L.N. Gumilyov Eurasian National University
Artificial Intelligence Technologies Bachelor Program
Module Hand Book

The Artificial Intelligence Technologies Undergraduate Program comprises courses from of general education sciences, mathematical sciences, and ICT engineering disciplines. The courses are categorized into 14 modules. This handbook presents detailed information on the modules and courses of the program.

Module and Courses Characterization

Module 1

Module No & Name	**EDUC 21001 Module of general education**	
Rationale and objective of the module	**Justification:** Graduates must be able to work on tasks in various fields of application under given technical, economic, ecological and social boundary conditions with the means of computer science and to develop appropriate systems. Computer scientists must be aware of the professional ethical framework and be able to assess the effects of their work on future users and on society in its social, economic, organisational, psychological and legal aspects.	
	Objectives: On successful completion of this course, students will be able to: To get into communication in oral and written forms in Kazakh, Russian and foreign languages in order to solve problems of interpersonal, intercultural, and professional interactions - To use digital technologies, various types of information and communication technologies for search, storage, processing, protection, and dissemination of information, as well as to apply economic knowledge in various spheres of activity - To apply philosophical knowledge for the formation of world view, to analyze the main stages and patterns of the historical development of society in order to increase civic engagement To provide a full-fledged social and professional activities by tools of physical culture, to master a safety culture, to promote an environmental awareness - To have a sufficient level of legal awareness, to execute faithfully professional duties, and to follow principles of positive behavior and ethical norms of communication	
Total ECTS of the module	**43**	
Courses of the Module		
Course Number	**Course Name**	**ECTS**
MHK 1101	Modern history of Kazakhstan	5
FL 1103 (1)	Foreign language	5
K(R)L 1104 (1)	Kazakh (Russian) language	5
ICT 1105	Information and communication technologies	5
Phil 2102	Philosophy	5
SPKM 1107	Social and Political Knowledge Module	8
EB 2207	Entrepreneurship and business	5
DTBA 2108	Digital technologies by branches of application	5
BR 2108	Business rhetoric	
FELS 2108	Fundamentals of ecology and life safety	

RZh 2108	Rukhani Zhangyru	
BC 2108	Business culture	
ACC 2108	Anti-corruption culture	
PhT 1111 (1),(2),(3),(4)	Physical training	8

Course 1

Module name	*General education module*
Module level (if available)	-
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Modern history of Kazakhstan*
Semester(s) when the module is taught	*Autumn and spring semesters of the first year of studies*
Person responsible for the module	*Kushenova Gainizhamal Imanovna*
Lecturer	*Kushenova Gaynizhamal Imanovna, Saylaubayeva Nurgul Yernazarovna, Battalov Kajrat Kanatovich, Yerdebekova Zhanar Seytkaliyevna, Yesimova Zhanar Kabdushevna, Zhakupova Kulyash Maulenovna, Mukhametzhanova Nurgul Ahmetzhanovna, Rakhimbekova Azhar Kabdolovna, Alzhapparova Bakytkul Kabdulmalikovna, Zhapekova Gulfayruz Kabdolovna, Yermenbyaeva Guljan Kakimbekovna, Kabyltayeva Samal Gazizovna, Muratbekkyzy Bibigul , Akpanbet Nurgul Nurlangyzy, Khasenova Zhazira Oralbekovna, Zhylkybayev Kenzhebek Duisebayevich, Abdurazakov Madiyar Furkatovich, Nabiyev Sayat Talgatovich*
Language of instruction	*Kazakh, Russian, English*
Within the curriculum	*For all bachelor programs, compulsory component, component, 1-2 semester of the first year of students*
Teaching type, contact hours	*2 lectures and 1 practical lesson – contact hours*
Hours	*(Estimated) workload divided into contact hours (lecture, exercises, laboratory sessions, etc.) and self-study, including exam preparation, indicated in hours and in general.* *30 hours of lectures, 15 hours of seminars, 105 hours of students' independent work*
ECTS number	*5*
Exam requirements	*At the end of the semester, the State exam is taken in an oral form. For the state exam, examination cards are used. The list of questions included in the exam cards is known to students in advance for preparation. Retaking the exam to improve the mark is not allowed*
Pre-requisites	*World History, Political Science, Social Studies, Sociology*
Module objectives / intended learning outcomes	*The purpose of the course „Modern history of Kazakhstan" is to form a system of scientific views on the history of modern Kazakhstani society in the context of the world historical process.* *The current stage of development of our country is characterized by the Third modernization of Kazakhstan, the creation of a new model of economic growth, which will*

	ensure the global competitiveness of the country. The modernization of the economy is inextricably linked with the modernization of consciousness, when every citizen of Kazakhstan must understand the need for changes to move to a qualitatively new level of development of their country. Kazakhstani society must have a spiritual and ideological core for the successful implementation of the goals. The Rukhani Zhangyru program reveals the mechanisms of modernization of public consciousness, which should be based on the continuity of spiritual and cultural traditions. Knowing the history of one's people promotes wider perception and the ability to rethink. *Expected learning outcomes:* *• to systematize the conceptual foundations of studying the modern history of Kazakhstan; to compare ideas about the continuity and continuity of historical and cultural development, deep roots of the spiritual heritage of Kazakhstan;* *• to reveal the significance of the formation of historical consciousness and ideological principles in accordance with national priorities;* *• to classify historical sources that reflect the peculiarities of the modern history of Kazakhstan;* *• to identify the historical patterns of the development of society, paying attention to the study of historical originality;* *• to master the techniques of historical description and analysis of the causes and consequences of events in the modern history of Kazakhstan;* *• to predict possible solutions to modern problems based on the analysis of the historical past and reasoned information;* *• to argue the features and significance of the modern Kazakhstani development model;* *• to explain the importance of educating patriotism, in the spirit of democratic values of modern society, using the example of the life of historical figures.*
Content	*1. Introduction to the course.* *2. Kazakhstan on the way to independence: stages of formation of the idea of a national state.* *3. Civil-political confrontation.* *4. Implementation of the Soviet model of nation-building.* *5. Contradictions and consequences of the Soviet reforms in Kazakhstan in the second half of the twentieth century.* *6. Formation of the state structure of the Republic of Kazakhstan.* *7. Kazakhstani model of economic development.* *8. Social modernization – the basis for the well-being of society.* *9. Ethno-demographic processes and strengthening of interethnic harmony.* *10. Socio-political development prospects and spiritual modernization.* *11. The policy of forming a new historical consciousness and*

	worldview of the people of the Great Steppe. *12. Kazakhstan – a state recognized by the modern world.* *13. N.A. Nazarbayev – a personality in history.* *14. Formation of the nation of a united future.*
Requirements for training and exams, exam forms	*1. It is mandatory for students to be active in the classroom process, which is assessed based on the quality of the performance. Attendance at classes and participation in the educational process are compulsory. students should not be absent from class without good reason. Late arrivals are not allowed. Code of conduct and ethics must be consistent with the university requirements. In this regard, the scores are from 0 to 100 points.* *2. Assessment at the lesson concerns not only the student's homework, but also active participation in the assignment and is estimated at 0-100 points.* *3. Students should regularly attend classes, take an active part in group discussions, colloquia, complete test assignments during midterm assessment, SIW assignments and presentations. The teacher reserves the right to enforce without prior warning various types of co assessment ntrol (quiz, test), which are aimed at consolidating the information of a lecture or a chapter. Their assessment will be included in the exam expressing the general understanding of the material. In this regard, the scores are from 0 to 100 points. Failure to complete assignment will bring to decresing points. All assignments must also be submitted in time.* *It is forbidden to read various sources of information from a book, electronic sources from books or sources of information, from electronic media during oral and intermediate assessment tasks.* *For a high-quality development of the course, students should be guided by the fact that they will need to read approximately 30-50 pages of literature per week. Students can get the maximum score if the task is completed efficiently, in accordance with the requirements.*
Media used	*Projector for presentations*
References	***Basic references*** *1. Ayagan B.G., Abzhanov Kh.M., Seliverstov S.V., Bekenova M.S. Sovremennaya istoriya Kazakhstana: Almaty: Raritet, 2010. – 432 s., 16 s.* *2. Kan G.V. Istoriya Kazakhstana: Uchebnoye posobiye dlya vuzov. – Almaty, 2005.* *3. Uly Dala tarikhy: uchebnoye posobiye / Kan G.V., Tugzhanov Ye.L. – Astana: Zhasyl Orda, 2015. – 328 str.* *4. Momynova Sh.R. Kazakhstan: drevneyshaya, drevnyaya i srednevekovaya istoriya. V 2 tomakh. - Karaganda, 2003* ***Additional references*** *1. Nazarbayev N.A. «7 graney Velikoy stepi». – Astana, 2018* *2. Nazarbayev N.A. «Era nezavisimosti». – Astana, 2017*

	3. *Kazakstan tarikhy. 5 tomdyk. 1-5-tomdar. – Almaty., 1996, 1997, 2000, 2010.* 4. *Kazakstan (Kazak Yeli) tarikhy. – 4 kytaptan turatyn okulyk. Tauelsiz Kazakstan: algyzharttary zhane kalyptasuy. 4 kytap / T. Omarbekov, B.S. Saylan, A.Sh. Altayev zhane t.b. – Almaty, Kazak universitety, 2016. – 264 b.* 5. *Alan Barnard Antropologiya tarikhy men teoriyasy [okulyk] / A. Barnard; aud. Zh. Zhumashova, 2018. – 240 b.* 6. *Shvab K. Tortinshi industriyalyk revolucia [monografiya] / K. Shvab; aud.: N.B. Akysh, L.A. Bimendiyeva, K.I. Matyzhanov, 2018. – 198 b.* 7. *Nazarbayev N.A. Tarikh tolkynynda. – Almaty: Atamura, 1999* 8. *Kan G.V. Istoriya Kazakhstana: Uchebnoye posobiye dlya vuzov. – Almaty, 2005.* 9. *Uly Dala Tarikhy: uchebnoye posobiye /Kan G.V., Tugzhanov Ye.L. – Astana: Zhasyl Orda, 2015. – 328 s.* 10. *Ayagan B.G., Abzhanov Kh.M., Makhat D.A. Kazirgi Kazakstan tarikhy. – Almaty, 2010.*

Course 2

Module name	General education module
Module level (if available)	-
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Foreign language*
Semester	*1/2 semesters*
Person responsible for the module	*Ustelimova N.A., Musina S.K., Burkitbayeva A.G.*
Lecturer	*Russian / Kazakh Ustelimova N.A., Musina S.K., Burkitbayeva A.G., Zhussupova G.M., Khamitova A.G., Kassenova A.B., Zhanayeva Zh.A., Zhandildinova A.M. , Nurlybay A.M., Nurgaliyeva U.S., Zagorulya O.L., Vatutina Zh.P., Dyusengaliyeva A.A.*
Language of instruction	*English / French / German*
Within the curriculum	*General education course*
Teaching type, contact hours	*Practical classes – 90 hours*
Hours	*45 practical classes / 105 SIW (students' independent work)*
ECTS number	*5*
Exam requirements	*Oral exam*
Pre-requisites	*Foreign language*

Module objectives / intended learning outcomes	*The learning outcomes in the course "Foreign Language":* *- the student owns the language system at the level of common European competence and methods of its use in cultural and communicative activities;* *- in the course of a dialogue and monologue, the student knows how to hold the attention of a partner, describes situations and events with refraction through their own experience of perception;* *- in the course of written communication, the student writes short essays on topics of interest, short reports with factual information of a daily nature and an explanation of the necessary actions;* *- in the course of listening the student understands simple information messages on radio and television on topics of interest;* *- in the course of reading, the student looks through texts in order to find necessary information, establishes the logic of reasoning on the topic of the text, and understands simple texts with factual information (traditional and online).* *In the process of foreign language education, students develop intercultural and communicative competencies in the traditional and online formats.*
Content	*1) Social sphere of communication: Family in the modern society* *2) Socio-cultural sphere of communication: /Entertainment* *3) Socio-cultural sphere of communication / Looking after yourself* *4) Socio-cultural sphere of communication: Cultural and historical background* *5) Socio-cultural sphere of communication: Cultural and historical background* *6) Socio-cultural sphere of communication: Cultural and historical background /Personal, private life* *7) Socio-cultural sphere of communication/Culture* *8) Educational of communication sphere/The world* *9) Educational of communication sphere/Student's life* *10) Socio-cultural sphere of communication: Cultural and historical background/Education* *11) Professional sphere of communication (the title of the topic depends on the specialty)* *12) Professional sphere of communication (the title of the topic depends on the specialty)* *13)Professional sphere of communication (the title of the topic depends on the specialty)* *14) Professional sphere of communication (the title of the topic depends on the specialty)* *15) Professional sphere of communication (the title of the topic depends on the specialty)*

Requirements for training and exams, exam forms	*Students are required to attend practical classes in a foreign language and take an active part in completing SIW assignments, the results of which are accepted by the teacher online or in the university classroom, depending on the type and form of the assignment. Students who have missed classes, receive the "absent" mark in the electronic mark-book in the AIS "Platonus". If the lesson is missed for a grounded reason, the student has the right to answer the missed topics to the teacher.* *The first midterm assessment: Performing test tasks on the studied material / oral statement on the covered topics, at the discretion of the teacher.* *The second midterm assessment: Fulfillment of test tasks on the studied material / oral statement on the covered topics, at the discretion of the teacher.*
Media used	*Edpuzzle, Kahoot, Socrative, Edmodo*
References	*1. Latham-Koenig Ch., Oxenden C. English File. Pre/Inter/Upper- Intermediate Student's Book. – 3d ed. – Oxford: Oxford University Press, 2014* *2. Sagimbayeva D.E., Mukhtarkhanova A.M., Tazhitova G.Z. From reading to speaking. – Stana, 2016.* *3. Murphy Raymond. Essential Grammar in Use.- 3d ed., 16th print. – Cambridge University Press, 2013. – 319 p.* *4. Nurbekova Zh.K., Zharkynbekova Sh.K., Sagimbayeva D.E., Mukhtarkhanova A.M. Inostrannyy yazyk: angliyskiy yazyk [elektronnyy resurs]: Tsifrovyye obrazovatel'nyye resursy dlya vsekh neyazykovykh spetsial'nostey 1 kursa. MON RK, YENU im. L.N.Gumileva. – Astana: YENU im.L.N. Gumileva, 2015. – 1 elektronnyy disk (CD); TSOR* *5. UMKD po distsipline "Inostrannyy yazyk I, ÍÍ» dlya obuchayushchikhsya neyazykovykh spetsial'nostey. Uroven' bazovoy standartnosti B1, V2. 2019 g.Yevraziyskiy natsional'nyy universitet im. L.N. Gumileva Rabochaya (modul'naya) uchebnaya programma (Syllabus) Izdaniye: pervoye F YENU 703-13-17 Rabochaya (modul'naya) uchebnaya programma (Syllabus). Izdaniye pervoye.* *6. Murphy, R. English Grammar in Use. A reference and practice book for intermediate / upper intermediate students of English / Raymond Murphy. - 4th ed.- Cambridge: Cambridge University Press, 2012.* ***E-resources:*** *Data bases: https://library.enu.kz/MegaPro/Web* *https://edpuzzle.com/* *https://learnenglish.britishcouncil.org/skills/listening/intermediate-b1* *https://www.britishcouncil.kz/kk* *https://www.macmillanyounglearners.com/macmillanenglish/* *https://learnenglish.britishcouncil.org/* *https://create.kahoot.it/auth/login*

Course 3

Module name	*EDUC 21001* *General Education Module*
Module level (if available)	-
Code (if available)	*K(R)L 1104*
Subtitle (if available)	-
Course (if available)	*Kazakh (Russian) language*
Semester(s) when the module is taught	*Autumn and spring semesters of the first year of studies*
Person responsible for the module	*Candidate of philological sciences Abduova B.S. (Kazakh)* *Candidate of pedagogical sciences Galiyeva B.Kh. (Russian)*
Lecturer	*Candidate of philological sciences Abduova B.S. (Kazakh)* *Candidate of pedagogical sciences Galiyeva B.Kh. (Russian)*
Language of instruction	*Kazakh / Russian*
Within the curriculum	*General education module, compulsory component*
Teaching type, contact hours	*contact hours – 3 hours a week* *Practical classes – 90 (45+45)* *SIW (students' independent work) – 210 (105+105)* *Number of students in a group – 12-15*
Hours	*Practical classes – 90 (45+45)* *SIW (students' independent work) – 210 (105+105)*
ECTS number	*5*
Exam requirements	*The combined exam consists of 25 exam cards with two questions. The first question is taking a test in the SOCRATIV program, where students solve 40 questions; the second question is an oral answer to a given topic. The list of topics for oral answers is given to students in advance for preparation. The third question is reading a text and answering questions about the text in writing.*
Pre-requisites	*to master this course (level B2), students must have a level of proficiency and skills in the course "Kazakh / Russian language" equivalent to level of secondary education (A1, A2, B1).*
Module objectives / intended learning outcomes	*Learning outcome 1 – to enter into communication in oral and written forms in Kazakh, Russian and foreign languages to solve the problems of interpersonal, intercultural and professional communication;* *Learning outcome 2 – building a speech behavior program in situations of personal, social and professional communication in accordance with the norms of language, culture, the specifics of the sphere of communication, certification requirements.*
Content	*The course of the Kazakh / Russian language as a discipline of the general education cycle is designed for students of the Russian / Kazakh departments of the university (bachelor's degree) and is designed to develop the linguistic personality of the student, who is able to carry out cognitive and communicative activities in the Kazakh / Russian language in the spheres of interpersonal, social, professional, intercultural communication in the context of the implementation of state programs of trilingualism and spiritual modernization of national consciousness.*

Requirements for training and exams, exam forms	*To make the right choice and use of linguistic and speech means for solving certain problems of communication and cognition on the basis of knowledge of a sufficient volume of vocabulary, a system of grammatical knowledge, and pragmatic means of expressing intentions.* *Exam form: combined (testing in Socrativ, oral answer, written assignment)*
Media used	*Electronic library systems for remote access:* *https://lib.enu.kz/?q=ru/node/768 - Scientific library of L.N. Gumilyov ENU* *http://e.lanbook.com/ - "Lan" Publishing House* *http:// www. Znanium. com – "Knowledge" electronic library* *https://biblioclub.ru – "University Library Online" ELS* *https://www.biblioschool.ru/ – "BIBLIOSHKOLA" ELS* *http://www.studentlibrary.ru/ – "Konsul'tant studenta" ELS* *http://www.iprbookshop.ru/3163.html. – "IPRbooks" ELS* *Справочно-информационный интернет-портал - www.gramma.ru* *Справочно-информационный интернет-портал- www.dic. academic.ru* *Справочно-информационный интернет-портал - www.slovari.yandex.ru* *Справочно-информационный портал -www.doc-style.ru* *www.ruscorpora.ru* *www.ruslit.ioso.ru www.ruspismo.net* *www.russian-world.info/kultura-rechi* *www.slovari.ru*

References	1. *Kazakhskiy yazyk: Kazak tili: Kulmanov K.S., Abduova B.S., Akbuzauova B., Akhmetova K.A., Baibolat L.B. Kazak tili (Til uyrenushilerdyn B1 zhane B2 dengeylerine arnalgan). Oku kuraly (Yekinshi basylym), Astana, 2016.* 2. *Kulmanov K.S., Abduova B.S., Akbuzauova B., Akhmetova K.A., Baibolat L.B. Kazak tili (Til uyrenushilerdyn B1 zhane B2 dengeylerine arnalgan). Oku kuraly (Yekinshi basylym), Astana, 2015.* 3. *Alimbek G. Kazak tili B1,B2 dengeyleri boyinsha oku-adistemelik kural. – Nur-Sultan, 2021. – 194 bet.* 4. *Kulmanov K.S., Adilbek A.M., Mazgumbekova A.K., Khamitova A.G. Kazak tili (A1 engeyi. Sheteldik studentterge arnalgan Oku kuraly– Nur-Sultan, 2021. – 176 bet.* 5. *Russkiy yazyk: uchebnoye posobiye dlya studentov kazakhskikh otdeleniy universitetov (bakalavriat) / pod redaktsiyey K.K. Akhmed'yarova, SH.K. Zharkynbekovoy. – 4-ye izd. – Almaty: Evero, 2016. – 241 c.//https://scicenter.online/yazyik-russkiy-scicenter/russkiy-yazyik-uchebnoe-posobie-dlya-studentov.html* 6. *Zhuravleva Ye.A., Asmagambetova B.M., Tashimkhanova D.S., Yavorskaya E.E., Te M.V., Yeshekeneva A.K. «Professional'nyy russkiy yazyk»: uchebno-metodicheskoye posobiye / Pod obshchey redaktsiyey Ye.A. Zhuravlevoy.– Almaty: Izdatel'stvo «Evero», 2019. – 242 s.// http://library.psu.kz/fulltext/transactions/4864_juravleva_e._a._asmagambetova_b._m._tashimhanova_d._s._yavorskaya_e._e._te_m._v._eshekeneva_a._k_professionalniy_russkiy_yazik_e._a._juravleva_i_dr.._-_almati_evero.pdf*

Course 4

Module name	*General education module*
Module level (if available)	-
Code (if available)	*IKT 1105*
Subtitle (if available)	-
Course (if available)	*Information and Communication Technologies*
Semester(s) when the module is taught	*Semester 1 of the first year of studies*
Person responsible for the module	*English – Karymsakova A.E., Abildinova G.M., Yermaganbetova M.A.*
Lecturer	*English – Karymsakova A.E., Abildinova G.M., Yermaganbetova M.A., Kurmanbayeva A.A., Mukhtarova A.Zh., Mussina G.T.*
Language of instruction	*English*
Within the curriculum	*General education course*
Teaching type, contact hours	*2 hours of lectures, 1 hour of seminars per week – contact hours*
Hours	*Lectures 30 / Seminars 15 / SIW 105 (students' independent work)*

ECTS number	*5*
Exam requirements	*Matrix testing, the number of questions per student is 40. Questions are prepared in advance and loaded into Microsoft Teams Forms. The system allows students to randomly distribute questions among students. Test questions cover all the material studied. Students are not given questions in advance, but they know the list of topics.*
Pre-requisites	*Fundamentals of Computer Science, Mathematics and Physics*
Module objectives / intended learning outcomes	*Knowledge:* *– to explain the purpose, content and development trends of information and communication technologies, to justify the choice of the most appropriate technology for solving specific problems; to know the features of the use of multimedia on the Internet;* *– to explain methods of collecting, storing and processing information, ways of implementing information and communication processes; to develop multimedia content;* *– to describe the architecture of computer systems and networks, the purpose and functions of the main components;* *– to use information Internet resources, cloud and mobile services to search, store, process and disseminate information;* *– to apply software and hardware of computer systems and networks for collecting, transmitting, processing and storing data;* *– to analyze and justify the choice of methods and means of information protection;* *– using digital technologies to develop analysis and data management tools for various types of activities;* *– to carry out project activities in the specialty using modern information and communication technologies.* *Competencies:* *– mastering by students of the conceptual foundations of the architecture of computer systems, operating systems and networks; evaluate the effectiveness of digitalization in professional areas;* *– formation of knowledge about the concepts of developing network and web applications, information security tools;* *– developing skills in the use of modern information and communication technologies in various areas of professional activity, scientific and practical work, for self-education and other purposes.*
Content	*1 The role of ICT in key sectors of the development of society. ICT standards.* *2 Introduction to computer systems. Architecture of computer systems.* *3 Software. OS.* *4 Human-computer interaction.* *5 Database systems.* *6 Data analysis. Data management.* *7 Networks and telecommunications* *8 Cybersecurity.*

	9 Internet technologies. *10 Cloud and mobile technologies.* *11 Multimedia technology.* *12 Smart technologies* *13 E-technologies. Electronic business. E-learning. Electronic government* *14 Information technology in the professional field. Industrial ICT.* *15 Prospects for the development of ICT.*
Requirements for training and exams, exam forms	*The course "Information and Communication Technologies" is a mandatory component.* *Untimely performance of SIW (except for preparation for classes) leads to a decrease in the score:* *- by 1/3 if students are late for a week;* *- 2 times if students are more than a week late.* *Attendance at the classes is compulsory. Good reasons for missing classes do not exempt the student from completing the entire range of practical and independent work. In this case, students are given the opportunity to work it out according to an individual assignment and in time indicated by the teacher during consultations.* *All classroom time will be divided into lecture and practical sessions. Preparation for each lesson is required, as well as reading all the given material. Students' preparation will be checked by SIW, midterm assessment issues.* *If, for any reason, students were absent during the assessment event, they are given the opportunity to take it at the teacher's consultations in accordance with the established schedule.* *In the semester, there are two midterm assessments in the form of control questions. Test questions will be conducted on the material of the corresponding block.* *Exam form – matrix testing*
Media used	*MS Office: Excel, Access, My SQL, Cisco Packet Tracer, ScetchUp, 3Ds MAX.*
References	*1. Shynybekov D.A., Uskenbayeva R.K., Serbin V.V., Duzbayev N.T., Moldagulova A.N., Duisebekova K.S., Satybaldiyeva R.Z., Hasanova G.I., Urmashev B.A. Information and communication technologies. Textbook: in 2 parts. Part 1, 1st ed. – Almaty: IITU, 2017. – 588 p.* *2. Urmashev B.A. Information and communication technology: Textbook / B.A. Urmashev. – Almaty, 2016. – 410 p.* *3. Nurpeisova T.B., Kaidash I.N. ICT, Almaty, Bastau, 2017. – 241 p.* *4. Brown G., Sargent B., and Watson D. Cambridge IGCSE ICT. – London: Hodder Education Group, 2015. – 439 p.* *5. Williams B. K. and Sawyer S. Using information technology: A practical introduction to computers & communications. - New York: McGraw-Hil. – 8th ed.; 2010. – 563 p.* *6. Watson D. and Williams H. Cambridge IGCSE Computer Science: Hodder Edu.; 3 ed. 2015. –278 p.* *Electronic editions:* *1. TSOR Information and communication technology. Avtory:*

