of applying the studied methods of machine learning for real practical problems, the development of tools for data analysis.* *Students will study the structural description of images in terms of a variety of non-derivative elements and operations for their compilation; they will gain skills in developing pattern recognition systems using graph matching algorithms.* *Students will study the basic concepts of the theory of fuzzy sets, the foundations of fuzzy logic and fuzzy calculations, the construction of fuzzy models for applied problems, the choice of fuzzy modeling methods in relation to information technology.* *Students will learn how to apply AI to project management.* *Students will gain knowledge of standards in the field of artificial intelligence, study a wide range of issues related to the normative and technical regulation of various aspects of the applied use of artificial intelligence technologies.*
Content	*Principles, methods and tasks of machine learning; logical, metric, probabilistic machine learning models.* *Learning the language for describing images, methods of structural image recognition.* *Basic concepts of the theory of indefinite plurality and nebulous logic; minor operations; types of minor products of the model: linguistic, relational, TS; basics of knowledge*

	of fuzzy models and their properties; nonlinear inference algorithms; the use of neural networks in random modeling; bad governance. *Creation of a virtual assistant for the project manager to automate the distribution of tasks and resources; project analyst (identifying the risks of missed deadlines); automatic selection of the optimal project team, assessment of the quality of the software product development plan (resources, timing, risks), adjustment of the software product development plan, verification of compliance with regulatory technical documents.* *Standards related to the implementation of intelligent systems in various application areas.*
Exams and assessment formats	*Final written examination (90 min.) have short answer questions, covering around half the marks, and then one long problem-solving practice task. On the written exam students are demonstrating their understanding of the course outline through the completion of tasks. The next aspects of learning to program or an intellectual system development are assessed: the algorithms design, description of algorithms, the use of a programming environment to enter, edit, and debug cod.*
Study and examination requirements	*Compulsory attendance of classroom lessons, active participation in the discussion of issues, preliminary preparation for lectures based on teaching aids and basic references, high-quality and timely accomplishment of MSIW tasks, participation in all types of assessment (current assessment, MSIW assessment, midterm assessment, final assessment).*
Reading list	*1. Giuseppe Bonaccorso. Machine Learning Algorithms: A reference guide to popular algorithms for data science and machine learning. 360 pages. 2017.* *2. Tom M. Mitchell. Machine Learning. 320 pages. 2017.* *3. B. G. Kukharenko Intelligent systems and technologies: textbook / B.G. Kukharenko; - Moscow: Altair: MGAVT, 2015. –115 p.* *4. V.V. Kruglov Fuzzy logic and artificial neural networks. – M.- Fizmat- 2015.-224 p.* *5. Paul Boudreau. Applying Artificial Intelligence to Project Management. 185 pages. 2019.*