	Aymicheva G., Baygusheva B., Karazimova K., Burambayeva N., Abil'dinova G., Yermaganbetova M., Maykibayeva M., Tolǧanbayұly T.– Rezhim dostupa: https://moodle.enu.kz/course/view.php?id=7; *2. Osnovy Web-tekhnologiy [Elektronnyy resurs]: uchebnoye posobiye / P.B. Khramtsov [i dr.]. – Elektron. tekstovyye dannyye. – Moskva, Saratov: Internet-Universitet Informatsionnykh Tekhnologiy (INTUIT), Vuzovskoye obrazovaniye, 2017. – 375 c. – 978-5-4487-0068-2. – Rezhim dostupa: http://www.iprbookshop.ru/67384.html* *3. TSOR KZ Basics of cloud technologies. Avtory: Serík M., Aymicheva G., Baygusheva K., Karazimova K., Burambayeva N., Tolǧanbayұly T.– Rezhim dostupa: https://moodle.enu.kz/course/view.php?id=8. 4. Massive open online-course: Information and communication technology. Avtory: Yermaganbetova M.A., Karymsakova A.Ye.- Rezhim dostupa: https://mooc.enu.kz/course/view.php?id=391*

Course 5

Module name	*General education module*
Module level (if available)	-
Code (if available)	*Fil 2102*
Subtitle (if available)	-
Course (if available)	*Philosophy*
Semester(s) when the module is taught	*3/4*
Person responsible for the module	*Kazakh – Zholbarysova U.K., Kenzheyev A.A., Kemerbay R.A.* *Russian – Tolgambayeva D.T., Mustafina T.V., Sarkulova M.S.* *English – Ryskulbekova D.A., Shamakhai S.*
Lecturer	*Kazakh – Zholbarysova U.K., Kenzheyev A.A., Kemerbay R.A.* *Russian – Tolgambayeva D.T., Mustafina T.V., Sarkulova M.S.* *English – Ryskulbekova D.A., Shamakhai S.*
Language of instruction	*Kazakh, Russian, English*
Within the curriculum	*General education course*
Teaching type, contact hours	*2 hours of lectures, 1 hour of seminars per week – contact hours*
Hours	*Lectures – 30 hours, seminars – 15 hours, SIW – 105 hours (students' independent work)*
ECTS number	*5*
Exam requirements	*Computer-based testing* *Computer-based testing, tests are developed by the lecturer in advance and are entered into the program in AIS "Platonus". Each test question has several answer options, master's students must choose one correct answer. One minute is allotted for each question, after which the program switches to the next question. It is impossible to return to the previous question. There are 50 questions per master student. The test result is known to master's students immediately after its completion. A retake is permitted once upon receipt of an FX score.*
Pre-requisites	*Modern History of Kazakhstan, Introduction to the Specialty*

Module objectives / intended learning outcomes	***The purpose of the module*** *is to form in students a holistic systemic understanding of philosophy as a special form of understanding the world, its main sections, problems and methods of studying them in the context of future professional activities.* *– to know the categorical apparatus of philosophy;* *– to explain the specifics of the philosophical understanding of reality;* *– to substantiate the worldview as a product of philosophical understanding* *and the study of the natural and social world;* *– to classify the methods of scientific and philosophical knowledge* *the world;* *– to interpret the content and specifics of the mythological, religious and scientific worldview;* *– to substantiate the role and significance of such key worldview concepts as values of social and personal life of a person in the modern world;* *– to analyze the philosophical aspect of media texts, social cultural and personal situations to justify and accept ethical decisions;* *– to formulate and correctly argue one's own moral position in relation to urgent problems of the modern global society;* *– to conduct research relevant to identifying philosophical content of problems in the professional field and present the results for discussion.*
Content	1. *The emergence of a culture of thinking.* 2. *The subject and method of philosophy.* 3. *Consciousness, soul and language.* 4. *Being. Ontology and metaphysics.* 5. *Cognition and creativity.* 6. *Education, Science, Engineering and Technology.* 7. *Human being.* 8. *Life and death. Meaning of life.* 9. *Ethics. Philosophy of values.* 10. *Philosophy of Freedom.* 11. *Philosophy of art.* 12. *Society and culture.* 13. *Philosophy of history.* 14. *Philosophy of religion.* 15. *"Mangilik Yel" and "Rukhani Zhagyru" – the philosophy of the new Kazakhstan*

Requirements for training and exams, exam forms	*Attendance at classes and active participation in the educational process are mandatory. Late arrivals are not allowed. Cell phones should be turned off during classes. High-quality and timely execution of SIW tasks, participation in all types of assessment (current assessment, SIW assessment, midterm assessment, final assessment) are mandatory. For a high-quality mastering of the course, students should be guided by the fact that they independently work with texts, approximately 40-60 pages per week. Code of conduct and ethics must comply with the requirements of the university charter.* *Active work at the seminar (the ability to lead a discussion, to argue one's position with references to the studied literature, a creative approach to the selection and analysis of texts), the quality of prepared individual written assignments (glossary, etc.) and creative work (essays) are highly appreciated.* *Exam requirements: to find one correct answer. The assessment criteria are outlined in the syllabus*
Media used	*PowerPoint, MindMeister, Miro.com, Socrative.com, Canva. Microsoft Teams forms, Google forms*

References	1. *Nazarbayev N.A. Vzglyad v budushcheye: modernizatsiya obshchestvennogo soznaniya. http://www.akorda.kz.* – *Nazarbayev N.A. Maңgilik Yel. Gody, ravnyye vekam. Epokha, ravnaya stoletiyam. – Astana: Delovoy mir Astana, 2014. – 368 c.* 2. *Nurysheva G.Zh. Filosofiya. – Almaty: Inzhu-marzhan, 2013.* 3. *Petrova V.F., Khasanov M.SH. Filosofiya. – Almaty: Evero, 2014.* 4. *Garifolla Yesym. Falsafa tarikhy, – Almaty, 2000.* 5. *Garifolla Yesym. Kazak filosofiyasynyn tarikhy, – Almaty, 2006* 6. *Garifolla Yesym. Adam-zat, – Astana, 2008.* 7. *Bertran R. Istoriya zapadnoy filosofii. – M.: Izdatel' Litres, 2018. – 1195 s.* 8. *Johnston D. Filosofiyanyn kyskasha tarikhy. Sokrattan Derridaga deyin / Gylymi red. Nurysheva G.Zh. – Astana, 2018. – 216 b.* 9. *Hess R. Filosofiyanyn tandauly 25 kytaby. / Gylymi red. Rayev D.S. – Astana, 2018. – 360bб.* 10. *Kenny E. Batys filosofiyasynyn zhana tarikhy. 1-tom: Antika filosofiyasy / Nauch. redaktor Moldabekov Zh.Zh. – Astana, 2018. – 408 b.* 11. *Kenny E. Batys filosofiyasynyn zhana tarikhy. 2- tom: Orta gasyr filosofiyasy / Nauch. redaktor Ospanov S. – Astana, 2018. – 400 b.* 12. *Karen Armstrong. Iudaizm, khristiandyk pen islamdagy 4000 zhyldyk yzdenys: Kudaytanu bayany/ Nauch. redaktor Kenzhetay D. - Astana, 2018. – 496 b.* 13. *Johnston D. A Brief History of Philosophy: From Socrates to Derrida. –A&C Black, 2006. – 211 p.* 14. *Kenny A. New History of Western Philosophy. Volume 1-4. – Oxford University Press, 2006 - 2010.* 15. *Humphreys P. The Oxford Handbook of Philosophy of Science. – Oxford University Press, 2016.* 16. *Estlund D. The Oxford Handbook of Political Philosophy. – Oxford University Press, 2017.* 17. *Cappelen H., Gendler T., Hawthorne J. The Oxford Handbook of Philosophical Methodology. – Oxford University Press, 2016.* 18. *Karen Armstrong A History of God: The 4000-year quest of judaism, christianity and islam. – Gramercy Books, 2014. – 496 p.* 19. *Johnsom D. Kratkaya istoriya filosofii/ per. Ye.Ye. Sukharev. - M.: Astrel', 2010. – 236 c.* 20. *Khess R. 25 klyuchevykh knig po filosofii. – M.: Ural LTD, 2000. – 368 s.*

Course 6.1

Module name	*Social and Political Knowledge Module*

Module level (if available)	-
Code (if available)	*MSPZ1107*
Subtitle (if available)	-
Course (if available)	*Political Science*
Semester(s) when the module is taught	*Semester 1 and semester 2 of the first year of studies*
Person responsible for the module	*in Russian – Askeyeva G.B., Onuchko M.Yu., Sergazin E.F., Aubakirova L.T.* *in Kazazkh – Dyusembekova M.K., Zhanpeisova K.D., Tulebayeva M.K., Gabdulina B.A., Byulegenova B.B., Kalenova T.S., Abdrakhmanova G.S., Bolatuly N., Kaliolauly D ., Primbetov D.S.*
Lecturer	*in Russian – Askeyeva G.B., Onuchko M.Yu., Sergazin E.F., Aubakirova L.T.* *in Kazazkh – Dyusembekova M.K., Zhanpeisova K.D., Tulebayeva M.K., Gabdulina B.A., Byulegenova B.B., Kalenova T.S., Abdrakhmanova G.S., Bolatuly N., Kaliolauly D ., Primbetov D.S.* *in English – Kamaldzhanova T.A., Gabdulina B.A., Aubakirova L.T.*
Language of instruction	*Kazakh, Russian, English*
Within the curriculum	*General education course, compulsory component*
Teaching type, contact hours	*15 hours of lectures, 15 hours of seminars – contact hours*
Hours	*15 hours of lectures, 30 hours of seminars, SIW (students' independent work) – 90 hours.*
ECTS number	*3*
Exam requirements	*The course ends with matrix testing, tests are prepared by lecturers in advance, testing questions are not given to students, but the list of topics for which tests are compiled are known to students.*
Pre-requisites	*Not required*
Module objectives / intended learning outcomes	*Knowledge and skills:* – *to know the conceptual and categorical apparatus of political science;* – *the ability to explain the process of formation and development of political science,* – *to have an idea of the mechanisms of functioning of the political system, political institutions and power;* – *to know the patterns and trends in the development of political thought, modern political reality;* – *to have an understanding of the worldview level of politics, the relationship between politics and ideology, politics and culture, etc.;* – *to be able to determine the peculiarities of Kazakhstani political practice.* *Competencies:* – *the formation of students' civic position on socio-political issues;* – *to analyze socio-political problems and phenomena of world and Kazakhstani practice.*

Content	1. *Political science as a science and academic course.* 1. *Politics and its role in the life of society.* 2. *History of the development of political thought.* 3. *Political power as a social phenomenon.* 4. *Political system of society.* 5. *State and civil society: origin and essence.* 6. *Political parties and social and political movements.* 7. *Political leadership.* 8. *Political elites. Modern theories of elites.* 9. *Political ideologies.* 10. *Political culture and political consciousness: essence and origin.* 11. *Electoral systems.* 12. *Political conflicts and political processes.* 13. *Political development and modernization.* 14. *International relations and foreign policy.*
Requirements for training and exams, exam forms	*The course "Political Science" is a mandatory course of the university component.* *Students need to study the recommended sources and special references on the topics of the course, to timely fulfill the tasks of SIW, and participate in all forms of assessment.* *Missing classes and being late are not allowed. Students who fail to complete all assignments are not allowed to take the exam.* *Exam form – matrix testing*
Media used	*STATISTICA*
References	1. *Politologiya. Uchebnik dlya vuzov / pod red. M.A. Vasilika. M., 1999* 2. *Gadzhiyev K.S. Politicheskaya nauka.- M., 1995.* 3. *3.Pugachev V.I. Solov'yev A.I. Vvedeniye v politologiyu. - M.: Aspekt-press, 2002 – 477 s.* 4. *4.Istoriya politicheskikh i pravovykh ucheniy (pod obshchey red. V.S. Nersesyants). - M.: Norma, 2002 – 352 s. 1.* 5. *Politologiya. Uchebnik dlya vuzov / pod red. A. Nysanbayeva. Almaty, 1998* *E-manuals* 1. *Osnovy politicheskoy nauki: V 2-chastyakh / Pod red. Pugacheva V.P. - M., 1993. https://nicbar.ru/politology* 2. *Politologiya. Uchebnoye posobiye./ Pod. red. Krasnova B.M.-M., 1995. http://window.edu.ru/catalog/resources/uchebnik-politologiya* 3. *Politologiya. Uchebnoye posobiye./ Pod obshch. red. Kliment'yeva D.S.-M., 1997. https://www.twirpx.com/files/science/politology /*

Course 6.2

Module name	*Social and Political Knowledge Module*

Module level (if available)	-
Code (if available)	*MSPZ 1107*
	SPKM 1107
Subtitle (if available)	-
Course (if available)	*Psychology*
Semester	*Spring semester of the first year of studies*
Person responsible for the module	*in Rus. – Mambetalina A.S., Sakenov D.Zh.* *in Kaz. – Bayzhumanova B.Sh.* *in Engl. – Abdykhalykova Zh.E.*
Lecturer	*in Rus. – Mambetalina A.S., Sakenov D.Zh.* *in Kaz. – Bayzhumanova B.Sh.* *in Engl. – Abdykhalykova Zh.E.*
Language of instruction	*Russian, Kazakh, English*
Within the curriculum	*General education course*
Teaching type, contact hours	*15 hours of lectures, 30 hours of seminars – contact hours*
Hours	*15 hours of lectures, 30 hours of seminars, SIW (students' independent work) – 60 hours.*
ECTS number	*2,5*
Exam requirements	*Computer testing, tests are developed by the lecturer in advance and are entered into the program in AIS "Platonus". Each test question has several answers, the student must choose one correct answer. One minute is allotted for each question, after which the program switches to the next question. Returning to the previous question is impossible. There are 40 questions for each student. The test result is known to the student immediately after its completion. A retake is permitted once upon receipt of an FX score.*
Pre-requisites	*Not required*
Module objectives / intended learning outcomes	*The purpose of the discipline: the formation of socio-psychological proficiency among bachelor's students in the context of solving problems of modernization of public consciousness, defined by the state program "Looking into the Future: Modernization of Public Consciousness".* *Tasks:* *1) mastering basic psychological concepts, theories and approaches to the study of society and its subsystems;* *2) formation of psychological knowledge about the basic principles of functioning of modern society and its social institutions;* *3) developing skills in describing and analyzing topical psychological problems of modern society, the essence of social processes and relationships;* *4) mastering by students of the main sources and methods of obtaining psychological information;* *5) instilling in students skills to use knowledge gained in the process of mastering psychology in professional activity;* *6) developing critical thinking skills and the ability to apply them in practice.* *Based on the results of mastering the program, the student will have the following learning outcomes:* *1) to explain and interpret subject knowledge*

	(concepts, ideas, theories) in the field of psychology; *2) to explain the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the discipline of psychology;* *3) to algorithmically represent the use of scientific methods and research techniques in the context of a specific academic course and in the procedures for the interaction of courses of the module;* *4) to explain the nature of situations in various spheres of social communication on the basis of the content of theories and ideas of scientific spheres of psychology;* *5) to reasonably and in a well-argued manner provide information about various stages of development of the Kazakh society, culture, language, social and interpersonal relations;* *6) to analyze features of psychological institutions in the context of their role in the modernization of Kazakhstani society;* *7) to analyze various situations in different areas of communication from the standpoint of correlation with the value system, social, business, cultural, legal and ethical norms of the Kazakhstani society;* *8) to distinguish between strategies of different types of research in society and justify the choice of methodology for analyzing specific problems;* *9) to assess the specific situation of relations in society from the standpoint of psychology, to project prospects for its development, taking into account possible risks;* *10) to develop programs for resolving conflict situations in society, including in professional society;* *11) to carry out research project activities in various areas of communication, to generate socially valuable knowledge, to present it.*
Content	*The course "Psychology" is aimed at developing psychological knowledge, skills and abilities among students of non-psychological specialties. The course allows systematizing and deepening knowledge in the system of professional training in psychology and involves the formation of a number of professionally significant personal competencies necessary for the professional development of a Kazakhstani specialist.*
Requirements for training and exams, exam forms	*The specificity of the course involves an emphasis on understanding various concepts, concepts, categories, laws to a rather greater extent than memorizing definitions. In practical classes, it is supposed to actively present and use knowledge and skills to each student in solving practical problems, group discussions, defense of presentations. This knowledge and skills will allow students to successfully complete the course and pass the final exam in the course.* *Students are encouraged to study the material after studying each topic, following the scheme and method of study, adapted to their individual requirements. Work on the topic should be*

	continued until students fully understand and memorize the material. If, after working on the topic, there still remain unclear questions, it is necessary to sort them out with the teacher in consultation. *The main requirement in preparing a student for a practical lesson (seminar) is knowledge of the lecture material, the glossary of the topic, connection with the previous topics of the course and related fields of science.* *Students' independent work is any activity organized by the teacher aimed at fulfilling the set goal in a specially allotted time (search for knowledge, comprehension, consolidation, formation and development of skills and abilities, generalization and systematization of knowledge, etc.), suggesting the possibility of consultations with a teacher.* *Exam form – computer-based testing*
Media used	*PowerPoint, MindMeister, Miro.com, XMind, Lucidchart, Canva programs*
References	*Basic references:* 1. *Nazarbayev N.A. Na poroge XXI veka. – Astana, 2016.* 2. *Nazarbaev N.A. «Vzglyad v bwdwşçee: modernïzacïya obşçestvennogo soznanïya». – Astana, AKORDA, 2017 / http://www.akorda.kz/ru* 3. *Nazarbaev N.A. Vzglyad v bwdwşçee. – Astana, 2017.* 4. *Aronson É. Köpke umtılğan jalğız [Mätin] = The Social Animal: älewmettik psïxologïyağa kirispe: [oqwlıq] / É. Aronson ; awd. D. D. Düysenbekov [jäne t. b.]. - 11-bas. - Astana: "Ulttıq awdarma byurosı" qoğamdıq qorı, 2018. - 407, [2] b. - (Rwxanï jañğırw).* 5. *Godfrwa J. Çto takoe psïxologïya. Tom 1. – M.: Mïr, 2005 g. – 496 s.* 6. *Godfrwa J. Çto takoe psïxologïya. Tom 2. – M.: Mïr, 2005 g. – 276 s.* 7. *Danïel Gowlman. Émocïonalnıy ïntellekt. Poçemw on mojet znaçït bolşe, çem IQ. Ïzd-vo Mann, Ïvanov ï Ferber: 2018. -560 s.* 8. *Djakwpov S.M. Vvedenïe v obşçwyu psïxologïyu. – A.: Qazaq wnïversïteti, 2014* 9. *Ïlïn E.P. Psïxologïya obşçenïya ï mejlïçnostnıx otnoşenïy. - SPb.: Pïter, 2009. - 576 s. ïl. - (Serïya «Mastera psïxologïï»).* 10. *Mayers D. Älewmettik psïxologïya [Mätin] = Social Psychology: [oqwlıq] / D. G. Mayers, J. M. Twenj ; awd. G. Q. Ayqınbaeva [jäne t.b.]. - 12-bas. - Astana : "Ulttıq awdarma byurosı" QQ, 2018. - 559, [1] b.: swr. - (Rwxanï jañğırw).* 11. *Mayers D. Psïxologïya / per. s angl. Ï.A. Karpïkov, V.A. Starovoytova. – 4-e ïzd. – Mïnsk.* *Additional references:* 1. *Antsupov A.YA, Shipilov A.I. - Konfliktologiya .- Moskva: Yurayt, 2017.* 2. *Arbuzova Ye. N., Anisimov A. I., Shatrova O. V. Praktikum*

	po psikhologii obshcheniya. 2008 – 272 s. 3. *Vinogradova, S. M. Psikhologiya massovoy kommunikatsii: uchebnik / S. M. Vinogradova, G. S. Mel'nik. – Moskva: Yurayt, 2014. – 512 s.* 4. *Garner A., Piz A. YAzyk razgovora. Izdatel'stvo: «Eksmo-Press» 2006 g. – 224 s* 5. *Grishina N.V. Psikhologiya konflikta. SPb.: Piter, 2008. – 464 s. il. – (Seriya «Mastera psikhologii»).* 6. *Yefimova N.S. Sotsial'naya psikhologiya. – Moskva: Yurayt, 2017.* 7. *Il'in Ye.P. Psikhologiya tvorchestva, kreativnosti, odarennosti. – SPb.: Piter, 2011. – 448 s.* 8. *Maklakov A.G. Obshchaya psikhologiya. Uchebnik dlya vuzov. Moskva: Yurayt, 2018.* 9. *Maslou A. Motivatsiya i lichnost'. — SPb.: Piter, 2008. – 352 s.* 10. *Naumov V.V. Gridasov M.A. Psikhologiya kar'yernogo rosta. Izd-vo MSSH: 2009- 320 s.* 11. *Solso R.L. Kognitivnaya psikhologiya. – per. s angl. –M. «Trivola», M. «Liberiya». 2002. – 600 s.* 12. *E. Bern Igry, v kotoryye igrayut lyudi. Lyudi, kotoryye igrayut v igry. 2016 – 576 s.* 13. *Balint M. Bazisnyy defekt. M.: Kogito-Tsentr, 2002. 256 s.* 14. *Kokhut KH. Analiz samosti. Sistemnyy podkhod k lecheniyu nartsissicheskikh narusheniy lichnosti. M.: Kogito-Tsentr. 2003. 368 s.* 15. *Freyd A. Ego i mekhanizmy zashchity // Teoriya i praktika detskogo psikhoanaliza. Per. s angl. I nem. / M.: OOO Aprel' Press, ZAO Izd-vo EKSMO-Press, 1999. S. 115-244.* 16. *Shmidbauer V. Vytesneniye i drugiye zashchitnyye mekhanizmy // Entsiklopediya glubinnoy psikhologii. T.1. - M.: ZAO MG Menedzhment, 1998. S. 289-295.* 17. *Vygotskiy L.S. Problema voli i yeye razvitiye v detskom vozraste // Sobr. soch. v 6 t. T. 2. M.: Pedagogika, 1982. S. 454-465.* *Internet resources:* 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/*

Course 6.3

Module name	*Social and Political Knowledge Module*
Module level (if available)	-
Code (if available)	*MSPZ 1107*
Subtitle (if available)	-
Course (if available)	*Sociology*
Semester(s) when the module	*Semester 1 and semester 2 of the first year of studies*

is taught	
Person responsible for the module	*Russian – Burbaeyva P.T., Yessenova D.K.* *Kazakh – Madyarbekov O.B., Tazhibayeva G.D.*
Lecturer	*Russian – Burbaeyva P.T., Yessenova D.K.* *Kazakh – Madyarbekov O.B., Tazhibayeva G.D.*
Language of instruction	*Kazakh, Russian*
Within the curriculum	*General education course*
Teaching type, contact hours	*Lectures and seminars, 0,5/1*
Hours	*7 hours of lectures, 15 hours of seminars, 30 hours of SIW (students' independent work)*
ECTS number	*1,5*
Exam requirements	*Computer testing; tests are developed by the lecturer in advance and are entered into the program in AIS "Platonus". Each test question has several answers, students must choose one correct answer. One minute is allotted for each question, after which the program switches to the next question. Returning to the previous question is impossible. There are 40 questions per student. The test result is known to the student immediately after its completion. A retake is permitted once upon receipt of an FX score.*
Pre-requisites	*Not required*
Module objectives / intended learning outcomes	*Objectives of studying the course: formation of the social and humanitarian worldview of students in the context of solving the problems of modernizing public consciousness, defined by the state program "Looking Into the Future: Modernization of Public Consciousness".* *Expected learning outcomes based on the results of mastering the course:* *1) to explain and interpret the subject knowledge (concepts, ideas, theories) of the sociology that form the academic courses of the module;* *2) to explain the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the courses of the socio-political module;* *3) to algorithmically represent the use of scientific methods and research techniques in the context of a specific academic courses and in the procedures for the interaction of courses of the module;* *4) to explain the nature of situations in various spheres of social communication on the basis of the content of theories and ideas of scientific spheres of the studied courses;* *5) to reasonably and in a well-argued manner reasonably provide information on the various stages of development of the Kazakh society, social and interpersonal relations;;* *6) to analyze the features of a social institution in the context of their role in the modernization of the Kazakhstani society;* *7) to analyze various situations in different spheres of communication from the standpoint of correlation with the system of values, social, business, cultural, legal and ethical norms of Kazakhstani society;* *8) distinguish among strategies of different types of research*

	in society and to justify the choice of methodology for the analysis of specific problems; *9) to assess the specific situation of relations in society from the standpoint of sociology as a science of a social and humanitarian type, to project the prospects for its development, taking into account possible risks;* *10) to develop programs for resolving conflict situations in society, including in the professional society;* *11) to carry out research project activities in various areas of communication, to generate socially valuable knowledge, and to present it;* *12) to correctly express and reasonably defend their own opinions on issues of social significance.*
Content	*1 Sociology in the understanding of the social world* *Invitation to sociology. Subject and object of science. The structure of sociological knowledge.* *2 Introduction to theories of sociology* *Sociological theory. Development of individual schools and directions (O. Comte, G. Spencer E. Durkheim, M. Weber, K. Marx).* *3 Social structure and stratification of society* *Society, equality and inequality. Open and closed society. Stratification as a structured inequality between different groups. Stratification systems and differentiation. A brief overview of the theories of social stratification (K. Marx, M. Weber). Forms of social stratification (P. Sorokin). Social mobility. Horizontal and vertical mobility.* *4 Socialization and identity* *The relationship between the individual and society. Socialization and identity theories* *(T. Parsons, G.H. Mead). Stages of socialization. Primary socialization. Secondary* *socialization. The adult stage of socialization. Gender socialization. Gender* *order. Identity and personality. Social and personal identity. Roles and statuses.* *5 Sociological research* *Sociological research design. Research question. Hypotheses. Variables. Sample. Methods of collecting information. Qualitative and quantitative. Data analysis.* *6 Deviation, crime and social control* *Deviation and social control. A brief overview of theoretical approaches to deviation (sociological, biological, psychological, economic and cultural). Anomy and society. Delinquency and crime.* *7 Sociology of ethnicity and nation* *Socio-ethnic communities. Ethnic systems. Ethnicity, people, nation. Ethnic identity. National identity. Nation-state. Ethnic groups and their coexistence. Ethnic interests and interethnic communication. Interethnic and interfaith harmony. Ethnosociological study of society.*
Requirements for training and	*Students are required to attend lectures and seminars, being*

exams, exam forms	*preliminary prepared for lectures and seminars based on teaching aids and basic literature, participation in all types of assessment (current assessment, midterm assessment, final assessment), mandatory participation in intermediate and final certification tests, fulfillment of the teacher's assignments. The active work at the seminar (the ability to lead a discussion, to argue one's position with references to the studied literature, a creative approach to the selection and analysis of texts), the quality of accomplished individual written assignments (glossary, etc.) and creative work (essays) are highly appreciated.* *Exam form – computer-based testing*
Media used	*PowerPoint, MindMeister, Miro.com, XMind, Lucidchart, Canva*
References	*Basic references:* *4. Biyekenov K.U., Biyekenova S.K., Kenzhakimova G.A. «Sotsiologiya: Uch. posobiye». – Almaty: Evero, 2016. – 584 s.* *5. Äbdirayimova G.S. Jastar sociologiyasy: oku kuraly. 2-basylym. – Almaty: «Kazak universitety», 2012. – 224 s.* *6. Brïnkerxof D, Weyts R., Ortega S. Aleumettanu negizderi.- Almaty: Ulttik audarma byurosy, 2018* *7. Dj.Rïtcer, Dj. Stepnïckï Aleumettanu teoriyasi.- Almaty: Ulttik audarma byurosy, 2018.* *8. Aitov N.K. Aleumettanu. Astana, 2015* *9. Smagambet B.Zh. Sheteldik aleumettanu tarikhy. – Almaty: Evero, 2016.* *Electronic editions:* *1. Otar E.S. Osobennosti gorodskogo srednego klassa Kazakhstana. – Astana. YENU im. L.N. Gumileva. 2018. – 400.* *2. Fuller S. Sotsiologiya intellektual'noy zhizni: kar'yera uma i vne akademii. Izdatel'skiy dom «Delo», 2018* *3. Khamidullin N.R. Sotsiologiya sotsial'nykh izmeneniy. OGU, 2017.* *4. Sotsiologiya migratsionnykh protsessov. Direkt-Media, 2017.*

Course 6.4

Module name	*Social and Political Knowledge Module*
Module level (if available)	-
Code (if available)	*Kul 1118*
Subtitle (if available)	-
Course (if available)	*Culturology*
Semester(s) when the module is taught	*Semester 1 and semester 2 of the first year of studies*
Person responsible for the module	*in Kazakh – Yermagambetova K.S., Ramazanova A.Ch., Atymtayev A.S.* *in Russian – Sandybayeva U.M., Arystambayeva S.A.* *in English – Umbetova G.T., Abdibek A.*

Lecturer	*Kazazkh – Yermagambetova K.S., Ramazanova A.Ch., Atymtayev A.S.* *Russian – Sandybayeva U.M., Arystambayeva S.A.* *English – Umbetova G.T., Abdibek A.*
Language of instruction	*Kazakh, Russian, English*
Within the curriculum	*General education course*
Teaching type, contact hours	*Lectures and seminars*
Hours	*7 hours of lectures, 15 hours of seminars, 60 hours of SIW (students' independent work)*
ECTS number	*2*
Exam requirements	*Computer-based testing*
Pre-requisites	*Not required*
Module objectives / intended learning outcomes	***The purpose of the module**: formation of social and humanitarian* *worldview of students in the context of solving problems of modernization of public consciousness.* - *mastering the conceptual apparatus of cultural studies, basic theories and approaches to the study of culture;* - *development of skills for describing and analyzing topical issues in the field of culture;* - *formation of critical thinking skills and the ability to apply them in practice;* - *formation of skills in analyzing characteristics of cultural institutions in the context of their role in the modernization of Kazakhstani society;* - *the ability to analyze situations in different spheres of communication from the standpoint of correlation with the system of values, cultural, ethical norms of the Kazakhstani society;* - *knowledge of the cultural policy of the state;* - *the ability to work in a team, correctly defend one's point of view, propose new solutions;* - *to explain and interpret subject knowledge (concepts, ideas, theories) in all fields of science that form the academic courses of the module;* - *to reasonably and a well-argues manner provide information on the various stages of development of the Kazakh society, political programs, culture, language, social and interpersonal relations;* - *to carry out research project activities in various areas of communication, to generate socially valuable knowledge, present it.*

Content	***1. Morphology of culture****. The history of the formation of the concept of culture: a variety of approaches to the definition of the essence and functions of culture. Axiological, civilizational, structuralist, anthropological, conomic interpretations of the concept of culture. Review of theoretical approaches: F. Boas, L. White, Z. Freud, K. Levi-Strauss, K. Marx, E. Tylor, O. Spengler, A. Toynbee, L. Gumilyov, P. Sorokin, S. Huntington* ***2. Language and semiotics of culture****. Culture as a world of signs and meanings. Information-semiotic understanding of culture. Culture as a world of artifacts. Culture as a world of meanings. Types of meanings. Culture as a world of signs. Typology of symbolic systems of culture. The main types of signs and sign systems. Natural signs. Functional signs. Iconic signs. Cultural code. Cultural code concept. The uniqueness of the cultural code of the national culture. Ethos of culture. Ethos and culture code. Types of global cultural codes: preliterate (traditional), written (book), screen, digital. Mass culture code. The code of Kazakh traditional culture. Kazakh culture code.* ***3. Anatomy of culture.*** *Three-dimensional model of culture. Cultural forms. The structure of the cultural space: paradigms, faces of culture, cultural scenarios. Axial cultural forms: cognitive paradigms, value paradigms, regulatory paradigms. Forms of culture: myth, art, religion, morality, philosophy, law, politics, science, technology.* ***4. Culture of the nomads of Kazakhstan****. Archaic culture on the territory of ancient Kazakhstan: monuments of material culture. The main achievements of material ("technological") culture. The main monuments of technical achievements of the ancient world. Nomadism as a type of culture. The concept of nomadism. Typology of nomadic culture. Classification and types of nomadism (nomad culture). The main features of the culture of the nomads of the Eurasian space. The culture of ancient tribes on the territory of Kazakhstan: customs, customs, traditions, cults, beliefs.* ***5. Formation of Kazakh culture****. The epic culture of Kazakhs. Myths and legends of the Kazakh people. Formation of Kazakh traditional culture. Forms of folk poetry, Musical creativity of akyns and zhyrau. Musical instruments. Agon in oral Kazakh folk art. Great Kazakh biys. Rhetors of the Kazakh steppe. Speech etiquette in the Kazakh language. Cultural values and ethics of batyrs. Development of Kazakh art: painting, sculpture, architecture, opera, ballet, music, drama of the twentieth century. Famous opera performers of the XX century. Literature of Kazakhstan of the XX century.* ***6. Kazakh culture in the context of globalization****. Problems of preserving cultural heritage of the Kazakh people in the context of globalization. Museums of Kazakhstan and their role in the preservation of cultural heritage. Museum of the Republic of Kazakhstan in the broadcast of the cultural heritage of the Kazakh people. The role of museums in preserving the cultural and ethnic memory of the Kazakh people. Implementation of the "Madeni Mura" program, the project of museums-reserves, cultural and natural monuments of Kazakhstan.* *National museum-reserves project: Botay, Saraishyk, Bozok,*

	7. Cultural policy of Kazakhstan*. Basic principles of cultural reform in Kazakhstan. Socio-cultural aspects of the processes of spiritual modernization in Kazakhstan. The relationship between the models of cultural policy and the system of basic values of society. Kazakhstan model of cultural policy. National idea "Mangilik Yel". Assembly of the People of Kazakhstan and its role in the cultural creation of Kazakhstani society. Basic patterns of cultural harmony. State Program "Cultural Heritage". Dynamics of traditions and innovations, mechanisms of continuity and transmission of cultural experience. Ecology of culture: difficulties and problems. Formation and development of the ecological culture of Kazakhstanis. The role of cultural institutions, cultural organizations in the creation and development of local history work.*
Requirements for training and exams, exam forms	*Attendance at classes and active participation in the educational process are mandatory. Late arrivals are not allowed. Cell phones should be turned off during classes. High-quality and timely execution of SIW tasks, participation in all types of assessment (current assessment, SIW assessment, midterm assessment, final assessment) are mandatory. For a high-quality mastering of the course, students should be guided by the fact that they independently work with texts, approximately 40-60 pages per week. Code of conduct and ethics must comply with the requirements of the university charter.* *Active work at the seminar (the ability to lead a discussion, to argue one's position with references to the studied literature, a creative approach to the selection and analysis of texts), the quality of prepared individual written assignments (glossary, etc.) and creative work (essays) are highly appreciated.* *Exam requirements: to find one correct answer. The assessment criteria are outlined in the syllabus*
Media used	*PowerPoint, MindMeister, Miro.com, Socrative.com, Canva. Microsoft Teams forms, Google forms*

References	*1. Nazarbayev N.A. «NA poroge KHKHI veka». – Astana, 2016* *2. Nazarbayev N.A. «Vzglyad v budushcheye: modernizatsiya obshchestvennogo soznaniya». – Astana, Ak Orda, 2017 / http://www.akorda.kz/ru* *3. Nazarbayev N.A. «Vzglyad v budushcheye». – Astana, 2017.* *4. Beysenova G.A. «Problemy globalizatsii i identichnosti». – A., Print, 2009.* *5. Barnard Alan. «Antropologiya tarikhy men teoriyasy»/per. na kaz.yaz. Pod rukov. Kul'sariyeva A.T., Masalimova A.R. – A., 2017.* *6. «Vseobşchaya istoriya zhivopisi». – M., EKSMO, 2010.* *7. Gabitov T.Kh. «Kazak madeniyetinin tarihy: oku kuraly». – Almaty: Kazak universiteti, 2016* *8. Gabitov T.Kh. «Kazakhi: Opyt kul'turologicheskogo analiza». – Saarbrücken: Germany Academic Publishing GmbH & Co. Kg lap lambert. – Heinrich-Böcking-Str. 6-8, 66121. - KG LAP LAMBERT, GERMANIYA, 2012.* *9. Gabitov T.Kh., Abdigaliyeva G.K., Ismagambetova Z.N. «Filosofiya kul'tury»: Uchebnik dlya studentov vuzov i kolledzhey. – Almaty: Evero, 2013* *10. Gabitov T.Kh., Zatov K. «Kazak madeniyetinin rukhani kenistigi». – Almaty: Raritet, 2013.* *11. Gabitov T.Kh., Mutalipov ZH., Kulsariyeva A. «Kul'turologiya». – Almaty, Raritet, 2008.* *12. Tursun Gabitov. «Actual Problems of Kazakh Culture. Kazakh Culture Challenges». - Saarbrücken: Lambert. – Publishing, 2016.* *13. «Drevniye tsivilizatsii». – M., 2009.* *14. Zholdubayeva A.K. «Kul'turologiya: praktikum». – Almaty: Kaznu im.al'-Farabi, 2014.* *15. «Istoriya kul'turologii pod red. Ogurtsova A.P». – M., Gardariki, 2006.* *16. Kairzhanova A. Palaeoturcica. «Mir drevnikh tyurkov». – Almaty, 1999.* *17. Karabayeva A.G. «Epistemologicheskiye etyudy». – Monografiya. – A., Kazak universitety, 2016.* *18. 18. Kondybayev S. Vvedeniye v kazakhskuyu mifologiyu. – Almaty. 1999.* *19. 19. Khasanov M.SH., Karakozova ZH.K. Kosmos kazakhskoy kul'tury. – Almaty: TOO «Evero», 2011. – 250 s.*

Course 7

Module name	*General education module*
Module level (if available)	*EDUC 21001*
Code (if available)	*PB 2108*
Subtitle (if available)	*General education course, elective component*
Course (if available)	*Entrepreneurship and Business*
Semester(s) when the module is taught	*3*

Person responsible for the module	*Ryspekova M.O.*
Lecturer	*Ryspekova M.O.*
Language of instruction	*Ryspekova M.O. – Russian* *Karipova A.T. – Kazakh*
Within the curriculum	*Elective component, 3 semester*
Teaching type, contact hours	*30 lectures (for 20 students);* *15 practical seminars (for 20 students)* *SIW – 60 hours (for 5-10 people)*
Hours	*30 hours of lectures;* *15 practical seminars* *60 hours – SIW* *Total – 105 hours*
ECTS number	*5*
Exam requirements	*Oral exam* *Oral exam using exam cards. An examination card is a set of two or three questions to assess the knowledge of students. Cards for examinations during the intermediate session are prepared in advance, teachers can give a list of sample questions to students in advance for preparation, however, exam cards become available only during the exam. The questions in the tickets cover the material studied during the period of teaching the course and does 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.).*
Pre-requisites	*Recommended required prerequisites: Economic theory, Microeconomics* *Recommended prerequisites: Knowledge of the fundamentals of economics in the scope of the program of secondary school, Economics and Entrepreneurship*

Module objectives / intended learning outcomes	*"Entrepreneurship and Business" is the acquisition of the necessary skills of entrepreneurial activity, understanding the mechanism of functioning of the market structure in business.* *<u>Knowledge</u>: acquaintance with the theory of business and entrepreneurship, systematization of regulatory, economic, organizational and managerial knowledge on the formation, conduct of entrepreneurship and business.* *- Skills: cognitive and practical skills, for the development of entrepreneurial thinking for solving specific problems and business situations.* *- Skills in the preparation, assessment and implementation of business development projects in various sectors of the economy;* *- Skills of organization, reorganization and liquidation of entrepreneurial firms and preparation of working documentation - instruments for regulating economic relations among business entities;.* *<u>Competencies:</u>* *- to form students' readiness for entrepreneurial activity and for organizing a business. - skills of preparation, assessment and implementation of business development projects in various sectors of the economy.* *- to collect, analyze and process the data necessary to solve the set economic tasks in the field of organizing and developing a business;* *- to select and apply tools for processing economic data in the field of organization and business management in accordance with the task,* *- analyze the results of calculations of economic efficiency and substantiate the conclusions. .* *Exam form: oral*
Content	1. *Introduction to the course "Entrepreneurship and Business"* 2. *The essence of business and entrepreneurship. Objectives, functions and generic characteristics of the business* 3. *The system of modern business: subjects of business relations, business infrastructure, government support.* 4. *Forms of business. Small, medium and large businesses.* 5. *Registration of an entrepreneurial company.* 6. *Organization of an entrepreneurial firm.* 7. *Reorganization and termination of the company* 8. *Economic activity in the business system.* 9. *Competition in business.* 10. *Business activities and contracts of the firm* 11. *Tax system in business.* 12. *Business interests in business.* 13. *Entrepreneurial risk.* 14. *Innovative entrepreneurship.* 15. *Business infrastructure.*

Requirements for training and exams, exam forms	*The course "Entrepreneurship and Business" is an elective component.* *Homework should be done on time. Students are allowed to take exams. Attendance is a must.* *Teachers expect students to:* *1. Not be late for classes;* *2. When skipping classes, to independently study the topics of the course.*
Media used	*Modern interactive teaching tools: multimedia tools, applications, software, Statistica, use of XL program, slide show, electronic board, modern online platforms, Tims services, Zoom, software product: "Training and test system".*
References	*1. Bobrova, O. S. Organizatsiya kommercheskoy deyatel'nosti : uchebnik i praktikum dlya srednego professional'nogo obrazovaniya / O. S. Bobrova, S. I. Tsybukov, I. A. Bobrov. – Moskva : Izdatel'stvo Yurayt, 2019. – 332 s.* *2. Bobrova, O. S. Osnovy biznesa : uchebnik i praktikum dlya akademicheskogo bakalavriata / O. S. Bobrova, S. I. Tsybukov, I. A. Bobrov. – Moskva : Izdatel'stvo Yurayt, 2019. – 330 s.* *3. Belyy Ye. M. Osnovy sotsial'nogo predprinimatel'stva : uchebnoye posobiye dlya vuzov / Ye. M. Belyy [i dr.] ; pod redaktsiyey Ye. M. Belogo. – Moskva : Izdatel'stvo Yurayt, 2019. – 178 s.* *4. Bobrova, O. S. Nastol'naya kniga predprinimatelya : prakticheskoye posobiye / O. S. Bobrova, S. I. Tsybukov, I. A. Bobrov. – Moskva : Izdatel'stvo Yurayt, 2019. – 330 s.* *5. Ekonomika malogo i srednego predprinimatel'stva. Uchebnoye posobiye. Avtory: Maydyrova A.B., Ryspekova M.O. – Astana: Yevraziyskiy natsional'nyy universitet im. L. N.Gumileva, 2019 g. – 243 s.* *Electronic editions:* *1. Gorfinkel' V. YA. Innovatsionnoye predprinimatel'stvo : uchebnik i praktikum dlya srednego professional'nogo obrazovaniya / V. YA. Gorfinkel' [i dr.] ; pod redaktsiyey V. YA. Gorfinkelya, T. G. Popadyuk. – Moskva : Izdatel'stvo Yurayt, 2019. – 523 s.: https://urait.ru/book/innovacionnoe-predprinimatelstvo-442427* *2. Zaramenskikh, Ye. P. Osnovy biznes-informatiki : uchebnik i praktikum dlya bakalavriata i magistratury / Ye. P. Zaramenskikh. – Moskva : Izdatel'stvo Yurayt, 2019. – 407 s.: https://urait.ru/bcode/433677* *3. Kuz'mina, Ye. Ye. Predprinimatel'skaya deyatel'nost' : uchebnoye posobiye dlya srednego professional'nogo obrazovaniya / Ye. Ye. Kuz'mina. – 3-ye izd., pererab. i dop. – Moskva : Izdatel'stvo Yurayt, 2019. – 417 s.: https://urait.ru/book/predprinimatelskaya-deyatelnost-437823* *4. Repin, V.V. Protsessnyy podkhod k upravleniyu. Modelirovaniye biznes-protsessov / V.V. Repin. - M.: Mann, Ivanov i Ferber, 2013. - 544 c.: https://www.mann-ivanov-ferber.ru/assets/files/bookparts/the-process-approach-to-management/podhod_read.pdf*

	5. Burov V. YU., – Osnovy predprinimatel'stva : Chast' III, uchebnoye posobiye : [v 3 ch. / V. YU. Burov; Zabaykal. gos. un-t. – Izd. 2-ye, dop. i pererab. – Chita, ZabGU, 2018..: http://scipro.ru/conf/%D0%91%D0%A3%D0%A0%D0%9E%D0%92.-%D0%9F%D0%9E%D0%A1%D0%9E%D0%91%D0%98%D0%95.-%D0%A7%D0%90%D0%A1%D0%A2%D0%AC-3.pdf

Course 8

Module name	*General education module*
Module level (if available)	-
Code (if available)	*MNGT 21003*
Subtitle (if available)	-
Course (if available)	*Digital Technologies by Industries*
Semester(s) when the module is taught	*Semester 1 and semester 2 of the second year of studies*
Person responsible for the module	*Russian – Akhayeva Zh.B., Abildinova G.M.* *Kazakh – Alzhanov A.K., Shyndaliyev N.T., Sadvakasova A.K.*
Lecturer	*Russian – Akhayeva Zh.B., Abildinova G.M.* *Kazakh – Alzhanov A.K., Shyndaliyev N.T., Sadvakasova A.K.*
Language of instruction	*Kazakh, Russian*
Within the curriculum	*General education course*
Teaching type, contact hours	*2 lectures and 1 seminar per week – contact hours*
Hours	*30 hours of lectures, 15 hours of seminars, 105 hours of SIW (students' independent work)*
ECTS number	*5*
Exam requirements	*Matrix testing, the number of questions per student is 40. Questions are prepared in advance and loaded into Microsoft Teams Forms. The system allows students to randomly distribute questions among students. Test questions cover all the material studied. Students are not given questions in advance, but they know the list of topics.*
Pre-requisites	*"Information and Communication Technologies" course*
Module objectives / intended learning outcomes	*Knowledge:* *– to learn the basic concepts of digital technologies, platforms and mobile devices;* *– to know the features of the use of multimedia on the Internet;* *– to be able to effectively use digital technologies and Internet resources;* *– to develop multimedia content;* *– to use the functionality of social networks;* *– to use various means of processing and storing digital information;* *– to analyze the reliability of means and methods of security in the network;* *Competencies:* *– to formation of students' skills and abilities necessary for their further professional activity;* *– to evaluate the effectiveness of digitalization in professional areas.* *– to synthesize the effective use of Internet services for work and life;*

Content	*1. Introduction to the course. State program "Digital Kazakhstan".* *2. Smart City. Basic concepts. Organization platforms and technologies. Smart Astana roadmap.* *3. Computer networks. The Internet. Internet access technologies. Internet by wire. Internet without wires. Mobile Internet. Mobile networks (3G, 4G / LTE). Cellular systems.* *4. Digital platforms for e-government services. Electronic digital signatures (EDS).* *5. "E-licensing" information system. Digital e-commerce platforms. Electronic commerce. Virtual payment facilities and systems. Internet shops. Online shopping.* *6. Information security on the Internet. Cybersecurity. Strong passwords. 2-step authentication* *7. 3D modeling and animation. 3D graphics. 3D modeling.* *8. Virtual and augmented reality VR and AR.* *9. Introduction to Java. Java programming language.* *10. Acquaintance with the Python programming language.* *11. Processing of digital information in the professional field. Organization of texts, transformation of text information. Processing of graphic images. Compression of digital information.* *12. Database. Big data and open data* *13. Statistical processing of results by means of STATISTICA software.* *14. Modern multimedia services. Social networks. Search engines. Electronic catalogs, libraries. Video conferences.* *15. Application of cloud technologies for storing digital information. General concepts of cloud technologies. Advantages and disadvantages of cloud services.*
Requirements for training and exams, exam forms	*The course "Digital Technologies by Industries" is an optional component.* *The work should be completed within the specified timeframe. Students who fail to complete all assignments are not allowed to take the exam.* *Revision of the topic and the development of the passed materials for each training lesson are required. The degree of mastering the educational material is checked by testing. Testing of students may be conducted without warning.* *Homework and SIW assignments should be completed on time, in case of non-fulfillment, the final grade will be decreased.* *Attendance in all classroom lessons is compulsory; in case of missed classes, they are worked out at a time specified by the teacher.* *The lecturer expects students to:* *1. Not to be late for classes.* *2. If missing a lesson, to study the material on their own and start the next lesson.* *3. to strictly observe the deadlines for the delivery of SIW.* *Exam form: matrix testing*
Media used	*Python, Java, STATISTICA programs*
References	*1. Serik M., Sadvakasova A.K., Senbai D. Bulttyk*

tehnologiyalar negizdery: oku kuraly. – Astana, 2017. – 111b.
2. *Zhumagulova S.K. Akparattyk kauipsizdik zhane akparatty korgau. – Almaty, 2017.*
3. *Yermekov N.T. Akparattyk tehnologiyalar: okulyk / Nurmukhambet Turlynuly Yermekov; Kazakstan Respublıkasy Bilim zhane gylym ministrligi tehnikalyk zhane kasiptik bilim beru uyimdaryna usynady. – 2-şi bas.. – Astana: Folıant, 2011. – 206, [2] b.: sur.. – (Kasiptik bilim). – 1000 ekz. – ISBN 978-601-271-045-5*
4. *Seıtbekova G.O. Akparattyk tehnologiyalar: zhogary oku oryndaryna arnalgan oku kuraly / G.O. Seıtbekova, G.A. Tiulepberdinova. – Almaty: Evero, 2015. – 251, [1]b.: sur.. – Bibliogr.: b. 248. – ISBN 978-601-240-854-6*
5. *Aljanov A.K. Multımediynye tehnologii v obrazovanii: [uchebno-metodicheskoye posobiye] / A.K. Aljanov, G.M. Abildinova. – Almaty: Evero, 2016. – 94, [1] c.: sv. ıl.. – Bibliogr.: s. 94. – ISBN 978-601-310-240-5*
6. *Serik M., Shyndaliyev N.T., Zulpykhar Zh.E. Kompyuter arkhıtekturasy zhane zhuyine akimshiliktendyru. –Astana, 2012.*

Electronic editions:
1. *Luchaninov D.V. Osnovy razrabotki web-saytov obrazovatel'nogo naznacheniya [Elektronnyy resurs]: uchebnoye posobiye / D.V. Luchaninov. – Elektron. tekstovyye dannyye. – Saratov: Ay Pi Er Media, 2018. – 105 c. – 978-5-4486-0174-3. – Rezhim dostupa: http://www.iprbookshop.ru/70775.html*
2. *Kurushin V.D. Graficheskiy dizayn i reklama [Elektronnyy resurs] / V.D. Kurushin. – Elektron. tekstovyye dannyye. – Saratov: Profobrazovaniye, 2017. – 271 c. – 978-5-4488-0094-8. – Rezhim dostupa: http://www.iprbookshop.ru/63814.html*
3. *Shan'gin V.F. Zashchita komp'yuternoy informatsii. Effektivnyye metody i sredstva [Elektronnyy resurs] / V.F. Shan'gin. – Elektron. tekstovyye dannyye. – Saratov: Profobrazovaniye, 2017. – 544 c. – 978-5-4488-0074-0. – Rezhim dostupa: http://www.iprbookshop.ru/63592.html*
4. *Vel'ts O.V. Informatika [Elektronnyy resurs] : laboratornyy praktikum / O.V. Vel'ts, I.P. Khvostova. – Elektron. tekstovyye dannyye. – Stavropol': Severo-Kavkazskiy federal'nyy universitet, 2017. – 197 c. – 2227-8397. – Rezhim dostupa: http://www.iprbookshop.ru/69384.html*
5. *Kovalenko YU.V. Informatsionno-poiskovyye sistemy [Elektronnyy resurs]: uchebno-metodicheskoye posobiye / YU.V. Kovalenko, T.A. Sergiyenko. – Elektron. tekstovyye dannyye. – Omsk: Omskaya yuridicheskaya akademiya, 2017. – 38 c. – 978-5-98065-148-0. – Rezhim dostupa: http://www.iprbookshop.ru/66817.html*
6. *Osnovy Web-tekhnologiy [Elektronnyy resurs]: uchebnoye posobiye / P.B. Khramtsov [i dr.]. – Elektron. tekstovyye*

	dannyye. – Moskva, Saratov: Internet-Universitet Informatsionnykh Tekhnologiy (INTUIT), Vuzovskoye obrazovaniye, 2017. – 375 c. – 978-5-4487-0068-2. – Rezhim dostupa: http://www.iprbookshop.ru/67384.html

Course 9

Module name	*General education module*
Module level (if available)	-
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Business Rhetoric*
Semester(s) when the module is taught	*3*
Person responsible for the module	*Shakhin A.A., Tashimkhanova D.S.*
Lecturer	*Shakhin A.A., Tashimkhanova D.S.*
Language of instruction	*Kazakh / Russian*
Within the curriculum	*General education module, elective component*
Teaching type, contact hours	*2 лекции и 1 практическое в неделю – контактные часы*
Hours	*Lectures 30 / Seminars 15 / SIW 105 (students' independent work)*
ECTS number	*5*
Exam requirements	*The combined exam consists of 25 exam cards with two questions. The first question is taking a test in the SOCRATIV program, where students solve 40 questions; the second question is an oral answer to a given topic. The list of topics for oral answers is given to students in advance for preparation.*
Pre-requisites	*Russian / Kazakh*
Module objectives / intended learning outcomes	***The goal** is to develop skills for effective public speaking, skills of successful communication in various situations of business communication.* ***Know** the main rhetorical strategies and tactics, methods of argumentation aimed at achieving a communicatively meaningful result.* ***Be able** to apply knowledge about the oratorio to the speech facts of business communication; to build effective business communication in accordance with students' own communicative intentions.* ***Have** the skills of effective interaction with participants in the business communication process in various genres of business communication.*

Content	*The course has a professional and practical focus. Its study presupposes mastering the technology of rhetorical activity in professionally significant situations. The objectives of the course include increasing students' speech education, acquiring knowledge about the principles of effective business communication, main factors and processes that ensure the successful impact of public speech on listeners, the forms and means of interaction between the speaker and the audience.* *The student gains knowledge of the basic rhetorical strategies and tactics aimed at achieving a communicatively meaningful result; the basics of public speaking skills; knowledge of the terminological apparatus according to the course; the ability to produce tests of an official business orientation, to be aware of one's own communicative intentions and to build effective business communication in accordance with this.*
Requirements for training and exams, exam forms	*The course "Business Rhetoric" is an optional discipline.* *The student must complete the assigned tasks in a strictly established timeframe, which applies both to classroom work and to the implementation of students' independent work.* *Being late for classes is not welcome. A student who is missing classes or does not complete the assignment is not allowed to take the exam.* *Attendance in classrooms is compulsory; absences can only be for a valid reason. All missed classes are worked out in the form of completing individual assignments, preparing presentations, etc.* *The exam form is a combined exam.*
Media used	*Course "Rhetoric"* *https://www.youtube.com/playlist?list=PLo9UMekjzF143Nl5PXNc4-1UrvIzCaivZ* *Kazakhstan School of Public Speaking and Personal Growth* *https://mediaprofi.kz/orator/* *Online Rhetoric courses:* • *1 HEDU* • *2 Udemy* • *3 Alexey Sobolev School of Public Speaking* • *4 Skillbox* • *5 Online school of effective communications* • *6 PMClub* • *7 "THE KING IS SPEAKING!»* • *8 MBA City Academy* • *9 New Business University* • *10 4brain* • *11 «Look and learn»* • *12 Oratoris* • *13 Oratorus* • *14 Moscow School of Orators* • *15 "Learning to speak publicly"* • *16 school oratory* • *17 Online courses from Oleg Kot* • *18 School of Mind Sharpness*

	• *19 Free Online Courses* • *20 University of oratory and rhetoric*
References	1. *Sternin I.A. Prakticheskaya ritorika: ucheb. posobiye dlya studentov vysshikh uchebnykh zavedeniy. – M.: «Akademiya», 2016. – 272 s.* 2. *Shelamova G.N. Etiket delovogo obshcheniya: ucheb. posobiye dlya nach. prof. obrazovaniya. – M.: "Akademiya», 2015. – 192 s.* 3. *Vvedenskaya L.A. Delovaya ritorika: Uchebnoye posobiye dlya vuzov. – Rostov n/D, 2012.* 4. *Mal'khanova I.A. Delovoye obshcheniye: ucheb. posobiye. – M.: Akademicheskiy Proyekt, 2014. – 224 s.* 5. *Anisimova T.V., Gimpel'son Ye.G. Sovremennaya delovaya ritorika: ucheb .posobiye. – M. : NPO «MODEK», 2017. – 432 s.* 6. *Golub I.B. Ritorika: ucheb. posobiye. – M.: «Eksmo», 2015.– 384 s. Kuzin F.A. Kul'tura delovogo obshcheniya. – M., 2017.*

Course 10

Module name	*General education module*
Module level (if available)	-
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Rukhani Zhangyru*
Semester(s) when the module is taught	*Semester 1 and semester 2 of the second year of studies*
Person responsible for the module	*Battalov Kairat Kanatovich, Yerdebekova Zhanar Seytkaliyevna*
Lecturer	*Battalov Kairat Kanatovich, Yerdebekova Zhanar Seytkaliyevna, Yesimova Zhanar Kabdushevna, Sailaubayeva Nurgul Yernazarovna*
Language of instruction	*Kazakh, Russian, English*
Within the curriculum	*For all bachelor's programs, elective component*
Teaching type, contact hours	*5 ECTS, 30 hours of lecture (lecture room for 60-70 people of a number of groups), 15 hours of seminars (standard classroom for 25-30 students), 105 hours of students' independent work (consultations in a standard classroom, work in the library, online)*
Hours	*30 hours of lectures, 15 hours of seminars, 105 hours of students' independent work*
ECTS number	*5*
Exam requirements	*At the end of the semester, an oral exam is taken using exam cards. Cards are developed by the lecturer in advance. Students are not given cards before the exam, but they are familiar with the list of sample questions. Retaking the exam to improve the mark is not allowed.*
Pre-requisites	*Modern History of Kazakhstan*
Module objectives / intended learning outcomes	*The course covers topical issues of modernization of the modern Kazakhstani society. The course is aimed at forming an idea of modern global trends in the post-industrial development of society, a vision of one's own and world*

	future, awareness of the development trend of the world labor market, an idea of Kazakhstan's identity, the main directions of the development of the country's spiritual modernization. The course covers basic knowledge of leadership strategies in society. The world examples of leadership in different historical periods are considered.
Content	*The education program is based on three conceptual foundations: cognitive – the study of the foundations of modernization of public consciousness and laws of development of modern society; patriotic – respectful attitude to history, heroic past of their people, love for the Fatherland, native land, historical personalities, involvement in national values; informational – popularization of spiritual and moral values that strengthen national identity, clarification of the tasks defined in the Program Article of the Head of State, strategic documents of the country, the President's Address to the people of Kazakhstan. The discipline consists of 3 modules:* *Module 1. Modernization in the Context of Globalization. The World of the Future.* *Module 2. Modernization of Consciousness as a Factor in the Success of a Nation.* *Module 3. Leadership in the Face of Modernization.* *The module "Modernization in the Context of Globalization. The World of the Future" covers the origins and main stages of globalization, changes in the world in the context of globalization, global trends of the present and the future, the prospects of total digital societies of the future, the prospects of Kazakhstan in the context of globalization, value benchmarks and development trends of the Kazakh society, competitiveness in the modern world, pragmatism in conditions of our time.* *The module "Modernization of Consciousness as a Factor in the Success of the Nation" the main aspects and problems of the formation of the historical consciousness and worldview of Kazakhstanis, the preservation of sacred monuments of their native land, the importance of preserving tradition for Kazakhstan, modern threats to Kazakhstani identity, the value of knowledge for the development of society, Abai and openness of consciousness, the role of humanity and tolerance in the modern world.* *The module "Leadership in the Context of Modernization" covers various models and examples of leadership in the world history, the historical significance of the Kazakh steppes in world history, features of leadership in a nomadic society, Alash leadership, N.A. Nazarbayev's initiative as the foundation of global leadership.*
Requirements for training and exams, exam forms	*1. It is mandatory for students to be active in the classroom process, which is assessed on the basis of the quality of their performance. Attendance at classes and participation in the educational process are compulsory. Students should not miss their class without good reason. Late arrivals are not allowed.*

	Code of conduct and ethics must be consistent with university requirements. In this regard, the scores are from 0 to 100 points. *2. Lesson assessment concerns not only student's homework, but also active participation in assignments that are assessed from 0 to 100 points.* *3. Students should regularly attend classes, take an active part in group discussions, colloquia, complete test assignments during midterm control, SIW assignments and presentations. The teacher reserves the right to use without prior warning various types of assessment (quiz, test), which are aimed at consolidating the information of a lecture or chapter. This assessment will be included in the final assessment summarizing the general understanding of the material. In this regard, students receive points from 0 to 100 points* *Failure to complete students' assignments will help to define their points. All assignments must also be submitted on time.* *It is forbidden to read various sources of information from a book, electronic data from books or sources of information, from electronic media during oral and intermediate assessment tasks.* *For a high-quality development of the course, students should be guided by the fact that they will need to read approximately 30-50 pages of references per week. You can get the maximum score if the task is performed efficiently, in accordance with the requirements.*
Media used	*Projector device for PPT presentations.*
References	*Basic references* 1. *Nazarbayev N.A. Vzglyad v budushcheye: modernizatsiya obshchestvennogo soznaniya // Kazakhstanskaya pravda, 2017. – 12 aprelya* 2. *Nazarbayev N. Era nezavisimosti. – Astana, 2017. – 508 s.* 3. *Obrashcheniye Prezidenta Respubliki Kazakhstan N.A.Nazarbayeva k narodu «Pyat' sotsial'nykh initsiativ Prezidenta» // http://www.akorda.kz* 4. *Yuval' Noy Kharrari. „Homo Deus: Kratkaya istoriya budushchego". – M.: Sindbad, 2018. – 496 s.* 5. *Kuttykadam S. «10 primerov sluzheniya natsii». – Almaty: INES-TSA, 2009. 356s.* 6. *Abay Kunanbayev. Izbrannoye (seriya «Mudrost' vekov»), Moskva, 2006* 7. *Memleket basshysynyn 2017 zhylgy 31 kantardagy «Kazakstannyn үshinshi zhangyruy: zhakhandyk basekege kٔ–kabilettilik» atty Kazakstan khalkyna Zholdauy // http://www.akorda.kz* 8. *Nazarbayev N. Tarikh tolkynynda. - Almaty: «Atamura», 1999* 9. *"Kazakstan-2050" Strategiyasy kalyptaskan memlekettin zhana sayasi bagyty. Kazakstan Respublikasynyn Prezidenti – Yelbasy N.A. Nazarbayevtyn Kazakstan khalkyna Zholdauy, Astana k., 2012 zhylgy 14 zheltoksan*

	// http://adilet.zan.kz/kaz/docs/K1200002050
	10. *Ukaz Prezidenta Respubliki Kazakhstan „O perevode alfavita kazakhskogo yazyka s kirillitsy na latinskuyu grafiku“ (s izmeneniyami ot 19.02.2018 g.) Astana, Akorda, 26 oktyabrya 2017 goda No 569 (Alfavit kazakhskogo yazyka, osnovannyy na latinskoy grafike, izlozhen v redaktsii Ukaza Prezidenta RK ot 19.02.18 g. No 637) // http://online.zakon.kz/Document/?doc_id=33613600*
	11. *Poslaniye Prezidenta Respubliki Kazakhstan N.Nazarbayeva narodu Kazakhstana. «Novyye vozmozhnosti razvitiya v usloviyakh chetvortoy promyshlennoy revolyutsii» 10 yanvarya 2018 g. // Kazakhstanskaya pravda, 2018. – 10 yanvarya*
	12. *Poslaniye Prezidenta Respubliki Kazakhstan N.Nazarbayeva narodu Kazakhstana. «Tret'ya modernizatsiya Kazakhstana: global'naya konkurentosposobnost'» 31 yanvarya 2017 g. // Kazakhstanskaya pravda, 2017. – 31 yanvarya*
	13. *Nazarbayev N. V potoke istorii.-Almaty: «Atamura», 1999 Strategiya Kazakhstan-2050: novyy politicheskiy kurs sostoyavshegosya gosudarstva.*
	14. *Poslaniye Prezidenta Respubliki Kazakhstan – Lidera Natsii N.A. Nazarbayeva narodu Kazakhstana, g. Astana, 14 dekabrya 2012 goda // http://adilet.zan.kz/rus/docs/K1200002050*
	15. *Kunanbayev A. Shykarmalarynyk tolyk zhinagy (eki tomdyk) – Almaty, 2002*
	16. *Schwab Klaus Turtinshi industrial revolution. – Almaty: Ulttyk audarma byurosy, 2018. – 200 b. (9-13 bb.)*
	17. *Yesim G. Khakim Abay. – Almaty, 1994*
	18. *Kazakhstani zalpyulttyk Kasietti nysandary / Sacred objects of Kazakhstan of national importance. – Astana: Folio, 2017.- 496 b.*
	19. *Kazakstannyk Kirlik Kasietti nysandary / Regional sacred objects of Kazakhstan.- Astana: Folio, 2017.- 504 b.*
	20. *Kazakstanday 100 zhana esim zhobasy / Project of 100 new faces of Kazakhstan // http://100esim.el.kz/kz*
	21. *Zhabaikhan Abdildin, Raushan Abdildin. The logic of evolutionary development // Kazakhstanskaya Pravda. – 2017. – May 16*
	22. *Remy Hess Philosophical tadauly 25 kitaby. – Almaty: ulttyk audarma burosy, 2018*
	23. *Johnston D. Philosophical qysgasha tarikhy: Socrattan Derridana deyin. – Almaty: „Ulttyk audarma burosy“ Kokamdyk kory, 2018.- 2016 beta*
	24. *Alan Barnard Anthropology of tarikhy men theory. – Almaty: Ulttyk audarma burosy, 2018.*
	25. *Ter-minasova, S.G. Til zhune medenietaraly communication. – Almaty; Astana, 2018*
	Additional references

	1. *Lutfur Rahman Modernization Theory: A Critical Analysis // http://www.academia.edu/8374391/Modernization_Theory_A_Critical_Analysis* 2. *Huntington S.P. The Change to Change: Modernization, Development, and Politics // Comparative Modernization: A Reader. Ed. By C.E.Black. – N.Y., London, 1976. – P. 28;* 3. *A.Y. Social Change and Development: Modernization, Dependency, and World-System Theories. Newbury Park, 1990. P.18-23* 4. *Khantington E. Politicheskiy poryadok v menyayushchemsya obshchestve. – M., 2004.* 5. *Shtompka P. Sotsiologiya sotsial'nykh izmeneniy. – M., 1996. – S. 178* 6. *Inglkhart, R. Modernizatsiya i postmodernizatsiya // Novaya postindustrial'naya volna na Zapade. Antologiya. – M., 1999. – S. 267-268.* 7. *Giddens E. Posledstviya moderniti // Novaya postindustrial'naya volna na Zapade. Antologiya. – M., 1999. – S. 101-122* 8. *Sydykov Ye.B. Modernizatsiya obshchestvennogo soznaniya i novyye zadachi istoricheskoy nauki // el.kz/news/ruhani-zhangyru/* 9. *Nysanbayev A., Nurmuratov S. Kiege ie men zhuye kerek // Yegemen Kazakstan.-2018. – 16 nauryz* 10. *Amangeldi Aytaly. Rukhani kod – ulttın ishki zhan duniyesi // Yegemen Kazakstan.-2017. – 6 karasha* 11. *Fundament dlya evolyutsionnoy modernizatsii // Kazakhstanskaya pravda. – 2018. – 13 aprelya*

Course 11

Module name	*General education module*
Module level (if available)	-
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Business Communication Culture*
Semester(s) when the module is taught	*3*
Person responsible for the module	*Russian – Loginova M.V., Seliverstova Zh.B.*
Lecturer	*Russian – Loginova M.V., Seliverstova Zh.B.*
Language of instruction	*Kazakh / Russian*
Within the curriculum	*General education module, elective component*
Teaching type, contact hours	*2 lectures and 1 seminar per week – contact hours*
Hours	*Lectures 30 / Seminars 15 / SIW 105 (students' independent work)*
ECTS number	*5*

Exam requirements	*The combined exam consists of 25 exam cards with two questions. The first question is taking a test in the SOCRATIV program, where students solve 40 questions; the second question is an oral answer to a given topic. The list of topics for oral answers is given to students in advance for preparation.*
Pre-requisites	*Russian / Kazakh*
Module objectives / intended learning outcomes	*The goal is the formation of skills for effective public speaking, the development of the linguistic and communicative competence of students, the formation of practical skills in the Russian language in its oral and written form in various kinds of professional and socially significant situations.* *To know the basic norms of the modern Russian literary language and their variants; basic etiquette formulas of speech communication; ways of the expedient use of language means in accordance with a communicative situation.* *To be able to navigate in various communication situations; compose written and oral texts in accordance with the norms of the culture of speech; use etiquette formulas in oral and written communication; to realize communicative intentions adequately to the situation and communication tasks arising in professional activity.* *To have the skills of a competent, fluent own speech in various communication conditions.*
Content	*The course is aimed at increasing the general culture of students' speech, formation of skills and abilities of the correct use of language means in speech in various situations of communicative interaction. The course provides for the presentation of the theoretical foundations of the culture of speech, familiarization with its basic concepts and categories, the principles of speech organization of styles, the laws of the functioning of language means in speech.* *The student gains knowledge of the basic rhetorical strategies and tactics aimed at achieving a communicatively meaningful result; the basics of the mastery of public speaking; possession of the terminology-technical apparatus for the course; the ability to produce tests of an official business orientation, to be aware of their own communicative intentions and to build effective business communication accordingly.*
Requirements for training and exams, exam forms	*The discipline "Business Communication Culture" is an optional course.* *The student must complete the assigned tasks in a strictly established timeframe, which applies both to classroom work and to the implementation of students' independent work.* *Being late for classes is not welcome. A student who is missing classes or does not complete the assignment is not allowed to take the exam.* *Attendance in classrooms is compulsory; absences can only be for a valid reason. All missed classes are worked out in the form of completing individual assignments, preparing presentations, etc.* *The exam form is a combined exam.*

Media used	*Course "Rhetoric"* *https://www.youtube.com/playlist?list=PLo9UMekjzF143Nl5PXNc4-1UrvIzCaivZ* *Kazakhstan School of Public Speaking and Personal Growth* *https://mediaprofi.kz/orator/* *Online Rhetoric courses:* *1 HEDU* *2 Udemy* *3 Alexey Sobolev School of Public Speaking* *4 Skillbox* *5 Online school of effective communications* *6 PMClub* *7 "THE KING IS SPEAKING!»* *8 MBA City Academy* *9 New Business University* *10 4brain* *11 «Look and learn»* *12 Oratoris* *13 Oratorus* *14 Moscow School of Orators* *15 "Learning to speak publicly"* *16 school oratory* *17 Online courses from Oleg Kot* *18 School of Mind Sharpness* *19 Free Online Courses* *20 University of oratory and rhetoric*
References	*Belova N. A.Kul'tura delovogo obshcheniya: ucheb. Posobiye [Elektronnyy resurs] / N. A. Belova. – Saransk: Izd-vo Mordov. un-ta, 2020. –1,52 Mb.– URL http://openedo.mrsu.ru/pluginfile.php/116630/mod_resource/content/1/%D0%9A%D1%83%D0%BB%D1%8C%D1%82%D1%83%D1%80%D0%B0%20%D0%B4%D0%B5%D0%BB%D0%BE%D0%B2%D0%BE%D0%B3%D0%BE%20%D0%BE%D0%B1%D1%89%D0%B5%D0%BD%D0%B8%D1%8F.pdf* *Sternin I.A. Prakticheskaya ritorika: ucheb. posobiye dlya studentov vysshikh uchebnykh zavedeniy. –M.: «Akademiya», 2016.–272 s. Shelamova G.N. Etiket delovogo obshcheniya: ucheb. posobiye dlya nach. prof. obrazovaniya. – M.: «Akademiya», 2015. –192 s. Mal'khanova I.A. Delovoye obshcheniye : ucheb.posobiye. – M.: Akademicheskiy Proyekt, 2014. –224 s.* *Anisimova T.V., Gimpel'son Ye.G. Sovremennaya delovaya ritorika: ucheb.posobiye.– M. : NPO «MODEK», 2017. – 432 s.* *Kuzin F.A. Kul'tura delovogo obshcheniya. – M., 2017.*

Course 12

Module name	*General education module*
Module level (if available)	-
Code (if available)	*EDUC21001*
Subtitle (if available)	-

Course (if available)	*Anti-Corruption Culture*
Semester(s) when the module is taught	*Semester 1 of the second year of studies*
Person responsible for the module	*Russian – Kapsalyamova S.S.* *Kazakh – Osmanova D.B.*
Lecturer	*Русс – Абдилов КС* *Каз – Османова Д.Б.*
Language of instruction	*Russian, Kazakh*
Within the curriculum	*General education course*
Teaching type, contact hours	*2 hours of lectures, 1 hour of seminars a week (30 hours of lectures, 15 hours of seminars)*
Hours	*Lectures 30 / Seminars 15 / SIW 105 (students' independent work)*
ECTS number	*5*
Exam requirements	*Computer testing; tests are developed by the lecturer in advance and are entered into the program in AIS "Platonus". Each test question has several answers, students must choose one correct answer. One minute is allotted for each question, after which the program switches to the next question. Returning to the previous question is impossible. There are 40 questions per student. The test result is known to the student immediately after its completion. A retake is permitted once upon receipt of an FX score.*
Pre-requisites	*Not required*
Module objectives / intended learning outcomes	*Students will have knowledge of the essence of corruption and the reasons for its origin.* *Students will be able to analyze the measure of moral, ethical and legal responsibility for corruption offenses.* *Students will have knowledge of the state's anti-corruption policy and current anti-corruption legislation.* *Students will be able to implement the values of moral consciousness and follow moral norms in daily practice.* *Students will be able to determine lawful action in a situation of conflict of interest.*
Content	*"Fundamentals of Anti-Corruption Culture" is a course that aims to raise awareness of corruption and form an its image as a public policy issue. The purpose of studying the course is to form a system of knowledge to combat corruption, existing legal responsibility and to develop, on this basis, a civic position in relation to this phenomenon. The development of the legal culture of the individual, contributing to the fight against corruption, the development of skills and abilities to critically analyze corruption phenomena, the study of modern anti-corruption approaches and practices.*

Requirements for training and exams, exam forms	*Students are required to attend lectures and seminars, being preliminary prepared for lectures and seminars based on teaching aids and basic literature, participation in all types of assessment (current assessment, midterm assessment, final assessment), mandatory participation in intermediate and final certification tests, fulfillment of the teacher's assignments. The active work at the seminar (the ability to lead a discussion, to argue one's position with references to the studied literature, a creative approach to the selection and analysis of texts), the quality of accomplished individual written assignments (glossary, etc.) and creative work (essays) are highly appreciated.* *Exam form – computer-based testing*
Media used	*Projector device, Multimedia board, Microsoft Teams program*
References	*Basic references:* 1. *Osnovy antikorruptsionnoy kul'tury: uchebnoye posobiye. Pod obshchey redaktsiyey d. b. n., professora B.S. Abdrasilova. – Astana: Akademiya gosudarstvennogo upravleniya pri Prezidente Respubliki Kazakhstan, 2016. – 176 s.* 2. *Protivodeystviye korruptsii. Uchebnik i praktikum. Pod obshchey redaktsiyey Ye.V.Okhotskogo. – Moskva, 2016.* 3. *Protivodeystviye korrptsii: konstitutsionno-pravovyye podkhody. Kollektivnaya monografiya\ otv. Avak'yan S.A – M.: Yustitsinform, 2016. – 512s.* 4. *Rouz-Akkeman S. Korruptsiya i gosudasrstvo. Prichiny, sledstviya, reformy. M.: Logos, 2010.* *Additional references:* 1. *Antikorruptsionnaya pravovaya politika: ucheb. posobiye / Ye. Alaukhanov. – Almaty: Zan adebiyeti, 2009. – 256 s.* 2. *Nravstvennost' kak osnova stanovleniya novoy generatsii gosudarstvennykh sluzhashchikh. / Kabykenova B.S., Shakhanov Ye.A., Dzhusupova R.S./. 2011.* 3. *Byurokratiya, korruptsiya i effektivnost' gosudarstvennogo upravleniya / V. D.Andrianov. - M.: Volters Kluver, 2009. - 248 s. - Bibliogr.: 234 s.* 4. *Korruptsiya i gosudarstvo: Prichiny, sledstviya, reformy: Per. s angl. O.A.Alyakrinskogo / S. Rouz-Akkerman. – M.: Logos, 2003. - 356 s.* 5. *Boleyev T.K. Psikhologicheskiye mekhanizmy korruptsionnogo povedeniya// Gosudarstvennoye upravleniye i gosudarstvennaya sluzhba. – №1. – 2015.* 6. *Protivodeystviye korruptsii i uluchsheniye standartov gosudarstvennykh uslug: opyt Novoy Zelandii, Avstraliya i Malayzii. - London: DAI, 2006* 7. *Vlast', korruptsiya i chestnost': Nauch. izd.: Per. s angl. / A. A. Rogou. – M.: Izd-vo RAGS, 2005. – 176 s. (Antologiya zarubezh. i otech. mysli)* 8. *«Belovorotnichkovaya» prestupnost' v SSHA cherez prizmu mirovogo finansovo-ekonomicheskogo krizisa: Monogr. /O. G. Karpovich, N. A. Shulepov. – M.: YUNITI-DANA, 2014. – 207*

	s. - Bibliogr.: 195 s. 9. *Aktual'nyye problemy bor'by s korruptsiyey v Respublike Kazakhstan / O.A. Abdykarimov. – Astana: Akad. gos. upr. pri Prezidente RK, 2005. – 19 s.* 10. *Korruptsiya kak sotsial'noye yavleniye i mery yeyo preduprezhdeniya: Ucheb. posobiye. /G. S. Maulenov. - Astana: Akad. gos. sluzhby pri Prezidente RK, 2005. - 96 s.* 11. *Alekseyev S. V. Korruptsiya: sotsiologicheskiy analiz / pod red. O. V. Bondarenko.– Shakhty: Izd-vo YURGUES, 2008. – 270 s.* 12. *Dobren'kov V. I., Ispravnikov N. R. Korruptsiya: sovremennyye podkhody k issledovaniyu. – M., 2009. – 207 s.* 13. *Bayrkenova G. O formirovanii pravovoy antikorruptsionnoy kul'tury obuchayushchikhsya vysshikh uchebnykh zavedeniy. Vysshaya shkola Kazakhstana. 2015. №1. – S.85-88.* 14. *Bayrkenova G. Vzaimnaya obuslovlennost' pravovoy i antikorruptsionnoy kul'tury. «Dukhovno-nravstvennoye vospitaniye molodezhi v usloviyakh globalizatsii sovremennogo obshchestva», posvyashchennaya 25-letiyu Nezavisimosti Respubliki Kazakhstan»: mat-ly mezhdunarodnoy. nauch.-prakt. konf. – Ust'-Kamenogorsk, VKGU imeni S. Amanzholova, TOO «VK PK ARGO» 2017. – S.55-59.* 15. *Bayrkenova G. Antikorruptsionnoye vospitaniye molodezhi v svete gosudarstvennoy antikorruptsionnoy politiki. Sbornik materialov mezhdunarodnoy nauchno-prakticheskoy konferentsii, posvyashchennoy 25-letiyu fakul'teta ekonomiki i prava «Obshchestvo, gosudarstvo, pravo, ekonomika: problemy vzaimodeystviya v sovremennom mire». – Oskemen: S.Amandolov atyndagy SKSU baspasy, 2017. – S.3-5.*

Course 13

Module name	*General education module*
Module level (if available)	*GCD EC*
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Fundamentals of ecology and life safety*
Semester(s) when the module is taught	*4*
Person responsible for the module	*Russian – Zhantokov B.Zh.* *Kazakh – Rakhisheva A.D.*
Lecturer	*Russian – Zhantokov B.Zh.* *Kazakh – Rakhisheva A.D.*
Language of instruction	*Russian, Kazakh*
Within the curriculum	*General education course*
Teaching type, contact hours	*2 hours of lectures, 1 hour of seminars a week (30 hours of lectures, 15 hours of seminars)*
Hours	*Lectures 30 / Seminars 15 / SIW 105 (students' independent work)*
ECTS number	*5*
Exam requirements	*Computer testing; tests are developed by the lecturer in*

	advance and are entered into the program in AIS "Platonus". Each test question has several answers, students must choose one correct answer. One minute is allotted for each question, after which the program switches to the next question. Returning to the previous question is impossible. There are 40 questions per student. The test result is known to the student immediately after its completion. A retake is permitted once upon receipt of an FX score.
Pre-requisites	*School Biology Course*
Module objectives / intended learning outcomes	*Formation of an ecological worldview, obtaining deep system knowledge and ideas about the basics of ecology and life safety,* *theoretical and practical knowledge on modern approaches to the rational use of natural resources and environmental protection.* *As a result of studying this discipline, students should:* *know:* *- the main patterns of interaction between nature and society;* *- fundamentals of ecosystem functioning and biosphere development;* *- the impact of harmful and dangerous factors of production and* *the environment on human health;* *- the concept, strategies, problems of sustainable development and practical approaches to their solution at the global, regional and local levels;* *- fundamentals of environmental protection legislation;* *- principles of organization of safe production processes;* *be able to:* *- evaluate the ecological state of the natural environment;* *- conduct an assessment of the man-made impact of production;* *on the environment have the skills to:* *- study of the components of ecosystems and the biosphere as a whole;* *- determining the optimal conditions for the sustainable development of ecological and economic systems;* *- conducting a logical discussion on topics related to the solution of environmental problems;* *- knowledge of standard environmental monitoring techniques*
Content	*Ecology and problems of modern civilization. Autoecology – the ecology of organisms. Demecology – ecology of populations. Synecology-Community Ecology. The biosphere and its stability. Evolution of the biosphere. The concept of living matter. Modern biosphere. Global biogeochemical cycles. Ecological crisis and problems of modern civilization. Strategies, goals and principles of safety and vital activity. Green economy and sustainable development. Natural resource management. Ecoenergy. Global Energy and Environmental Strategy for Sustainable Development XXI century. Water is a strategic resource of the XXI century. Renewable energy sources. Environmental Policy of the*

	Republic of Kazakhstan. The Concept of Sustainable Development of the Republic of Kazakhstan. Protection of the atmosphere. Protection of water resources. Protection of land resources, soil and subsurface resources. Physical pollution of the environment. Protection of flora and fauna.
Requirements for training and exams, exam forms	*Students are required to attend lectures and seminars, being preliminary prepared for lectures and seminars based on teaching aids and basic literature, participation in all types of assessment (current assessment, midterm assessment, final assessment), mandatory participation in intermediate and final certification tests, fulfillment of the teacher's assignments. The active work at the seminar (the ability to lead a discussion, to argue one's position with references to the studied literature, a creative approach to the selection and analysis of texts), the quality of accomplished individual written assignments (glossary, etc.) and creative work (essays) are highly appreciated.* *Exam form – computer-based testing*
Media used	*Projector device, Multimedia board, Microsoft Teams program*
References	*1 Akimova T. A., Haskin V. V. Ecology. Man-Economy-Biota-Environment: Textbook for University students / 2nd ed., reprint. and supplement-M: UNITY, 2009. – 556 p.* *2 Bigaliev A. B. General ecology / Second edition, revised and supplemented. - Almaty: NURPRESS Publishing House, 2011* *3 Denisova V. V. Ecology: A textbook – - M., 2004* *4 Abubakirova K. D., Kozhagulov S. O. Ecology and sustainable development. - Almaty, 2011* *5 Kolumbaeva S. Zh. et al. Ecology and sustainable development. - Almaty, "Kazakh University", 2011* *6 Alimov M. Sh. Ecology and sustainable development. - Almaty, 2012* *7 Korobkin V. I., Peredelsky L. V. Ekologiya: Uchebnik dlya studentov vuzov [Ecology: A textbook for university students]. - Rostov n/A: Phoenix, 2007-575 p.* *8 Tonkopiy M. S., Satbayev G. S., Imkulova N. P., Anisimova N. M. Ecology of zhane turakty damu: okulyk: KR Bilim zhane gylym m-gi. Almaty: ZHSHS RPBC "Dauir", 2011-312 b.* *9 Kolumbaeva S. Zh. Zhalpy ecology. - Almaty: 2006* *10 Maldybekova K. S. Tirshiliktanu-ekologiyalyk bilim beru men* *tarbieleudin negizi. - Almaty, 2003*

Course 14

Module name	*Module of general education*
Module level (if available)	*GCD CC*
Code (if available)	*EDUC 21001*
Subtitle (if available)	-
Course (if available)	*Physical training*
Semester(s) when the module is taught	*1,2,3,4 (first two years of studies)*
Person responsible for the	*Russian – Nazarkina O.N., Solovyeva N.A., Sidorova R.V.*

module	*Kazakh – Alikey A., Tungyshmuratova L.S., Rakhimzhanov D.A.*
Lecturer	*Russian – Nazarkina O.N., Solovyeva N.A., Sidorova R.V.* *Kazakh – Alikey A., Tungyshmuratova L.S., Rakhimzhanov D.A.*
Language of instruction	*Russian, Kazakh*
Within the curriculum	*General education course*
Teaching type, contact hours	*Two practical classes per week - contact hours*
Hours	*Practical classes – 30 hours, SIW – 30 hours (students' independent work)*
ECTS number	*8 (1 semester – 2 ECTS; 2 semester – 2 ECTS; 3 semester – 2 ECTS; 4 semester – 2 ECTS)*
Exam requirements	*Differential credit*
Pre-requisites	*To master the discipline of physical education, knowledge, skills and abilities acquired in the study of the following course are required: anatomy, pedagogy, biology, valeology.*
Module objectives / intended learning outcomes	*The purpose of mastering the course "Physical Education" is the formation of competencies in physical education, aimed at the development of students' personality and the ability to use the means and methods of physical education and sports to maintain and strengthen health, psychophysical training and self-preparation for future life and professional activity.* *To know: methods and means of physical education to ensure full-fledged social and professional activities; the foundations of the theory and methods of physical education and sports, necessary to ensure full-fledged social and professional activity; the influence of health-improving systems of physical education on health promotion, prevention of diseases by means of physical education and sports, methods of monitoring and self-monitoring of assessing physical development, functional state and physical fitness, safety precautions in physical education.* *To be able to: use the means and methods of physical education for professional and personal development, physical self-improvement, formation of a healthy lifestyle; independently select and apply methods and means of physical education for the formation and improvement of basic physical qualities and motor skills; perform physical exercises correctly, calculate the dosage of the exercise and compose exercise complexes for the development of basic physical qualities.* *To possess: the ability to use methods and means of physical education to ensure full-fledged social and professional activity; means and methods of physical education to maintain the proper level of physical fitness and high working capacity.*
Content	*The course "Physical Education" is the most important component of the holistic development of the individual. Being an integral part of the general education and professional training of the student throughout the entire period of study, physical education is an obligatory section in all components of education, the significance of which is manifested through the harmonization of spiritual and physical forces, the*

	formation of such universal values as health, physical and mental well-being, physical perfection. It ensures the continuity of the educational process with the programs of physical education for students of schools and secondary specialized educational institutions.
Requirements for training and exams, exam forms	*The course "Physical Education" is a compulsory educational discipline. Students who have not attended all practical classes are not eligible for differential credit.* *Revision of the topic and the development of the passed materials for each training lesson are required. The degree of mastering the educational practical material is checked by testing students' physical fitness. Testing of students may be conducted without warning.* *Homework and SIW assignments should be completed on time, in case of non-fulfillment, the final grade will be decreased.* *Attendance at all practical classes is compulsory; in case of missing classes, they are worked out at a time specified by the teacher.* *The teacher expects students to:* 1. *not be late for classes;* 2. *if missing a lesson, study the material on their own and start the next lesson;* 3. *strictly observe the deadlines for SIW completion.*
Media used	-
References	*1. Moiseyeva N.A.Gimnastika s metodikoy prepodavaniya : uchebnoye posobiye / N.A. Moiseyeva. - Almaty : New book, 2020. - 152, [1] s. : il., tabl. - Bibliogr.: s. 147. - ISBN 978-601-301-906-2.75.6ya7* *2. Borodikhin V.A.Zdorov'yesberegayushchaya napravlennost' fizicheskogo vospitaniya i sporta shkol'nikov i uchashcheysya molodozhi : [monografiya] / V.A. Borodikhin, ZH.A. Usin, ZH.A. Usina. - Almaty : SSK, 2019. - 302, [1] s.: diagr., tabl. - Bibliogr. v kontse chastey. - ISBN 978-601-327-892-6.75.1* *3. Adaptivnaya fizicheskaya kul'tura i sport : uchebnoye posobiye / U.S. Marchibayeva, Toktarbayev D.G.-S., Ye.S. Stotskaya [i dr.]; avtory-sostaviteli: U.S. Marchibayeva, D.G.-S. Toktarbayev, Ye.S. Stotskaya, S.ZH. Syzdykova, R.V. Sidorova, N.A. Moiseyeva, L.S. Tungyshmuratova; Fond razvitiya sotsial'nykh proyektov "Samruk-Kazyna Trust"; Ministerstvo obrazovaniya i nauki Respubliki Kazakhstan, Yevraziyskiy natsional'nyy universitet im. L.N. Gumileva. - Nur-Sultan: YENU im. L.N. Gumileva, 2019. - 406, [1] s.: il., tabl. - Bibliogr.: s. 383-391. – ISBN 978-601-7596-03-3.75.1ya7* *4. Teoriya i metodika obucheniya bazovym vidam sporta. Legkaya atletika : uchebnik dlya obrazovatel'nykh uchrezhdeniy vysshego professional'nogo obrazovaniya, po napravleniyu podgotovki "Fizicheskaya kul'tura" / G.V. Gretsov, S.Ye. Voynova, A.A. Germanova i dr.; pod redaktsiyey G.V. Gretsova i A.B. Yankovskogo. - 3-ye izd.,*

	ispr. - Moskva: Akademiya, 2016. - 287, [1] c: il., tabl. - (Vyssheye obrazovaniye. Fizicheskaya kul'tura i sport) (Bakalavriat). - Bibliogr.: s. 284-286. - ISBN 978-5-4468-3134-0. *5. Protsyuk O.A. Samostoyatel'naya rabota studentov po fizicheskoy kul'ture v vuzakh : uchebno-metodicheskoye posobiye / O.A. Protsyuk, V.N. Bel'kovich, L.A. Trubitskaya; Ministerstvo obrazovaniya i nauki Respubliki Kazakhstan, Yevraziyskiy natsional'nyy universitet im. L.N. Gumileva, Fakul'tet sotsial'nykh nuk, Kafedra fizicheskogo vospitaniya. - Astana : YENU im. L.N. Gumileva, 2015. - 100 s.: il., tabl. - Bibliogr.: s. 98-99. - ISBN 978-601-301-379-4.75.1ya7* *6. Trubitskaya L.A.Uchebno-metodicheskiy kompleks distsipliny "Fizicheskaya kul'tura" dlya studentov 1 kursa osnovnogo uchebnogo otdeleniya: uchebno-metodicheskoye posobiye / L.A. Trubitskaya, O.A. Protsyuk, V.N. Bel'kovich; Ministerstvo obrazovaniya i nauki RK, Yevraziyskiy natsional'nyy universitet im. L.N. Gumileva, Fakul'tet sotsial'nykh nuk, Kafedra fizicheskogo vospitaniya. - Astana : YENU im. L.N. Gumileva, 2015. - 132 s. - Bibliogr.: s. 128-130. - ISBN 978-601-301-380-0.75.1ya7* *7. Marchibayeva U.S.Fizicheskaya kul'tura: metodicheskiy kurs: uchebno-metodicheskoye posobiye / U.S. Marchibayeva, R.V. Sidorova, N.A. Mendybayeva. - Almaty : Evero, 2015. - 103, [1] c. : il., tabl. - Bibliogr. v kontse razd. - ISBN 978-601-240-788-4.* *Electronic editions:* *1. Marchibayeva U.S. Metodicheskiye osnovy fizicheskoy kul'tury: elektronnyy uchebnik / Mubarakkyzy B.M., Tashkeyev D.S., Kulanova K.K.,Sidorova R.V. Astana: YENU im. L.N. Gumileva, 2015. Svidetel'stvo o gosudarstvennoy registratsii prav na obyekt avtorskogo prava. IS 002796.*

Module 2

Module No & Name	**MATH 22002 Module mathematical competences**
Rationale and objective of the module	**Justification:** Computer scientists need mathematical skills to accurately describe problems and requirements, to transform them into suitable data structures and efficient algorithms. Math skills allow you to solve real problems. Mathematics in artificial intelligence is of fundamental importance. In mathematics, there are major areas underlying most AI methods, such as linear algebra, calculus, and probability statistics. This course aims to introduce the student to the main branches of mathematics and give a complete understanding of the most widely used approaches and methods in the field of AI
	Objectives: On successful completion of this course, students will be able to: - know the basics of linear algebra with elements of analytical geometry; - uses mathematical methods to solve typical professional problems; - develops mathematical models of processes with simple systems in natural sciences; - selects the optimal numerical methods for solving mathematical and technical problems; - analyzes the obtained results.
Total ECTS of the module	**18**

Courses of the Module

Course Number	**Course Name**	**ECTS**
Mat 1201	Mathematics	8
PTMS 1204	Probability theory and mathematical statistics	5
DM 2206	Discrete mathematics	5

Course 1 of the Module 2

Module designation	*Module mathematical competences*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22002*
Subtitle, if applicable	
Course, if applicable	*Mat 1201 Mathematics*
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Bayarystanov A., Professor, Candidate of Physical and Mathematical Sciences, Department of Higher Mathematics*
Lecturer	*Bayarystanov A., Professor, Candidate of Physical and Mathematical Sciences, Department of Higher Mathematics*
Language	*Kazakh/Russian*
Relation to curriculum	*University course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 75 hrs.:* *-Lecture:30* *-Seminars :45* *Class size:25 students*

Workload	*Total workload is 240 hours per semester which consists of 120 minutes lectures, 180 minutes seminar session, and 660 minutes self-study per week for 15 weeks.*
Credit points	*8*
Requirements according to the examination regulations	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	*This module is offered to students of technical specialties of the university in order to master the basic knowledge of mathematics. It is aimed at helping students to develop skills in using mathematical apparatus to solve the problems of everyday practice* *Students completing the module should be able:* - *fundamentals of linear algebra with elements of analytical geometry; must know the sections of mathematical analysis provided.* - *be able to use mathematical methods to solve typical professional problems.* - *to learn to create mathematical models of processes with simple systems in science.* - *to learn to choose the optimal numerical methods for solving mathematical and technical problems.* - *to learn to process the obtained results.*
Content	*Determinants and matrices and methods applied to them, methods for solving systems of linear equations, vectors and operations applied to them, analytical geometry in planes and spac, function, derivative of a function, higher order derivatives and differentials, research of functions, indefinite integrals, their properties, definite integrals and their applications.*
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a control work within the course tems.* *Final written examination (90 min.) have five tasks on exam tickets. On the written exam students are demonstrating their understanding of the course by completing the tasks.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*1. Bayarystanov AO Higher Mathematics - I: textbook, Almaty, "Nur Print", 2018.* *2. Bayarystanov AO Higher Mathematics - II: textbook, Almaty, "Nur Print", 2018.* *3. Bayarystanov AO, Idrisov Zh.M. Theory and problems of linear algebra and analytical geometry: textbook, Almaty, "Nur Print", 2019.* *4. Bayarystanov AO, Matin DT Theory and problems of boundaries and works: textbook, Almaty, "Nur Print", 2019.* *5. Bayarystanov AO, Abylayeva AM, Aldibayeva LT Theory and problems of indefinite and definite integrals: textbook, Almaty, "Almanakh", 2020.* *6. Minorsky VP Collection of tasks in higher mathematics: textbook, Moscow, 2018.* *7. Danko P.E. and others. Higher Mathematics in Exercises and Tasks Part I: Textbook, Moscow, 2018.*

Course 2 of the Module 2

Module designation	*Module mathematical competences*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22002*
Subtitle, if applicable	
Course, if applicable	*PTMS 1204 Probability theory and mathematical statistics*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Bayarystanov A., Professor, Candidate of Physical and Mathematical Sciences, Department of Higher Mathematics*
Lecturer	*Bayarystanov A., Professor, Candidate of Physical and Mathematical Sciences, Department of Higher Mathematics*
Language	*Kazakh/Russian*
Relation to curriculum	*University course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs.:* *-Lecture:15* *-Seminars :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*Mat 1201 Mathematics*

Module objectives/intended learning outcomes	*In this course, students of technical specialties of the university are introduced to the theory of probability and the application of mathematical statistics in science and industry, modern methods of statistics.* *The basic elements of combinatorics, the classical definition of probability, the basic theorems of probability, full probability, Bayesian, Bernoulli formulas, discrete and continuous random variables, limit theorems in Bernoulli's scheme, important laws of distribution, basic concepts of mathematical statistics are considered.* *Students completing the module should:* *- know the most important concepts, methodology and methods for calculating the main indicators of probability distributions, methods for calculating the parameters of random processes;* *- be able to independently conduct statistical research at each of its stages; model and analyze queuing systems;* *- have the skills to build and analyze mathematical models that take into account random factors, be able to apply analysis methods to evaluate the model parameters, to solve forecasting problems.*
Content	*Elements of combinatorics. Random events. Classical and statistical definition of probability. Theorems of probability theory. Total probability and Bayes formula. Repeated independent tests. Bernoulli's formula. Laplace's local and integral theorem. Random variables. Discrete random variables and the law of their distribution. The law of large numbers. Elements of mathematical statistics. Elements of correlation theory. Statistical verification of statistical forecasts. Basic concepts. Comparisons. Modeling of random variables. Monte Carlo method. Calculation of the definite integral by the Monte Carlo method*
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final test.* *Two Midterms are completed by a control work within the course tems.* *Final test (90 min.) have five tasks on exam tickets. On the written exam students are demonstrating their understanding of the course by completing the tasks.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*1. Bayarystanov AO Higher Mathematics - II: textbook, Almaty, "Light Print", 2018.* *2. Minorsky VP Collection of tasks in higher mathematics: textbook, Moscow, 2018.* *3. Gmurman VE Guide to solving the problem on the theory of probabilities and mathematical statistics: textbook, Moscow, 2016.* *4. Danko P.E. and others. Higher Mathematics in Exercises and Tasks Part II: Textbook, Moscow, 2018.* *5. Akanbay N. Probability theory and mathematical statistics Parts I and II: textbook, Almaty, "Kazakh University", 2017.* *6. Ryabushko AP Individual tasks in higher mathematics Part IV: textbook, Minsk, "Higher School", 2016.*

Course 3 of the Module 2

Module designation	*Module mathematical competences*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22002*
Subtitle, if applicable	
Courses, if applicable	*DM 2206 Discrete mathematics*
Semester(s) in which the module is taught	Semester 3
Person responsible for the module	Konyrkhanova A, PhD, Associate Professor
Lecturer	Konyrkhanova A, PhD, Associate Professor
Language	Kazakh, Russian
Relation to curriculum	*University course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs.:* *-Lecture:15* *-Seminars :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulation	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*Mat 1201 Mathematics*

Module objectives/intended learning outcomes	The purpose of teaching the discipline "Discrete Mathematics" is to form students professional competencies related to the ability to use the basic laws of mathematical logic in professional activities and the use of methods of the mathematical apparatus of discrete mathematics to solve problems of the subject area. *Students completing the module should:* - to have the skills to use the appropriate mathematical apparatus of discrete mathematics in solving professional problems; - use simple versions of evidence to substantiate or refute various conclusions or hypotheses, to analyze the logical structure of reasoning, to study scientific problems; - mastering the skills of solving basic problems of the theory of discrete mathematics; - application of elements of discrete mathematics for new scientific and professional education with the use of modern educational and information technologies; - ability to solve scientific or industrial problems at a high level using elements of discrete mathematics.
Content	Sets. Methods applied to them and their properties. Basic rules of combinatorics. Input-output formulas. Selections and their types. Placements, substitutions and dials are repetitive, non-repetitive. Conclusions and methods applied to them. Reality table. Formulas. Classification of formulas of algebra of concepts. Boolean functions. Superposition of Boolean functions. Normal forms. Disjunctive and normal conjunctive forms. Perfect normal forms. Mature disjunctive and conjunctive normal forms. Zhegalkin polynomial. Algorithm for creating Zhegalkin polynomials. Closing methods. Basic closed classes: To, T1, S, M, L. Complete system of operations. The concept of a graph. Methods and classifications of graphs. Matrix representation of graphs. Graphs with weights. Weight matrix. Incident matrices. Routes and overpasses. Trees. Algorithms for tree paths. Algorithm for finding the shortest path. Network flows and two-way graphs. Colouring graphs.
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium within the course.* *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 to solve tasks within the course*
Media employed	Syllabus, educational guide, computer, projector, interactive whiteboard

Reading list	1. Gerasimov A.S. Course of mathematical logic and theory of computability. S. P. 2011. (in russian) 2. Dzhumadildaev A.S. Elements of discrete mathematics. Training manual. Part 1. Almaty, 2004. (in russian) 3. Igoshin V.I. Problems and exercises in mathematical logic and the theory of algorithms. Moscow, 2007 (in russian) 4. Shaporev S.D. Discrete mathematics, a course of lectures and practical classes. S. P., 2006. (in russian) 5. Zhetpisov, K. Mathematical logic and discrete Mathematics, 2011 (in kazakh) 6. Novikov. F.A. Discrete mathematics for bachelors and Masters, 2013 (in russian) 7. Tusupov DA Basics of discrete mathematics. Taraz, 2010 (in kazakh)

Module 3

Module № & Name	**COMS 22003 Programming**
Rationale and objective of the module	**Justification:** Artificial intelligence is a high-tech field that requires the highest level of knowledge. To become an AI developer, you need to know programming languages. Programming languages are needed in order to transform an oral or written task into a clear sequence of actions.
	Objectives: On successful completion of this course, students will be able to: This module. allows you to form the student's competence in the field of algorithmic computing processes and programming. It aims to provide students with sufficient knowledge for employment or study for a master's degree. Students completing the module should: - to demonstrate deep knowledge of the principles of development, analysis and implementation of algorithms for processing basic data structures; - to be able to create algorithms for processing knowledge for various models of knowledge representation, use the capabilities of software architecture and software implementation of intelligent systems, to work with application programs and tools for solving problems in intelligent systems; - describe problems and requirements precisely in order to convert them into suitable data structures and efficient algorithms; - to present their ideas and proposed solutions convincingly in writing or orally.
Total ECTS of the module	**20**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
PLC 1202	Programming in language C++	5
PP 1203	Programming in Python	5
ADS 1207	Algorithms and data structures	5
OOPJ 3210	Object-oriented programming on Java	5

Course 1 of the Module 3

Module designation	*Programming*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 22003*
Subtitle, if applicable	
Course, if applicable	*PLC 1202 Programming in language C++*
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Turebayeva R.D.*
Lecturer	*Turebayeva R.D.*
Language	*Kazakh/Russian*

Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *- Lecture:15* *- Practical lesson – 15,* *- Laboratory :15* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 60 minutes practical lesson, 60 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	*As a result of studying the discipline, the student must:* *- know the history of the creation of programming languages, the composition and functions of programming systems;* *- be able to develop programs using a programming environment with a text and graphical interface, to implement the basic principles of structured programming; competently use the basic data types, functions and classes of the standard library, components of the programming environment, the ability to handle exceptions; choose methods for solving a problem, create or select algorithms, implement algorithms in a programming language* *- have the skills to use the capabilities of the integrated programming environment, debug and find errors, as well as professional tools for solving applied programming problems in the domain.*
Content	*Discipline is designed to study standard data types, constants, variables, operations, one-dimensional and multidimensional arrays, pointers. Allows you to develop software in C ++ programming language.* *Concepts of programming technology Introduction to C / C ++. Preprocessor directives. Classification of operators of an algorithmic language. Assignment operator. Control operators in C ++. Conditional operator. Selection operator. Cycle operators. One-dimensional and multi-dimensional arrays. Strings. Functions. Text files. Binary files. Structures. Dynamic structures in C ++. The basics of object- oriented programming, memory organization and addressing, development of programs using pointers, peculiarities of C ++ programming.*

Study and examination requirements and forms of examination	*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 Testing.* *Two Midterms are completed by a colloquium (a discussion of the course content).* *When compiling tests, the following are used:* *- selective method of entering answers (the student is invited to choose from one to 3 correct answers from 5-8 alternative answers for each test task),* *- a method for indicating the order of entering a response,* *- an effective method of entering answers (the tested one solves a numerical problem).* *Testing time is limited to 1.5 minutes per question. Each student is given a test of 40 questions of varying degrees of difficulty.*
Media employed	*e-Learning MOODLE, Computer software packages on the programming language C++, methodical development labs, individual cards, White-board, Laptop, LCD Projector*
Reading list	*1. Fedorenko Yu.P. Algorithms and programs in C ++ Builder. DMK Press. 2019.-544 p.* *2. T. Cormen, C. Leiserson, R. Rivest, K. Stein. Algorithms: construction and analysis. 3rd ed. Per. From English. - M .: Williams, 2014.* *3. S. Lippmann, J. Lajoye, B. Mu. C ++ programming language. Basic course. 5th ed. - M .: Williams, 2014.* *4. Ogneva M.V., Kudrina E.V. - Programming in the C ++ language: Practical course. Textbook for undergraduate and specialty studies - M.: Yurayt Publishing House - 2019 – 335 p. - ISBN: 978-5-534-05123-0*

Course 2 of the Module 3

Module designation	*Programming*
Module level, if applicable	*Bachelor*
Code, if applicable	COMS 22003
Subtitle, if applicable	
Course, if applicable	*PP 1203 Programming in Python*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Turebayeva R.D.*
Lecturer	*Turebayeva R.D.*
Language	*Kazakh/Russian*
Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *- Practical lesson – 15,* *-Laboratory :15* *Class size:25 students*

Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 60 minutes practical lesson, 60 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	*The purpose of this course of study problem-solving methods and algorithm development. Includes procedural and data abstractions, program design, debugging, testing, and documentation. Covers data types, control structures, functions, parameter passing, library functions, arrays, inheritance and object oriented design. The course discusses the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques. Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications.* *Students completing the module should:* *- Understand basic principles of computers* *- Understand basics of binary computation* *- Understand the programming basics (operations, control structures, data types, etc.)* *- Be able Readily use the Python programming language* *- Understand the object-oriented program design and development.*
Content	*Conceptual introduction: topics in computer science, algorithms; modern computer systems: hardware architecture, data representation in computers, software and operating system; installing Python; basic syntax, interactive shell, editing, saving, and running a script. Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file. Program structure and design. Recursive functions. Modularization and Classes. Standard modules. Packages. Defining Classes. Defining functions. Functions and arguments (signature). Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects. OOP, continued: inheritance, polymorphism, operator overloading (_eq, _str, etc); abstract classes; exception handling, try block. Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames*
Study and examination requirements and forms of examination	*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). *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.*
Media employed	*e-Learning MOODLE, Computer software packages on the programming language Python, methodical development labs, individual cards, White-board, Laptop, LCD Projector*
Reading list	1. Zlatopolsky DM Basics of programming in the Python language. - M.: DMK Press, 2017. - 284 p. 2. Лутц М. Programming in Python, Volume I, 4th Edition. - Per. SPb.: Simvol-Plus, 2011. - 992 p. 3. Лутц М. Programming in Python, Volume II, 4th Edition. - Per. SPb.: Simvol-Plus, 2011. - 992 p. 4. Gaddis T. Let's start programming in Python. - 4th ed.: Per. SPb .: BHV-Petersburg, 2019. - 768 p.

Course 3 of the Module 3

Module designation	*Programming*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 22003*
Subtitle, if applicable	
Course, if applicable	*ADS 1207 Algorithms and data structures*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Turebayeva R.D.*
Lecturer	*Turebayeva R.D.*
Language	*Kazakh/Russian*
Relation to curriculum	*Basic course, university component 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory: 30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 100 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Programming in language C++*
Module objectives/intended learning outcomes	*The purpose of mastering the discipline is to develop students' theoretical knowledge and practical skills in the field of the theory of algorithms, modern data structures and their implementation in a high-level programming language for*

	building mathematical models of discrete structures and software development. *Students completing the module should:* *- Knows elementary and specialized data structures used in various algorithms; main classes of algorithms: "divide and conquer", "greedy algorithms", algorithms for dynamic programming;* *- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.* *- Knows how to estimate the complexity of algorithms on average and in the worst case; owns methods of developing effective algorithms* *- Able to choose the optimal algorithms and data structures, depending on specific constraints on the solution of the problem and apply approximate algorithms in cases where an effective exact solution is impossible.* *- Skills in the implementation of algorithms and data structures in procedural programming languages.*
Content	*The concept of algorithms. Formal properties of algorithms. The complexity of the algorithm. Data structure concept. Classification of data structures. Operations on data structures. Dynamic data structures (arrays, lists, stacks, queues). Trees. Methods for storing trees in computer memory Binary search trees. Balanced search trees. Balance invariants support. Hash functions. Collision resolution methods: chaining method, open addressing. Priority queue. Binary heap. Graphs. Graph operations. Sequence processing algorithms. Basic sorting algorithms. Efficient sorting algorithms. Basic search algorithms. Recursive algorithms. Depth-first search and breadth-first search and its complexity. Application of data compression, classification of algorithms. Dynamic programming. "Greedy" algorithms and optimization problems.*
Study and examination requirements and forms of examination	*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).* *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.*
Media employed	*e-Learning MOODLE, methodical development labs, individual cards, White-board, Laptop, LCD Projector*

Reading list	1. Fedorenko Yu.P. Algorithms and programs in C ++ Builder. DMK Press. 2019.-544 p. 2. T. Cormen, C. Leiserson, R. Rivest, K. Stein. Algorithms: construction and analysis. 3rd ed. Per. From English. - M .: Williams, 2014. 3.S. Lippmann, J. Lajoye, B. Mu. C ++ programming language. Basic course. 5th ed. - M .: Williams, 2014. 4. Algorithms and data structures: Textbook / Belov VV, Chistyakova VI. - M.: KURS, Research Center INFRA-M, 2016 .-- 240 p. 5. Structures and algorithms for data processing Author: Pavlov LA, Pervova NV Publisher: SPb .: Lan: 2020, 256 p. 6. Wirth N. Algorithms and data structures, DMK Press,, 2010.

Course 4 of the Module 3

Module designation	*Programming*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 22003*
Subtitle, if applicable	
Course, if applicable	*OOPJ 3210 Object-oriented programming on Java*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Turebayeva R.D. .*
Lecturer	*Omarbekova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory: 30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 100 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Programming in language C++, Algorithms and data structures*
Module objectives/intended learning outcomes	*Discipline aliows you to get the skills to solve practical problems using a high-level pɔogramming language Java, masterirrg the technology of object-oriented programnring, using various structures and algorithms for data processing, programming methods and implementing a graphical user interface, use the basic techniques of object-oriented programming; create multi-threaded applications and GUI-interfbces, use JDBC technology to create a connection to tlre database.* *Students completing the module should:*

	- know the principles of object-oriented programming; Java architecture *- be able to write, compile and execute Java programs, use inheritance and polymorphism as implemented in Java, use the Java exception handling mechanism* *- have the skills to use Java API.*
Content	*This course introduces object-oriented programming using the Java programming language. Students will learn how to program in Java and use some of its most important APIs. Special importance will be assigned to the object-oriented nature of Java and its use of polymorphism. Hands-on labs and exercises will enable students toward becoming highly skilled Java Application developers.*
Study and examination requirements and forms of examination	*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).* *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.*
Media employed	*e-Learning MOODLE, Computer software packages on the programming language Java, methodical development labs, individual cards, White-board, Laptop, LCD Projector*
Reading list	*1. Danny Poo, Derek Beng Kee Kiong, Swarnalatha Ashok. Object-Oriented Programming and Java, Publisher: Springer-Verlag Berlin, Heidelberg ISBN:978-1-84628-962-0, 2007* *2. Rick Halterman. Object Oriented Programming in Java http://computing.southern.edu/halterman/OOPJ/* *3. R. Morelli and R. Walde. Java, Java, Java: Object-Oriented Problem Solving* *4. Prentice Hall, 3 edition (January 1, 2006), eBook (Updated, February 5, 2012)*

Module 4

Module No & Name	**COMS 22006 Artificial intelligence programming**
Rationale and objective of the module	**Justification:** Computer scientists should be able to recognize known problems in the context of an application and be familiar with the associated decision patterns. To do this, they need to know and define programming languages for creating artificial intelligence systems and data processing.
	Objectives: On successful completion of this course, students will be able to: - ability to recognize known issues in the application context - be familiar with the relevant decision-making patterns. - be able to develop software systems that fully meet the requirements of various classes of machine learning models. - use the capabilities of software architecture and software implementation of intelligent systems, - to work with application programs and tolIs for solving problems in intelligent system
Total ECTS of the module	**26**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
FLPAl 22l5	Functional and logic programming for AI	5
PR 22l5	Programming in R	5

Course 1 of the Module 4

Module designation	*Artificial intelligence programming*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 22006*
Subtitle, if applicable	
Course, if applicable	FLPAl 22l5 Functional and logic programming for AI
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Razakhova B*
Lecturer	*Razakhova B*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 100 minutes laboratory session, and 350 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Math 1201 Mathematics*

Module objectives/intended learning outcomes	*This module provides an introduction to the theory and implementation of neural networks, both biological and artificial. It aims to give students sufficient knowledge to enable employment or postgraduate study involving neural networks.* *Students completing the module should be able:* - *know methods for solving problems using logical and functional programming languages and their structure;* - *able to distinguish between different ways of solving logical programming problems, the use of program development using declarative programming languages;* - *analyze the possibilities, advantages and disadvantages of using different programming languages;*
Content	*Base of the concepts of declarative language, transition from formal logic to logical programming, the first period of development of formal logic, logic of clauses and predicates, Horn disjuncts, introduction to the logic programming language Prolog, input and output predicates, return mechanism, recursion and lists, trees, string,. Natural language processing, predicates for string processing strings and files, dynamic database, system of functional programming, lists, definition of functions, list processing functions.*
Study and examination requirements and forms of examination	*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 testing.* *Two Midterms are completed by a colloquium (a discussion of the course content).* *When compiling tests, the following are used:* *- selective method of entering answers (the student is invited to choose from one to 3 correct answers from 5-8 alternative answers for each test task),* *- a method for indicating the order of entering a response,* *- an effective method of entering answers (the tested one solves a numerical problem).* *Testing time is limited to 1.5 minutes per question. Each student is given a test of 40 questions of varying degrees of difficulty.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*8. Ivanov D.A. Functional programming and more. - M. 2016* *9. Graham P. ANSI Common LISP. -M. Symbol-Plus, 2012* *10. Tsukanova N.I., Dmitrieva T.A. Theory and practice of logical programming language Visual Prolog 7. study guide. - M. 2013* *11. Shreiner P.A. Fundamentals of programmirony in the Prolog language. - M. 2005* *12. Adamenko A.I., Kuchukov A.M. Logic programming and Visual Prolog. - SPb .: BHV– Petersburg, 2003.– 992 p*

Course2 of the Module 4

Module designation	*Artificial intelligence programming*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 22006*
Subtitle, if applicable	
Course, if applicable	PR 22l5 Programming in R
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Razakhova B*
Lecturer	*Turebayeva R*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 100 minutes laboratory session, and 350 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*ICT 1105 - Information and communication technologies*
Module objectives/intended learning outcomes	*Learning outcomes* Must know the basic objects used in the R language and how to work with them; ways of input and output of data from / to files of various formats; a set of tasks that can be solved using the R language; ways to update and expand the capabilities of free software "R". Must be able to use the vector version of object-oriented programming; Must be able to use R to solve the main problems of statistical data processing; connect program libraries to solve a wide class of statistical problems. Must be proficient in setting the tasks of statistical processing; searching the Internet for updates and language extensions, connecting them to work. Must demonstrate the ability and willingness to: use the statistical R language to solve statistical and processing problems data to improve language skills using reference and other official materials.

Content	*Introduction to R language and the development environment* course covers practical issues in statistical computing. *Data types in R. Understanding the R type system. Vectors, lists, matrices and, arrays. Data types in R. Formulas and functions in R. Object attributes. Utility and Special Composite Objects. Expressions and commands in R. R Symbols, Constants, and Operations. Conditional statements (if ... else)* *For, while, and repeat loops. Interoperability with other programming languages. Writing Functions in R. Function Arguments and Argument Mapping. Object scope Environment. Mathematical calculations and modeling in R. Object Oriented Programming, Object class, Inheritance in R. Object Oriented Programming, management of objects. Build graphics. Graphics settings. Throwing exceptions / errors in R Catching and Handling Exceptions / Errors. Configuring Exception / Error Handling. Performance improvements: speed and memory. Useful functions from the core R library. Working with date and time Text / line processing Regular Expressions*
Study and examination requirements and forms of examination	*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 within the course.* *Final Written Exam (90 min.) Consists of short answer questions covering about half of the points, followed by one lengthy problem-solving practice. In the written exam, students demonstrate their understanding of the course content by completing assignments. The following aspects of teaching programming or developing an intelligent system are assessed: development of algorithms, description of algorithms and software implementation in the R language, editing and debugging of code.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Robert Kabakov. R in Action. - DMK-Press, 2014 .-- 588 p. - ISBN 978-5-947060-077-1.* *2. Hadley Wickham, Garrett Growmund. R for Data Science: Visualize, Model, Transform, Tidy, and Import Data. - Williams, 2017 .-- 592 p. - ISBN 978-5-9909446-8-8, 978-1-491-91039-9.* *3. Norman Matloff [en]. The Art of R Programming: A Tour of Statistical Software Design .. - Peter, 2019 .-- 416 p. - ISBN 978-5-4461-1101-5.* *4. Mastitsky S.E., Shitikov V.K. Statistical analysis and data visualization using R. - M .: DMK Press, 2015 .-- 496 p.*

Module 5

Module № & Name	**COMS 42013 Programming technology**	
Rationale and objective of the module	**Justification:** In order for the computer to "think over" the task at hand, the intelligent system must consist of an expanding fact base, a knowledge base, a problem solver, and a comfortable user interface..	
	Objectives: On successful completion of this course, students will be able to use knowledge formalization technology and to create knowledge bases of various subject areas in full compliance with applicable standards, manage and promote projects. In the field of databases and knowledge base, it is necessary to master not only the theoretical foundations, but also the design process of the database and knowledge bases up to the operation of the application system supported by the database, as well as data analysis and the basics of machine learning.	
Total ECTS of the module	**16**	
Courses of the Module		
Course Number	**Course Name**	**ECTS**
KEKBD 3218	Knowledge Engineering and Knowledge Base Design	5
SSES 4306	Software and Systems Engineering Standards	6
PM 4220	Project management	5

Course 1 of the Module 5

Module designation	*Programming technology*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42013*
Subtitle, if applicable	
Course, if applicable	*KEKBD 3218 Knowledge Engineering and Knowledge Base Design*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Niyazova R*
Lecturer	*Ergesh B*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *- Lecture:15* *- Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 100 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the	*To attend at least 75% of lecture and laboratory study.*

examination regulations	
Recommended prerequisites	*Knowledge representation models and languages*
Module objectives/intended learning outcomes	*The discipline allows you to gain knowledge about ontologies and thesauruses and use practical skills in designing and applying ontologies in the development of intelligent software components, independently develop ontologies for a certain subject area and create a knowledge base of the subject area based on the ontology, solve problems oi automatic text processing and intelligent search.* *As a result of studying the discipline, the student must:* *- know the methods of formalization of information and knowledge;* *- own the basic methods, methods and means of knowledge extraction and obtaining a conclusion based on knowledge;* *- is able to understand best practices in knowledge design, and knows how to design, implement and apply these techniques in the development of intelligent applications, services or systems.*
Content	*Modeling knowledge about subject areas as the basis of intelligent automated systems. Features of knowledge. Knowledge representation problems. Knowledge Representation Models: Production Model, Formal-Logical Models, Semantic Networks, Frame Model. Fuzzy knowledge representation. Use of fuzzy logic in knowledge-based systems. Ontological approach and its use. Classification of ontologies. Visual representation of knowledge. Development of knowledge-based systems. Theoretical aspects of knowledge engineering. Engineering knowledge technology. New trends and applied aspects of knowledge engineering. Software toolkit for the development of knowledge-based systems.*
Study and examination requirements and forms of examination	*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)* *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. 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.
Media employed	*e-Learning MOODLE, Computer software packages on the programming language C++, methodical development labs, individual cards, White-board, Laptop, LCD Projector*
Reading list	*1. Zagorulko, Yu. A., Zagorulko, GB Engineering knowledge: textbook. allowance. Novosibirsk: RITs NSU, 2016 .-- 93 p. ISBN 978-5-4437-0452-4* *2. Gavrilova TA, Khoroshevsky VF Knowledge bases of intelligent systems. Textbook. SPb. : Peter, 2001, 384 p.* *3. Soviets, B. Ya. Intelligent systems and technologies. M .: Academia, 2015 .-- 624 p.* *4. Tsukanova NI Ontological model of knowledge representation and organization.* *Textbook for universities. - M .: Hot line - Telecom, 2015 .-- 272 p.: Ill. ISBN 978-5-9912-0454-5*

Course 2 of the Module 5

Module designation	*Programming technology*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42013*
Subtitle, if applicable	
Course, if applicable	*SSES 4306 Software and Systems Engineering Standards*
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Niyazova R.S*
Lecturer	*Niyazova R.S.*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university component 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 60 hrs:* *- Lecture:30* *- Practical lesson – 30* *Class size:25 students*
Workload	*Total workload is 180 hours per semester which consists of 100 minutes lectures, 100 minutes practical lesson, and 480 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	
Module objectives/intended learning	*The purpose of the discipline is to analyze the current*

outcomes	*state of the system of international standards of educational programs in the field of information technology.* *As a result of studying the discipline, the student must:* *- know software quality standards, methods and tools for developing software documentation, features of software systems standards;* *- are able to assess the quality of software in accordance with the studied methods and models;* *- have the skills:* *• use of criteria for assessing the quality and reliability of the information system; application of the testing methodology for the developed AI applications;* *• the use of new information technologies in the practical implementation of the requirements of domestic and international standards.*
Content	*Software life cycle processes in international standards. Guidance on the application. Software life cycle processes. Software and systems engineering — Requirements for assessors and testers of user documentation. Standard for Software Product Evaluation. Standard Quality characteristics and guidance for their application. Assessment of software development. Standard Software packages. Quality and Testing Requirements. Standard Software engineering -- Systems and software Quality Requirements and Evaluation*
Study and examination requirements and forms of examination	*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).* *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.*
Media employed	*e-Learning MOODLE, Computer software packages on the programming language C++, methodical development labs, individual cards, White-board, Laptop, LCD Projector*
Reading list	*1. Martyushev S.M., Software development technologies. Laboratory workshop: method. instructions / S. M. Martyushev, N. N. Lapina. - Ukhta: USTU, 2013 .-- 64 p.*

	2. Blagodatskikh V.A., Volnin V.A., Poskakalov K.F. Standardization of software development / Ed. O.S. Razumova. - M: Finance and Statistics, 2003. –286 p., ISBN 5-279-02657-3. *3.V. Lipaev Software quality assurance. Methods and standards. - M: SINTEG, 2001 - 30 p., ISBN 5-89638-044-5.*

Course 3 of the Module 5

Module designation	*Programming technology*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42013*
Subtitle, if applicable	*PM 4220 Project management*
Course, if applicable	
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Niyazova R*
Lecturer	*Niyazova R*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *- Lecture:15* *- Practical lesson – 15,* *- Laboratory :15* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 50 minutes lectures, 50 minutes practical lesson, 50 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	*The discipline covers project management tools and techniqucs such as project selection techniques, work breakdown structures, network diagrams, critical path analysis, critical chain planning, cost estimation, eaɔned value management, motivation theory, and team building. It discusses the factors contributing to the growing importance of AI, describes how to prepare for disruption, hone skiIls, usc AI to effectively initiate, plan, execute, monitor and control, close and irrtegrate projects.* *As a result of studying the discipline, the student must:* *- know the content, stages, work of engineering projects;* *- know the basic and instructive regulations governing project activities;* *- have the skills to manage the application development process using tools.*

Content	*What is project management. Project life cycle. Project life cycles in IT. Project environment. Project and organizational structures of the enterprise. An Introduction to PMBOK. The main groups of project management processes. Major areas of knowledge in project management. Project Integration Management. Project domain management. Time management in a project. Project cost management. Quality Management in a Project. Human Resource Management in a Project. Project Communications Management. Project Risk Management. Project procurement management. Project Stakeholder Management*
Study and examination requirements and forms of examination	*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).* *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. Project management skills are assessed.*
Media employed	*e-Learning MOODLE, Interactive whiteboard, projector, electronic textbook, electronic lectures, exercises for practical / laboratory classes, additional material, White-board, Laptop, LCD Projector*
Reading list	*1. Leach, L. On Time and On Budget: Critical Chain Project Management [Electronic resource] / Lawrence Leach; Per. from English - M .: Alpina Publishers, 2014 .-- 354 p.* *2. Blank, S. Four Steps to Insight: Strategies for Building Successful Startups [Electronic resource] / Steve Blank; Per. from English ? M .: Alpina Publisher, 2014.? 368 p/* *3. Project Management: Textbook / M.V. Romanov. - M .: ID FORUM: NITs INFRA-M, 2014 .-- 256 p.* *4. Project Management: Textbook / Yu.I. Popov, O.V. Yakovenko; Institute of Economics and finance "Synergy". - M .: NITs INFRA-M, 2013 .-- 208 p.* *5. Information technology project management: Textbook / N.M. Svetlov, G.N. Svetlova. - 2nd ed., Rev. and add. - M .: NITs INFRA-M, 2015 .-- 232 p.* *6. Bukharaev, N.R. Problems of managing innovative projects in the field of IT technologies. Introduction to flexible project management: lecture notes [Electronic resource] /N.R.Bukharaev. - Kazan: [b.i.], 2014. -106 p*

Module 6

Module No & Name	**COMS 33007 Machine learning**	
Rationale and objective of the module	**Justification:** Machine learning is a field of scientific study concerned with algorithmic techniques that enable machines to learn performance on a given task via the discovery of patterns or regularities in exemplary data. Consequently, its methods commonly draw upon a statistical basis in conjunction with the computational capabilities of modern computing hardware. This course aims to acquaint the student with the main branches of machine learning and provide a thorough introduction to the most widely used approaches and methods in this field	
	Objectives: On successful completion of this course, students will be able to: - know different machine learning model classes. - comprehend the difference between supervised, unsupervised, and reinforcement learning methods. - understand common machine learning models. - analyze trade-offs in the application of different models. - appropriately choose machine learning models according to a given task	
Total ECTS of the module	**26**	
Courses of the Module		
Course Number	**Course Name**	**ECTS**
NN 2301	Neural network	5
ML3302	Machine learning	5
DL 4304	Deep learning	6

Course 1 of the Module 6

Module designation	*Machine learning*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 33007*
Subtitle, if applicable	*NA*
Course, if applicable	*NN 2301 Neural network*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Mukanova A*
Lecturer	*Sharipbay A*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*

Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Math 1201 Mathematics, PP 1203 Programming in Python*
Module objectives/intended learning outcomes	*This module provides an introduction to the theory and implementation of neural networks, both biological and artificial. It aims to give students sufficient knowledge to enable employment or postgraduate study involving neural networks.* *Students completing the module should be able:* *to demonstrate an understanding of the principles of Neural Networks and a knowledge of their main areas of application;* *-the ability to design, implement and analyse the behaviour of simple neural networks.* *- critically evaluate model performance and interpret results;* *-write reports in which results are assessed and summarized in relation to aims, methods and available data*
Content	*General information about neural networks, model of an artificial neuron, classification of types and architectures of artificial neural networks and their applications, the learning algorithms of neural networks, basic applied problems are solved using neural networks, methods and techniques the installation of software and hardware for modeling and application of artificial neural networks, principles of associative memory, theory of adaptive resonance.*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	13. *Simon O. Haykin, Neural Networks and Learning Machines, 3rd Edition – Pearson, 2009.- 934 p.* 14. *Bishop, Ch. Neural Networks For Pattern Recognition.- 2005.* 15. *Menshawy A. Deep Learning By Example: A hands-on guide to implementing advanced machine learning algorithms and neural networks. – Packt Publishing Ltd, 2018.* 16. *Levine D. S. Introduction to neural and cognitive modeling. – Routledge, 2018* 17. *Alanis A. Y., Arana-Daniel N., Lopez-Franco C. (ed.). Artificial neural networks for engineering applications. – Academic Press, 2019.*

Course2 of the Module 6

Module designation	*Machine learning*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 33007*
Subtitle, if applicable	*NA*
Course, if applicable	*ML 3302 – Machine learning*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Mukanova A*
Lecturer	*Mukanova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*NN 2301- Neural network*

Module objectives/intended learning outcomes	*This module is devoted to the formation of an idea of the place and role of machine learning in solving actual practical problems, the study of the terminology that has developed in this field, and the development of systematic scientific approaches in machine learning* *Students completing the module should be able:* *-be able to analyze and list the differences between the types of machine learning* *-identify examples of classification problems, including available input characteristics and outputs that need to be predicted;* *-explain the difference between inductive and deductive learning.* *-describe over-fitting in the context of the problem* *-apply a simple statistical learning algorithm, such as a naive Bayesian classifier, to a classification problem and measure the accuracy of the classifier.*
Content	*General information about Machine Learning, Supervised Learning,Unsupervised Learning, Linear Regression with One Variable, Model Representation. Gradient Descent, Linear Algebra Review. Matrices and Vectors. Matrix Vector Multiplication. Matrix Multiplication Properties, Unsupervised Learning. K-Means Algorithm. Random Initialization,Dimensionality Reduction, Data Compression. Visualization. Principal Component Analysis Algorithm, Anomaly Detection. Gaussian Distribution. Developing and Evaluating an Anomaly Detection System. Multivariate Gaussian Distribution*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	5. *Brink Henrik, Richards Joseph, Feverolf Mark 687 Machine-trained ie. - St. Petersburg: Piter, 201 7. - 336 p.: ill. - (Series "ISTA Program Library"). ISBN 978-5-496-02989-6* 6. *Flach P. F70 Machine learning. The Science and art of constructing algorithms that extract knowledge from data / translated from the English by A. A. Slinkin. - Moscow: DMK Press, 2015. - 400 p.: ill. ISBN 978-5-97060-273-7* 7. *Dr. Anasse Bari, Mohammed Chaouchi, Tommy Jung. Predictive analytics for Dummies / / For Dummies; 2nd edition, 2016* 8. *Cubic Meters. Introduction to machine learning / M. Kubat. - 2nd ed. - Cham : Springer, 2017. - 348 p.: table- Springer. - Prem. edict: pp. 347-348; Bibliogr.: pp. 341 345. - ISBN 978-3-319-63912-3. - ISBN 978-3-319 63913-0.* 9. *Jan LeCun, Joshua Bengio, Geoffrey Hinton. Deep Learning / / Nature 521, 436-444 (May 28, 2015)*

Course 3 of the Module 6

Module designation	*Machine learning*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 33007*
Subtitle, if applicable	*DL*
Course, if applicable	*DL 4304 Deep learning*
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Mukanova A*
Lecturer	*Omarbekova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester – 60 hrs:* *-Lecture:30* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 180 hours per semester which consists of 120 minutes lectures, 120 minutes laboratory session, and 480 minutes self-study per week for 15 weeks.*
Credit points	*6*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*NN 2301 Neural network , ML 3302 – Machine learning, GT 3311Game theory*

Module objectives/intended learning outcomes	*This module will allow you to acquire knowledge in the field of artificial intelligence systems and decision-making, to study software tools for constructing intelligent systems for various subject areas.*
Content	Class introduction. Examples of deep learning projects. Deep Learning Intuition. Full-cycle of a Deep Learning Project. Adversarial examples – GANs. Attacking neural networks with Adversarial Examples and Generative Adversarial Networks. Generative Adversarial Nets, Conditional GAN, Super-Resolution GAN, CycleGAN. AI and Healthcare. Deep Learning Strategy. Deep Inside Convolutional Networks. Visualizing and Understanding Convolutional Networks.
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. François Cholle. 2017, Deep Learning with Python, Manning Publications; 1st edition 384 p. India.* *2. Rowel Atienza. 2018. Advanced Deep Learning with Keras: Apply deep learning techniques, autoencoders, GANs, variational autoencoders, deep reinforcement learning, policy gradients, and more. Packt Publishing; 1st edition. 368 p.*

Module 7

Module No & Name	COMS 32011 Natural Language Processing	
Rationale and objective of the module	**Justification:** Natural language processing (NLP) is a subfield of linguistics, computer science, and artificial intelligence concerned with the interactions between computers and human language, in particular how to program computers to process and analyze large amounts of natural language data. The result is a computer capable of "understanding" the contents of documents, including the contextual nuances of the language within them. Challenges in natural language processing frequently involve speech recognition, natural language understanding, and natural-language generation. This module presents an opportunity for students to gain experience with models and algorithms used in computational linguistics that underly practical applications while gaining an appreciation for the theoretical questions of the field. It will thus help prepare the student both for jobs in the industry and for doing original research in computational linguistics.	
	Objectives: On successful completion of this course, students will be able to: - understand core algorithms and data structures used in NLP - utilize corpora and annotations added to them - build statistical NLP components, such as n-gram language models, text classifiers and part-of-speech taggers, that learn from such corpora - evaluate the merits of different machine learning methods for given NLP tasks - appreciate the relationship between linguistic representations and computational applications	
Total ECTS of the module	**5**	
Courses of the Module		
Course Number	**Course Name**	**ECTS**
INLP 3217	Introduction to Natural Language Processing	5
MT 4220	Machine translate	5

Course 1 of the Module 7

Module designation	*Natural Language Processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32011*
Subtitle, if applicable	*NA*
Course, if applicable	*INLP 3217 Introduction to Natural Language Processing*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Ergesh B*
Lecturer	*Ergesh B*
Language	*Kazakh/Russian*

Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*MT 4220 Machine translate*
Module objectives/intended learning outcomes	*The discipline allows to study the basics of text and speech processing, the construction of language models, approaches, models and methods of natural language processing, such as n-grams, hidden Markov models, the basics of machine and deep learning methods and use knowledge to solve tasks of POS tagging, syntactic, semantic and sentiment analysis, automatic summarization, NER, and information retrieval tasks.* *Students completing the module should be able:* *- formulate an efficient problem space for a problem expressed in natural language (e.g., Kazakh) in terms of initial and goal states, and operators.* *- define a NLP problem and find a suitable solution to it* *- implement a simple NLP systems, use Python to solve a NLP tasks.* *- simulate, apply, or implement classic and stochastic algorithms for parsing natural language.* *- identify techniques for information retrieval, language translation, and text classification*
Content	*General information about NLP, Language modeling, Phonology and Morphology, Linguistics. Syntax (Phrase Structure vs. Dependency), Word Classes for NLP tasks., Tagging methods. Manually designed Rules and Grammars. Statistical Methods, Grammars & parsing algorithms. Introduction to Parsing. Generative Grammars. Properties of Regular and Context-free Grammars, Probabilistic parsing. Treebanks, Text classification, categorization, Text Summarizers, Autocorrect*

Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*18. Daniel Jurafsky and James H. Martin. "Speech and language processing an introduction to natural language processing, computational linguistics, and speech." (2000). https://web.stanford.edu/~jurafsky/slp3/* *19. Manning, C. D. and H. Schütze: Foundations of Statistical Natural Language Processing. The MIT Press. 1999. ISBN 0-262-13360-1.* *20. Allen, J.: Natural Language Understanding. The Benajmins/Cummings Publishing Company Inc. 1994. ISBN 0-8053-0334-0.* *21. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press. 1998. ISBN 0-262-10066-5.* *22. Sharipbay A.A.Mathematics for computer science : training manual / A.A. Sharipbay. - Astana, 2017. - 158, [1] с. : ил., табл. - (0). - Библиогр.: с. 158. - ISBN 978-601 -326-012-9.*

Course 2 of the Module 7

Module designation	*Natural Language Processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32011*
Subtitle, if applicable	*MT*
Course, if applicable	*MT 4220 Machine translation*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Ergesh B*
Lecturer	*Zhetkenbay L*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*ML3302 - Machine learning, INLP 3217 – Introduction to Natural Language Processing, OOPJ 3210 Object-oriented programming on Java, ADS 1207 - Algorithms and data structures*
Module objectives/intended learning outcomes	*This module is an introduction to the field of machine translation, including the related and more broad field of computer-aided translation. The course is novel in that it will also involve interdisciplinary learning with materials from and possibly team-based interactions with faculty in students in other, non-technical courses at Villanova. This unique offering affords all involved students and faculty the opportunity to accumulate and apply expertise from their respective disciplines to develop approaches and machine translation tools, much in the way such collaboration is done in academic research and the software industryStudents completing the module should be able:* *- localize software and applications by using latest technologies available.* *- to transfer theory into practice by examining the place of technology and automatic translation in translation process.* *- to create corpora and use corpora in the translation process.* *- to compare traditional translation with computer-assisted translation by editing computer-assisted translation and by using computer-assisted translation tools* *-to define main components of machine translation.*
Content	*General information about Machine Translation, Approaches to MT , Syntax tree, Statistical Machine Translation, Language Model, Phrase based Machine Translation, Feed Forward Neural Network Language Model, Neural Translation Mode, Encoder-Decoder, Monolingual Data, NMT - Architectures*

Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Kenny, D. (Ed.) (2017). Human Issues in Translation Technology. Routledge. (available in the library)* *2. Cronin, M. (2013). Translation in the Digital Age. Routledge. (available in the library)* *3. Poibeau, T. (2017). Machine Translation. Massachusetts Institute of Technology.* *4. Balling, L. W., & Carl, M. (Eds.). (2014). Post-editing of machine translation: Processes and applications. Cambridge Scholars Publishing.* *5. Schwieter, J. W. & Ferreira, A. (Eds.). (2017). The Handbook of Translation and Cognition. Wiley-Blackwell.* *6. Jiménez-Crespo, M. A. (2013). Translation and web localization. Routledge. (available in the library)* *7. Esselink, B. (2000). A practical guide to localization (Vol. 4). John Benjamins Publishing. (available in the library)* *8. O'Hagan, M., & Mangiron, C. (2013). Game Localization: Translating for the global digital entertainment industry (Vol. 106). John Benjamins Publishing. (available in the library)* *9. Chan, S. W. (2016). The Future of Translation Technology: Towards a World without Babel. Routledge. (available in the library)*

Module 8

Module No & Name	**COMS 42012 Data analysis and processing**
Rationale and objective of the module	**Justification:** Data analysis and processing is a complex and intricate process. It is comprised of collecting and structuring data, forming and testing hypotheses, identifying patterns, and drawing conclusions. Data analysts are essential in business, administration, and science. They work with fundamental tools such as Python and its libraries, Jupyter Notebook, and SQL. The main purpose of the module is to teach students how to best use these tools
	Objectives: On successful completion of this course, students will be able to: - know the main stages of data analysis and processing. - understand the difference between data processing and analysis and optimization. - understanding of common Data Mining methods and tools - application of classification, modeling and forecasting methods - use different methods of data processing and analysis - choose the right chart type for data visualization
Total ECTS of the module	**33**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
APHES 3217	Analytics powered by the Hadoop ecosystem	5
DV 3218	Data visualization	5
DP 3219	Data processing	5
DAO 3219	Data analysis and optimization	5
DM 3303	Data mining	5
DAW 4221	Data Analysis Workshop	7

Course 1 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*APHES 3217 - Analytics powered by the Hadoop ecosystem*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Mukanova A*
Lecturer	*Urynbassarova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*SDPSP 2216 - Statistical data processing in software packages*
Module objectives/intended learning outcomes	*The discipline focuses on a Hadoop, which is an open source, that supports the storage and processing of extremely large data sets in a distributed computing environment. Also, it deals with applications of Hadoop, including the major Big Data frameworks used in Data Analytics.* *Students completing the module should:* *- know difference between tools for processing Big Data such as Hadoop, Pig, Hive, Cassandra, Spark, Kafka;* *- know ways of using Hadoop to solve various applied problems.* *- apply Hadoop to solve applied problems.* *- must own skills to coding on Hadoop.*
Content	*General information about Big Data, Types of Big Data, Big Data analytics. Types of Big Data Analytics., Hadoop, Techniques for integrating Oracle and Hadoop, Hadoop Core Components., Hadoop ecosystem: Hadoop tools for crunching Big Data. HDFS. YARN. MapReduce., Apache Hadoop HDFS architecture, MapReduce advantages. Explanation of MapReduce program*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*23. T. White, Hadoop Definitive Guide, Publisher: O'Reilly Media.* *24. C. Lam, Hadoop in Action, Publisher: Manning.* *25. B. Femiano, J. Lentz, J. Owens, Hadoop Real-world Solutions,* *26. Publisher: Packt Publishing.* *27. J. Venner, Pro Hadoop, Publisher: Apress Publications.* *28. K. Tannir, Optimizing Hadoop for MapReduce,* *29. Publisher: Packt Publishing.* *30. H. Karambelkar, Scaling Big Data with Hadoop Solr,* *31. Publisher: Packt Publishing* *32. B. Lubinsky, K. T. Smith, A. Yakubovich, Professional Hadoop* *33. Solutions, Publisher: Wrox Publications.* *34. 8. B. Bengfort, J. Kim, Data Analytics with Hadoop,* *35. Publisher: O'Reilly Media.*

Course2 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*DV 3218 - Data visualization*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Mukanova A*
Lecturer	*Mukanova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*PP 1203-Programming in Python, PR 2215-Programming in R*

Module objectives/intended learning outcomes	*The discipline allows you to acquire the skills of data visualization; use and compare different visualization tools; create multiple versions of digital visualizations using different software packages; the ability to determine the appropriate methods of data visualization, taking into account the specific requirements for data; data visualization analysis.* *Students completing the module should be able:* *- learn and apply multiple data visualization techniques;* *-be able to use and compare different visualization tools;* *-be able to work with libraries for data visualization in the Python programming language: Matplotlib, Seaborn, Mayavi.* *-be able to analyze and select visualization methods for specific tasks* *-apply visualization techniques to extract useful information from a data set.*
Content	Introduction to Data Visualization, Matplotlib library. Plotting a chart for categorical data Basics of working with the pyplot module. Text labels on the chart,Setting up the chart elements. Working with a legend. Layout of graphs. Text elements of the graph, Matplotlib class. Data visualization. Step, stack, dot, and other graphs, Seaborn library. Introduction. Working with categorical data, Customize the appearance of the charts. Configuring the grid and axes, Visualization of relationships in data. Basic arguments. Increase the informativeness of the schedule. Scatter plot, Visualization of categorical data. Visualization of categorical data in the form of dot charts, Visualization of distributions in data, Visualization of the linear regression model, Mayavi library,Setting up the view. Managing A Shape/The stage, Mayavi. Data visualization. Functions for working with one-dimensional and two-dimensional datasets,Mayavi. Working with data sources. Working with filters
Study and examination requirements and forms of examination	*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.* *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.*

Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*10. Kabakov, Robert I.R in action. Data analysis and visualization in the R program or Kabakov Robert I.; translated from English by Polina A. Volkova. - Moscow: DMK Press, 2014. - 587, [1] P.: ill., tab., diagr. - ISBN 978-1-93518-239-9. - ISBN 978-5-97060-077-1.* *11. Python. Data visualization: Matplotlib, Seaborn, Mayavi"* *12. Everitt Bryan. Introduction to Applied Multivariate Analysis with R / Everitt Brian. - New York : Springer, 2011. - XIV, 273 p. - (Use R!). - ISBN 978-1-4419-9649-7.* *13. Andy Kirk. Data Visualization-2012, 237 p.*

Course 3 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*DP 3219 – Data processing*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Mukanova A*
Lecturer	*Ergesh B*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*PP 1203-Programming in Python, DM 2206 - Discrete mathematics, ADS 1207 - Algorithms and data structures*

Module objectives/intended learning outcomes	*This course is aimed at studying the object-oriented concept and principles, the development of abstract thinking and the development of professional skills of a future specialist, the development of a project structure, the formation and development of project implementation skills using data processing tools, data collection* *Students completing the module should be able:* *- develop and analyze conceptual and theoretical models of applied problems of big data analysis* *-use and apply advanced knowledge in the field of processing and analysis of big data* *-estimate the time and necessary hardware resources to solve the problems of data analysis and processing* *-create algorithms for analyzing and processing large amounts of data using Data Mining models* *-develop methods for the design and analysis of algorithms, programs*
Content	*General information about Data processing functions, History, Manual data processing, Automatic data processing, Electronic data processing, convenient and fast data acquisition, Data clean of data exploration, data transformation, data reduction, Applications, Commercial data processing, Data analysis*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Practical Data Analysis 2 nd edition; Hector Cuesta, Dr. Sampath Kumar; Packt; 2016; Practical Business Intelligence; Ahmed Sherif; Packt; 2016* *2. https://www.coursera.org/learn/python-data-processing#about* *3. https://www.researchgate.net/publication/324797992_ Data_Proce ssing*

Course 4 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*

Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*DAO 3219 - Data analysis and optimization*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Mukanova A*
Lecturer	*Kudubayeva S*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*ICT 1105-Information and communication technologies, DBSQLQ 2214-Databases and SQL querie*
Module objectives/intended learning outcomes	*The discipline provides for the study of questions about the features of working with large unstructured and semi-structured data, about tools for processing big data, about options for building distributed databases, replication, and fragmentation. Choice of tools for working with Big Data. Possibilities of NoSQL databases to ensure the integrity, availability of information processing speed.* *Students completing the module should be able:* *- know of storage technology, processing and analysis of big data;* *-have the ability to analyze data and evaluate the knowledge required to solve non-standard problems using mathematical methods and computer modeling methods;* *-have the ability to formalize the task of the applied field, in the solution of which it becomes necessary to use quantitative and qualitative assessments;* *- know of methods of building information systems based on non-relational databases and distributed storage systems;* *-ability to use data analysis tools using modern query languages, as well as their optimization*
Content	*Storage technologies big data, Tasks of decision support systems (DSS). DSS architecture. Fundamentals of Big Data Systems, Data warehouse concept. Data warehouse organization, Multidimensional data model. Definition of OLAP systems. Conceptual multidimensional. Representation. Twelve Rules of Codd.*

Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Barsegyan A.A. Analysis of data and processes, St. Petersburg:BHV-Petersburg, - 4th ed. - [B. m.]: Lan, 2018. - 356 p. – ISBN 978-5-9775-0368-6* *2. Nazarov, D.M. Intelligent systems: foundations of the theory of fuzzy sets: textbook. Manual for academic bachelor's degree /* *3. D.M. Nazarov, L.K. Konysheva. - 2nd ed., Rev. And add. - M .: Yurayt Publishing House, 2017 .- 202 p.* *4. Afonin, A. Yu. Operational and data mining / A. Yu. Afonin, PP Makarychev. –SPB .: PSU, 2012.* *5. Volkova P.A., Shipunov A.B. Statistical data processing in educational research works. - M . Forum, 2014 .- 96 p.* *6. Vukolov E.A. Fundamentals of Statistical Analysis. Workshop on Statistical Methods and Operations Research Using the STATISTICA and EXCEL Packages: A Study Guide for University Students*

Course 5 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*DM 3303 – Data Mining*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Mukanova A*
Lecturer	*Mukanova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*6*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Mat 1201- Mathematics, PTMS 1204- Probability theory and mathematical statistics, DM 2206 - Discrete mathematics, FLPAI 2215 - Functional and logic programming for AI, SDPSP 2216 - Statistical data processing in software packages*
Module objectives/intended learning outcomes	*This course is an introductory course on data mining. It introduces the basic concepts, principles, methods, implementation techniques, and applications of data mining. Topics covered include classification, association analysis, clustering. Students will create models and execute them using the RapidMiner data analysis application.* *Students completing the module should be able:* *- know basic notation and terminology used in data mining.* *-understand basic principles behind analysis algorithm of Association rules, Classification, Clustering.* *-visualize, summarize and analyze datasets.* *-formulate and solve analytical problems for given business problem.* *-create models and execute it with Rapid Miner*
Content	*Data Mining, Data Warehouse and OLAP, Data mining knowledge representation, Attribute-oriented analysis, Data mining algorithms: Association rules, Frequent Pattern Growth (FP-Growth) Algorithm, Classification. Hunt's Algorithm, Estimation of Generalization Errors, Prediction, Nonlinear Partial Least Squares (NLPLS) Model, Clustering. DBSCAN, Supervised Learning for Text Classification, Text Sequence Modeling*
Study and examination requirements and forms of examination	*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.* *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 following aspects of training are assessed: the application of algorithms for data mining, classification, forecasting and evaluation of generalization errors.*

Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar. Introduction to Data Mining (Second Edition)https://wwwusers.cs.umn.edu/~kumar001/dmbook/index.php* *2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining. Instructor's Solution Manual.https://wwwusers.cs.umn.edu/~kumar001/dmbook/sol.pdf* *3. Jiawei Han, Micheline Kamber, Jian Pei. Data Mining Concepts and Techniques (Third Edition) http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-MorganKaufmann-Series-in-Data-Management-Systems-Jiawei-Han-MichelineKamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-MorganKaufmann-2011.pdf*

Course 6 of the Module 8

Module designation	*Data analysis and processing*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42012*
Subtitle, if applicable	*NA*
Course, if applicable	*DAW 4221 Data Analysis Workshop*
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Mukanova A.*
Lecturer	*Niyazova R*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 75 hrs:* *-Lecture:30* *-workshops: 15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 210 hours per semester which consists of 120 minutes lectures, 60 minutes workshops, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*7*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*DM 3303 Data mining*

Module objectives/intended learning outcomes	*The main goal of this discipline is to form students' basic theoretical knowledge in the field of Data Analysis Workshop. Students completing the module should:* *- to understand the problems, and the solutions to problems in the professional practice of Artificial Intelligence application in business environment.* *- to solve the analysis of information needs from different organizations, identifying the uncertainty and variability sources.* *- managing the acquisition, the structuring, analysis and visualization of data and information in the field of specialization, and for critically assessing the results of this management.* *- analyze and solve complex technical problems.*
Content	*Basics of combinatorics, Determination of probability, Conditional probabilities, Test sequences, Random Variables Determination of a random variable, Discrete random variables and their most important numerical characteristics, Absolutely continuous random variables and their most important numerical characteristic, Relation measures of random variables, Central limit theorem*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*1. Soloviev Data analysis in economics. Probability theory and applied statistics in Microsoft Excel: textbook. / V.I.Soloviev. - Moscow: KNORUS, 2018.- 324 p.* *2. Kalinina V.N. Data analysis: Computer workshop: tutorial / V.N. Kalinin, V.I. Soloviev. Moscow: KNORUS, 2017 .-- 166 p.* *3. Mirkin B.G. Introduction to data analysis [Electronic resource]: textbook and workshop / BG Mirkin. - Moscow: Yurayt, 2017. -174 p. - Access mode: https://biblioonline.ru/book/46A41 F93-BC46-401C-A30E-27C0FB60B9DBrailov A.V. Collection of problems for the course "Mathematics in Economics". Part 3.* *4. Probability theory / AV Brailov, AS Solodovnikov. - Moscow: Finance and Statistics, 2010,* *5. 2013, 2017. — 125 p.*

Module 9

Module No & Name	**MATH 22009 Computer mathematics**	
Rationale and objective of the module	**Justification:** Machine learning is a field of scientific study concerned with algorithmic techniques that enable machines to learn performance on a given task via the discovery of patterns or regularities in exemplary data. Consequently, its methods commonly draw upon a statistical basis in conjunction with the computational capabilities of modern computing hardware. This course aims to acquaint the student with the main branches of machine learning and provide a thorough introduction to the most widely used approaches and methods in this field	
	Objectives: On successful completion of this course, students will be able to: - know different machine learning model classes. - comprehend the difference between supervised, unsupervised, and reinforcement learning methods. - understand common machine learning models. - analyze trade-offs in the application of different models. - appropriately choose machine learning models according to a given task	
Total ECTS of the module	**26**	
Courses of the Module		
Course Number	**Course Name**	**ECTS**
OR 2208	Operations research	5
SDPSP 2216	Statistical data processing in software packages	5
DL 4304	Decision theory	6
GT 3311	Game theory	5

Course 1 of the Module 9

Module designation	*Computer Mathematics*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22009*
Subtitle, if applicable	-
Courses, if applicable	*DT 4305* Decision theory
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Sharipbay A*
Language	*Russian, Kazakh*
Relation to curriculum	*Major course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*45 (Lectures- 15, Laboratory Classes-30)*
Workload	*Lectures- 15, Laboratory Classes-30,*
Credit points	*6 ECTS*

Requirements according to the examination regulations	*oral examination: two theoretical questions and one practical task*
Recommended prerequisites	
Module objectives/intended learning outcomes	*On completion of this discipline, students will be able to explain and apply the basic methods of discrete (noncontinuous) mathematics in computer science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems*
Content	*This course covers elementary discrete mathematics for computer science. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods; induction, well-ordering; sets, relations; elementary graph theory; integer congruences; asymptotic notation and growth of functions; permutations and combinations, counting principles; discrete probability.*
Study and examination requirements and forms of examination	*oral examination*
Media employed	*Presentation for each lesson using a computer, projector, interactive whiteboard, virtual laboratories*
Reading list	*1. Lehman, Eric, Tom Leighton, and Albert R. Meyer. Mathematics for computer science. Technical report, 2006. Lecture notes, 2010.* *2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/* *3. https://canvas.harvard.edu/courses/20024/files/3185893/download?verifier=JBE1sVtncVMoRx7J7cpHqxjDE1ANjHzoMNeHRmFB&wrap=1* *4.*

Course 2 of the Module 9

Module designation	*Computer Mathematics*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22009*
Subtitle, if applicable	*NA*
Course, if applicable	*SDPSP 2216 Statistical data processing in software packages*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Kudubayeva S*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Math 1201 Mathematics, PTMS 1204 Probability theory and mathematical statistics, PR 1203 Programming in R*
Module objectives/intended learning outcomes	*This module provides an introduction to "theory of statistics as a science" and "statistical methods of information processing". It aims to give students sufficient knowledge about the main categories of statistics (statistical regularity, statistical population, attribute, variation) and the basic methods of collecting and processing data (statistical observation, grouping and summary of statistical observation data, building tables and graphs for the formation and analysis of indicators as "statistical quantities" and "statistical distributions") for employment or postgraduate studies using package programs.* *Students completing the module should be able:* *- perform statistical processing of data;* *- to process statistical indicators in order to draw conclusions about the state of the phenomenon and the patterns of its development;* *- to study the general characteristics of indicators of distribution lines and methods of their calculation;* *- analyze and predict technical and economic indicators using applied programs*
Content	*Introduction to the theoretical foundations of statistics as a science, statistical observation, summary and grouping of statistical materials, statistical quantities, indicators of variation and statistical distributions, statistical study of relationships, study of the dynamics of social phenomena, indices.*
Study and examination requirements and forms of examination	*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* *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 acquisition of practical experience in statistical data processing is assessed.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*14. Gromyko G.L. The theory of statistics. Workshop. - 3rd ed., Add. and revised - M .: Infra-M, 2010 .-- 205 p.* *15. Efimova M.R., Petrova E.V., Rumyantsev V.N. General theory of statistics: Textbook. - 2nd ed., Add. and revised - M .: Infra-M, 2010 .-- 416 p.* *16. Nazarov M.G. Statistics. Educational and practical guide. - M .: KNORUS, 2010 .-- 480 p.* *17. Statistics: Textbook for universities (+ CD) / ed. Professor I.I. Eliseeva - SPb .:Peter, 2012 .-- 368 p.* *18. Statistics: a training manual. Ed. M.G. Nazarov. - M .: KNORUS, 2011 .-- 480 p..*

Course3 of the Module 9

Module designation	*Computer Mathematics*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22009*
Subtitle, if applicable	*NA*
Course, if applicable	*OR 2208 - Operations research*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Razakhova B*
Language	*Kazakh/Russian*
Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*NN 2301- Neural network*

Module objectives/intended learning outcomes	*Operations Research is a discipline aimed at providing tools for preparation, analysis and efficient resolution of these systems using models which can quantitatively measure the results of the decisions of the leadership of organizations. Today, integration is key for this class of systems to aid decision making within the different information systems that can operate in organizations. The course begins by presenting a case study with which to illustrate these concepts and continues with an exhibition of models established in the Operations Research techniques and their efficient resolution. During the course students develop and solve one of these models adapted to the needs of the real case of an organization and evaluate and discuss their interaction with information systems present in it. Students completing the module should be able:* *- know the basic methodology and scope of operations research;* *- know principles of construction of mathematical models of conflicting situations and mathematical analysis methods of operations research;* *- be able to choose rational options in practical decision-making problems using standard mathematical models of operations research;* *- have skills in analysis of operations research objectives, mathematical methods and computer systems;* *- understand and identify the inputs and outputs of operations research models underlying various information systems and decision support systems described in the practical sessions.*
Content	*Introduction to Operations Research. Introduction to linear programing (LP). Linear programming models with binary variables. Graphical method of solution of the linear programming problem. Simplex Algorithm and Goal Programming. Sensitivity Analysis and Duality. Transportation Models. Network Models and Algorithms. Integer Programming. Modeling with integer variables. Dynamic Programming. Queueing Models. Nonlinear Programming. Course Summary and Future Directions.*
Study and examination requirements and forms of examination	*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* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*1. Mathematical Programming: operations research - Winston W.L; Venkataramanan, M, Brooks/Cole, 2003. ISBN: 0534359647 http://cataleg.upc.edu/record=b1253743~S1*cat* *2. AMPL a modeling language for mathematical programming - Fourer, R.; Gay, D.M.; Kernighan, B.W, Thomson/Brooks/Cole, 2003. ISBN: 0534388094 http://cataleg.upc.edu/record=b1237649~S1*cat* *3. Model building in mathematical programming - Williams, H.P, John Wiley and Sons, 2013. ISBN: 9781118443330 http://cataleg.upc.edu/record=b1423642~S1*cat* *4. Introduction to operations research - Hillier, F.S, McGraw Hill, 2010. ISBN: 9780071267670 http://cataleg.upc.edu/record=b1358085~S1*cat* *Complementary: 1. Linear and integer programming: theory and practice - Sierksma, G, CRC , 2002. ISBN: 0824706730 http://cataleg.upc.edu/record=b1431608~S1*cat*

Course 4 of the Module 9

Module designation	*Computer Mathematics*
Module level, if applicable	*Bachelor*
Code, if applicable	*MATH 22009*
Subtitle, if applicable	*NA*
Course, if applicable	*GT 3311Game theory*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Turebayeva R*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*NN 2301 Neural network , ML 3302 – Machine learning*

Module objectives/intended learning outcomes	*This module allows you to study the basic concepts of game theory used to describe the most important game models, methods for collecting and analyzing data processing, and apply game theory tools to solve theoretical and practical problems.* *As a result of studying the discipline, the student must know: the mathematical model of an antagonistic game, the concept of optimal strategies of players, the main theorems of matrix games, methods for solving games using applied programs* *As a result of studying the discipline, the student should be able to: independently master new methods of game theory, formulate problems and look for ways to solve them; to build models of games for various situations, find optimal strategies for different classes of games, use the results obtained to make optimal decisions, build mathematical models of objects of professional activity.* *As a result of studying the discipline, the student must have the skills: the basic techniques and methods for solving matrix games. To have an idea of the theory of games as a scientific and applied discipline, on the methods of conflict resolution based on its mathematical model.*
Content	*General understanding of game theory. The subject of game theory. Uncertainty in game situations. Application of game theory. Classification of games. Matrix games. Endless antagonistic games. Non-antagonistic games. Multi-step games. Antagonistic differential games. Non-antagonistic differential games. Cooperative differential games in the form of a characteristic function. Discounted cooperative differential games of two persons.*
Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*

Reading list	*1. Kolobashkina, L. V. Fundamentals of game theory: textbook / L. V. Kolobashkina - M.: Laboratory of Knowledge, 2017* *2. Petrosyan LA Theory of games. SPb.: BHV-Petersburg, 2014.* *3. Gadelshina G.A. and other Introduction to the theory of games [Electronic resource]: a tutorial. Moscow: Prometheus, 2018 .-- 169 pp. URL: https://www.twirpx.com/files/science/financial/mmethods/gametheory/https://eltc.kz/Courses/About/111* *4. http://www.intuit.ru*

Module 10

Module No & Name	**COMS 32005 Databases and knowledge bases**
Rationale and objective of the module	**Justification:** Knowledge representation models and languages course is aimed at developing a set of universal, professional and general professional competencies among graduate students, which form the necessary basis for studying the main problems of modern corpus linguistics. Then students will explore issues related to database design. Learn languages of description and data manipulation. They will study such issues as: Creating a database. Controls for working with the database, their properties and methods. Examples of programs for performing basic data processing operations in the DBMS: adding and deleting records, searching by various criteria, navigating the database.
	Objectives: On successful completion of this course, students will be able to: - Know the basic methods of representing and solving intellectual problems - use standard tools to create specific expert systems in various subject areas. - create SQL queries - Demonstrate knowledge about modern approaches to database development - Formation of skills in database design, creation, modification of tables and databases, data manipulation using the SQL - To describe the knowledge base in one of the languages of knowledge representation. - Possess the methods and means of knowledge representation
Total ECTS of the module	**10**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
KRML 2214	Knowledge representation models and languages	5
DBSQLQ 2214	Databases and SQL queries	5

Course 1 of the Module 10

Module designation	Databases and knowledge bases
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32005*
Subtitle, if applicable	*NA*
Course, if applicable	*KRML 2214 Knowledge representation models and languages*
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Razakhova B*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Math 1201 Mathematics,* PLC 1202 *Programming in language C++*
Module objectives/intended learning outcomes	*This module provides an introduction to the theory and implementation of neural networks, both biological and artificial. It aims to give students sufficient knowledge to enable employment or postgraduate study involving neural networks.* *Students completing the module should be able:* *to demonstrate an understanding of the principles of Neural Networks and a knowledge of their main areas of application;* *-the ability to design, implement and analyse the behaviour of simple neural networks.* *- critically evaluate model performance and interpret results;* *-write reports in which results are assessed and summarized in relation to aims, methods and available data*
Content	*Models of knowledge representation and rules of inference are considered: production model of knowledge representation and rules for their processing; relational models of knowledge representation and corresponding ways of reasoning; frames, semantic networks; theory and technique of knowledge acquisition; principles of knowledge acquisition. Existing approaches and solution techniques, expert systems - a tool for automated training systems; knowledge base. Rules; objects; definition of the request; editor; procedural language; compiler of rules and objects. Expert systems; artificial intelligence languages. The concept of fuzzy sets and their relationship with the theory of constructing expert systems; implementation of expert systems in the Windows environment.*

Study and examination requirements and forms of examination	*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.* *Final course project (90 min.) have Model Representation Tasks, and then one long problem-solving practice task. On the course project exam students are demonstrating their understanding of the course outline through the completion of tasks. The next aspects of learning to program or semantic networks; theory and technique of knowledge acquisition; principles of knowledge acquisition the concept of fuzzy sets and their relationship with the theory of constructing expert systems; implementation of expert systems in the Windows environment.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. V.V. Anisimov, R.A. Yeshenko. INTELLIGENT INFORMATION SYSTEMS. Khabarovsk. Publishing house FVGUPS. 2017* *2. Lapshin, V.A. Ontology in computer systems / V.A. Lapshin. - M.: Scientific world, 2010 .-- 224 p.* *3. Shchipitsina L. Yu. Information technologies in linguistics. Moscow: Flinta, 2013* *4. Fundamentals of building intelligent systems: textbook, G. V. Rybina, Moscow: Finance and statistics; Infra-M, 2014* *5. Artificial intelligence* *6.Nesterov S.A. Databases: Tutorial. - SPb .: Publishing house of Polytechnic.University, 2013 .- 250 s* *7.Khomonenko, Maltsev, Tsyganov: Databases: Textbook for higher educational institutions Publishing house: Korona-Print, 2019 - 736 p.*

Course 2 of the Module 10

Module designation	Databases and knowledge bases
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32005*
Subtitle, if applicable	*NA*
Course, if applicable	*DBSQLQ 2214- Databases and SQL queries*
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Kudubayeva S*
Lecturer	*Kudubayeva S*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*ICT 1105Information and communication technologies*
Module objectives/intended learning outcomes	*In this course, students will explore issues related to database design. Learn languages of description and data manipulation. Students will gain knowledge of the basics of the SQL language. They will study such issues as: Creating a database. Controls for working with the database, their properties and methods. Examples of programs for performing basic data processing operations in the DBMS: adding and deleting records, searching by various criteria, navigating the database.* *Students completing the module receive the following learning outcomes:* *- knowledge and use of modern instrumental and methodological tools database development;* *- acquaintance with the language of structured database queries (sql) and obtaining practical skills in working with data, organizing a database;* *- mastering a number of fundamental concepts, such as a data model, models for organizing user work with a database, normalization, indexing, database integrity;* *- knowledge of database architecture, have practical skills in using functional and supporting subsystems;* *- to complete course work related to the development of applied software, as well as be able to develop information systems of the widest profile in the future.*
Content	*The information and data. Information relations and data interconnections. Database as an information model of the subject area. The centralized architecture. Computing model with network and file server (Architecture "File server"). Distributed computing model (Client-server architecture). Three-link (multi-link) architecture). Data Properties Supported in the database: independence, integration, protection, duplication. Data models. Abstract data types, data structure, basic data operations. Choice of data model. Relational data model. Attitude, attribute. Normalization of relations in the database. Relational algebra and relational calculus. SQL and QBE query languages. Creation of databases in a modern DBMS. Relational databases. Physical storage layer and file systems. SQL. Executing queries to retrieve data. Connections and theoretically multiple operations on relations. Defining the concepts of integrity Data in the SQL*

	standard. Definitions of declarative and cascading referential integrity. SQL language. General rules access control. Modes Authentication and Components security structures. Implementing SQL statements in application programs
Study and examination requirements and forms of examination	*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.* *Final course project (90 min.) have Model Representation Tasks, and then one long problem-solving practice task. On the course project exam students are demonstrating their understanding of the course outline through the completion of tasks. The next aspects of learning to program or semantic networks; theory and technique of knowledge acquisition; principles of knowledge acquisition the concept of fuzzy sets and their relationship with the theory of constructing expert systems; implementation of expert systems in the Windows environment.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Nesterov S.A. Databases: Tutorial. - SPb .: Publishing house of Polytechnic.University, 2013 .- 250 s* *2.Khomonenko, Maltsev, Tsyganov: Databases: Textbook for higher educational institutions Publishing house: Korona-Print, 2019 - 736 p.* *3. E. Siore. Design and implementation of database management systems. DMK Press Publishing House, October 2020 - 466 pages* *4.B. A. Novikov, E. A. Gorshkova. Basics of database technologies. DMK Press, 2018 - 240 pages* *5.Tamer Yosu M., P. Valduries. Principles of organizing distributed databases. DMK Press, 2020 - 672 pages*

Module 11

Module No & Name	**COMS 32010 Organization of computing systems**
Rationale and objective of the module	**Justification:** Organization of computing systems module provides is to give the student a deep knowledge in the field of formal teaching of languages necessary in the field of information technology, to familiarize students with various models for the formal assignment of languages (finite state machines generating grammars, regular expressions, finite automata with memory), with the properties of these models and the boundary their applicability. Then allows to study the principles of the structural and functional organization of modern computer systems. Also the formation of students' theoretical and practical knowledge of the basics of creation and use information security systems in telecommunications and information systems
	Objectives: On successful completion of this course, students will be able to: - The standard ways of formal language assignments; - To explain the function of each element of a memory hierarchy; - Practical knowledge of various tools, processes and methods to ensure security of systems through a minimum of two hands-on assignments involving attack and protection in a virtual environment.
Total ECTS of the module	**15**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
TAL 2216	The Theory of Automata and language	5
AOCS 3211	Architecture and organization of computer systems	5
CB 3212	Cybersecurity basics	5

Course 1 of the Module 11

Module designation	*Organization of computing systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32010*
Subtitle, if applicable	
Course, if applicable	*TAL 2216 The Theory of Automata and language*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Kintonova A.*
Lecturer	*Sharipbay A*
Language	*Kazakh/Russian*
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	*Organization of computing systems module provides is to give the student a deep knowledge in the field of formal teaching of languages necessary in the field of information technology, to familiarize students with various models for the formal assignment of languages (finite state machines generating grammars, regular expressions, finite automata with memory), with the properties of these models and the boundary their applicability.* *Then allows to study the principles of the structural and functional organization of modern computer systems. Also the formation of students' theoretical and practical knowledge of the basics of creation and use information security systems in telecommunications and information systems*
Content	*Bases of languages and automatons. Notations, concepts and abbreviations. Mathematical foundations. Language detection mechanisms. Regular languages. Mechanisms for generating regular languages. Recognition mechanisms of regular languages. Properties of regular languages. Equivalence of non-deterministic and deterministic automata. Context-free languages. Generative mechanisms of context-free languages. Recognition mechanisms of context-free languages.* *Properties of context-free languages. Context sensitive languages. Generative mechanisms of context sensitive languages. Recognition mechanisms of context sensitive languages. Properties of context sensitive languages. Recursively enumerable languages. Generative mechanisms of recursively enumerable languages. Recognition mechanisms of recursively enumerable languages.*

Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*[1] Fedoseeva, L.I. Fundamentals of the theory of finite automata and formal languages [Electronic resource]: textbook. allowance / L.I. Fedoseeva, R.M. Adilov, M.N. Shmokin. - Electron. Dan. - Penza: PenzGTU, 2013 .-- 136 p. - Access mode: https://e.lanbook.com/book/62703. - Title from the screen.* *[2] Malyavko A.A. Formal languages and compilers [Electronic resource] / Malyavko A.A. - Novosib .: NSTU, 2014 .-- 431 p .: ISBN 978-5-7782-2318-9 - Access mode: http://znanium.com/bookread2.php?book=548152* *[3] Korotkova, M.A. Problem book for the course "Mathematical linguistics and the theory of automata": textbook for universities [Electronic resource]: textbook. allowance / M.A. Korotkova, E.E. Trifonov. - Electron. Dan. - Moscow: NRNU MEPhI, 2012 .-- 92 p. - Access mode: https://e.lanbook.com/book/75843. - Title from the screen.* *[4] Sharipbay A. Theory of languages and automata: textbook / author. Sharipbay A.A. - Astana: ENU named after L.N. Gumilyov, 2014. –245 p.*

Course 2 of the Module 11

Module designation	*Organization of computing systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32010*
Subtitle, if applicable	
Course, if applicable	*AOCS 3211 Architecture and organization of computer systems*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Kintonova A*
Lecturer	*Kintonova A*
Language	*Kazakh/Russian*

Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs.:* *-Lecture:15* *-Seminars :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*School Mathematics, Mat 1201 Mathematics*
Module objectives/intended learning outcomes	*In this course, to study the principles of the structural and functional organization of modern computer systems, basic methods and algorithms implemented in various components of the computer system, elements and nodes of a digital computer are considered.* *Forming of students' basic knowledge on structural and functional organization of modern computer systems.* *Forming of student's abilities to apply basic methods to implement various components of the computer system, elements and nodes.* *Students completing the module should:* - *To understand the structure, function and characteristics of computer systems ;* - *To identify the elements of modern instructions sets and their impact on processor design* - *To explain the function of each element of a memory hierarchy* - *To carry out the selection of technologies, means of computer technology in the organization of the process of development and research of objects of professional activity, to ensure the protection of information in the network of software users*
Content	*Introduction to computer networks. The interaction of computers in the network. Network topology and data transmission medium. Communication lines. Network architectures. Communication devices. Protocol stacks. Basics of IP Addressing. Basics of IP routing: basics of IP addressing, IP address representations, subnet mask. Basics of IP routing: assigning IP addresses; IP addresses in local networks. Operating systems. Working in Networks. Means of communication and data exchange. Network services. Security concerns when working in networks*

Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final test.* *Two Midterms are completed by a control work within the course tems.* *Final test (90 min.) have five tasks on exam tickets. On the written exam students are demonstrating their understanding of the course by completing the tasks.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1.Olifer V.G., Olifer N.A. Computer networks. Principles, technologies, protocols. - SPb.: Peter, 2016 - 944p.* *2. Kurose, D. Computer networks. Top-down approach / D. Kurose, K. Ross. - M.: Eksmo, 2016 .- 912 p.* *3. Astakhova I.F. Computer science. Trees, operating systems, networks / I.F. Astakhova et al. - M .: Fizmatlit, 2017 .-- 88 p.* *4. Kulgin M. Technologies for corporate networks. Encyclopedia. - SPb.: Peter, 2016 .-- 650s.*

Course 3 of the Module 11

Module designation	*Organization of computing systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 32010*
Subtitle, if applicable	
Courses, if applicable	*CB 3212 Cybersecurity basics*
Semester(s) in which the module is taught	*Semester 6*
Person responsible for the module	*Kintonova A*
Lecturer	*Niyazova R*
Language	*Kazakh, Russian*
Relation to curriculum	*Basic course, university component for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs.:* *-Lecture:15* *-Seminars :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulation	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*School Mathematics, Mat 1201 Mathematics*

Module objectives/intended learning outcomes	*This course introduces the concept of cyber security, its interdisciplinary nature and its relation to nation, businesses, society and people. Participating students would gain knowledge of various* *cyber security terminologies, technologies, protocols, threat analysis, security principles, security mechanisms, policies, forensics, incidence response and methods/practices to secure systems.* *Students completing the module should:* *- Reasonable understanding of the fundamentals of the cybersecurity domain and related issues;* *- Practical knowledge of various tools, processes and methods to ensure security of systems through a minimum of two hands-on assignments involving attack and protection in a virtual environment;* *- Adequate level of cross-disciplinary knowledge of design, implementation, evaluation and testing of secure protocols, systems or applications* *- Basic knowledge to be able to build bug-free systems, dependable during malice or error* *- Foundational skills for developing expertise in one or more sub-domains of cyber-security* *- To carry out the selection of technologies, means of computer technology in the organization of the process of development and research of objects of professional activity, to ensure the protection of information in the network of software users*
Content	*The Security Environment. Threats, vulnerabilities, and Consequences. Advanced persistent threats. The state of security today. Cryptographic information security methods. Network and computer security.* *- Network Security: Network Security Protocols. Threats. Network security systems. Computer security: data types. Security Management* *- Standards, security policy and controls.* *- Risk Management, - Legal norms* *Basics of Windows Operating System Security* *- User and kernel mode, - File Systems, - Catalog Structure, - Shortcuts and com. Basics of Windows Operating System Security* *- User and kernel mode, - File Systems, - Catalog Structure, - Shortcuts and com. macOS Security Basics, macOS audit, macOS security settings, macOS recovery. Basics of virtualization and cloud computing. Cloud computing management, security and benefits. Information security standards. Client system management, workstation protection and error correction. Server and user administration. Information security and software audit securing. TCP / IP structure, Ethernet and Lan networks.* *Identification of threats inherent in wireless systems. Secure access to corporate applications via wireless devices.* *Cybersecurity industry and career.*

	- Modeling of the information security industry. - Roles and careers in the information security industry. - Professionalization of information security.
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium within the course.* *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 to solve tasks within the course*
Media employed	*Syllabus, educational guide, computer, projector, interactive whiteboard*
Reading list	*1. Biryukov A.A. Information security: defense and attack. - M .:DMK Press, 2013.- 474 p.* *2 Kolisnechenko D. Anonymity and security on the Internet. From the "teapot"* *to the user. - SPb .: BHV-Petersburg, 2012.-240s.* *3 Melnikov V.P., Kleimenov S.A., Petrakov A.M. Information security and information protection. - M .: Publishing Center "Academy", 2011. - 336s.* *4 Ryabko B.Ya., Fionov A.N. Cryptographic protection methods information. Textbook for universities. - M .: Hotline - Telecom, 2014 .-- 229 p.* *5 Forousan B.A. Cryptography and security of networks. - M .: ECOM, 2014.* *784s.* *6 Khalyavin V. How to use the Internet after the adoption of the law "On* *Internet ". - M .: OOO "AST Publishing House", 2013.- 200s.* *7 Khalyavin V. The latest secrets of the Internet. A practical guide user. - M .: MARTIN, 2013.-128s.*

Module 12

Module No & Name	**COMS 42014 Intelligent systems**
Rationale and objective of the module	**Justification:** Intelligent systems provides students with the theoretical foundations of information retrieval, primarily documentary, and the skills to use various documentary IRS, including on the Internet "AI Workshop " is designed to form a holistic view of the current state of the theory and practice of building intelligent systems for various purposes. Transfer knowledge about artificial intelligence. Provide an understanding of the underlying abstractions and arguments for intelligent systems. To enable students to understand the basic principles of artificial intelligence in various applications. allows to study the principles of the structural and functional organization of modern computer systems, basic methods and algorithms implemented in various components of the computer system, elements and nodes of a digital computer are considered.
	Objectives: On successful completion of this course, students will be able to: - Know the concepts of relevance and criteria of semantic correspondence - know the basic methods of developing intelligent and information systems and the specifics of topical problem areas; - To use of neural networks in solving complex problems in data processing, to develop of programs based on neural networks, use algorithmic languages and techniques to create intelligent application - solve genetic problems; find a logical connection between the main sections of the course; draw up crossings, pedigree, and genetic drawings. - be able to work with various models of knowledge representation and justify the choice of one or another model depending on the nature of the subject area and the specifics of the problems being solved, to compose the structure of applied intelligent and information systems
Total ECTS of the module	**23**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
IRS 3309	Information retrieval systems	5
DDIS 3310	Design and development of intelligent systems	5
AIW 4221	AI Workshop	7
ICSCS 4222	Intelligent control systems and cognitive systems	6

Course 1 of the Module 12

Module designation	*Intelligent systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42014*
Subtitle, if applicable	*NA*
Course, if applicable	*IRS 3309 Information retrieval systems*
Semester(s) in which the module is taught	*6*

Person responsible for the module	*Omarbekova A*
Lecturer	*Mukanova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university comnonent for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs:* *-Lecture:15* *-Laboratory :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes laboratory session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and laboratory study.*
Recommended prerequisites	*Math 1201 Mathematics, PP 1203 Programming in Python*
Module objectives/intended learning outcomes	*This module provides study of the theoretical foundations of information retrieval know the main types of information retrieval systems as well as the skills of using various IRS, including on the Internet. Provide an understanding of the underlying abstractions and arguments for intelligent systems. Allows to study the principles of the structural and functional organization of modern computer systems, basic methods and algorithms implemented in various components of the computer system, elements and nodes of a digital computer are considered.* *Students completing the module should be able:* - Know the concepts of relevance and criteria of semantic correspondence; - Analyze and compare of the main Internet retrieval systems;. - Use the query languages and interfaces of these systems; - Apply AI techniques to real-world problems to develop intelligent systems; - using computational models for understanding the psychology and behavior of people, animals, and artificial agents;
Content	*The content provides students with the theoretical foundations of information retrieval, primarily documentary, and the skills to use various documentary IRS, including on the Internet*

Study and examination requirements and forms of examination	*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.* *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.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Text Information Retrieval Systems, Third Edition (Library and Information Science) (Library and Information Science) (Library and Information Science)/ pdfdrive.com/text-information-retrieval-systems-third-edition-library-and-information-science-library-and-information-science-library-and-information-science-e156719774.html* *2. Information Storage and Retrieval Systems: Theory and Implementation (The Information Retrieval Series, Vol. 8)/ https://www.pdfdrive.com/information-storage-and-retrieval-systems-theory-and-implementation-the-information-retrieval-series-vol-8-e184339009.html* 3. *Information Retrieval Systems/ https://www.pdfdrive.com/information-retrieval-systems e42203477.html*

Course 2 of the Module 12

Module designation	*Intelligent systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42014*
Subtitle, if applicable	
Course, if applicable	*DDIS 3310 Design and development of intelligent systems*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Omarbekova A.*
Lecturer	*Omarbekova A*
Language	*Kazakh/Russian*
Relation to curriculum	*Major course, university comnonent for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*

Type of teaching, contact hours	*Total Contact hours/semester - 45 hrs.:* *-Lecture:15* *-Seminars :30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*5*
Requirements according to the examination regulations	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*School Mathematics, Mat 1201 Mathematics*
Module objectives/intended learning outcomes	The acquisition by students of theoretical knowledge and sustainable skills of practical work with the means of intelligent systems and technologies, providing them with professional knowledge for a systematic approach to the creation of automated systems, computer decision-making systems, expert systems, project management and geoinformation systems.
Content	Acquaintance with intelligent systems. Elements of an intelligent system. An example of an intelligent system. Creation of an intelligent system. Analysis of the applicability of intelligent systems. Types of tasks for which intelligent systems are needed. Large tasks. Situations where intelligent systems are successful. Brief basics of working with data. Common mistakes when working with data. Violation of the confidence intervals. Determination of the goals of the intelligent system. An example of difficulty in choosing a target. Intelligent Experience Components Presenting intelligence to the user. Difficulty developing intellectual experience.
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final test.* *Two Midterms are completed by a control work within the course tems.* *Final test (90 min.) have five tasks on exam tickets. On the written exam students are demonstrating their understanding of the course by completing the tasks.*
Media employed	*e-Learning MOODLE, White-board, Laptop, LCD Projector*
Reading list	*1. Hulten J."Building Intelligent Systems". ISBN: 978-5-97060-760-2* *2. Vasiliev V.I. Intelligent control systems. Study guide M. Radio engineering, 2009-392 p .: ill.-Lit.: 387* *3. Gladkov L.A., V.V. Kureichik, V.M. Kureichik. Genetic algorithms. M. Fizmatlit, 2010 - 320 p.*

Course 3 of the Module 12

Module designation	*Intelligent systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42014*

Subtitle, if applicable	
Courses, if applicable	*AIW 4221 AI Workshop*
Semester(s) in which the module is taught	Semester 7
Person responsible for the module	*Omarbekova A*
Lecturer	*Niyazova R*
Language	Kazakh, Russian
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 75 hrs.:* *-Lecture:30* *-Seminars :15* *-Laboratory:30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*7*
Requirements according to the examination regulation	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*School Mathematics, Mat 1201 Mathematics*
Module objectives/intended learning outcomes	The study of the course "AI Workshop " is designed to form a holistic view of the current state of the theory and practice of building intelligent systems for various purposes. Transfer knowledge about artificial intelligence. Provide an understanding of the underlying abstractions and arguments for intelligent systems. To enable students to understand the basic principles of artificial intelligence in various applications.
Content	Artificial intelligence as a scientific field. Theoretical aspects of knowledge engineering. Representation of tasks in the state space. State-space search methods. Reducing a task to a set of subtasks. Search methods for reducing tasks to a set of subtasks. Representation of knowledge in intelligent systems. Semantic networks. Representation of knowledge by rules and inference. Representation of knowledge in frames. Modeling linguistic activity. Understanding Natural Language Queries in Intelligent Systems. Analysis of formal concepts as a tool for conceptual clustering. Linguistic information resources and their application for the problems of computer processing of natural language constructions. Automatic compression of texts and recognition of semantic equivalence.

Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium within the course.* *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 to solve tasks within the course*
Media employed	Syllabus, educational guide, computer, projector, interactive whiteboard
Reading list	1. George F.Luger. Artificial Intelligence. Structures and Strategies for Coomplex Problem Solving. Fourth Edition.- 2003. – 432 p. 2. Bolshakova E.I., Malkovsky M.G., Pil'shchikov V.N.Artificial intelligence. Algorithms for heuristic search (textbook) - Moscow: Publishing Department of the Faculty of Computational Mathematics and Cybernetics, Moscow State University (license ID No. 05899 from 24.09.01), 2002. 83 p. 3. Bessmertny, I.A.Artificial intelligence systems: a textbook for academic bachelor's degree / I.A.Bessmertny. - 2nd ed., Rev. and add. - M.: Yurayt, 2017.- 130 p. 4. Borovskaya, E. Fundamentals of artificial intelligence [Text] / E. Borovskaya. - M .: Binom, 2015.- 128 p. 5. Burakov, M.V. Artificial intelligence systems. Study guide [Text] / M.V. Burakov. - M .: Prospect, 2017.- 440 p. 6. Kudryavtsev, VB Intelligent systems: textbook and workshop for undergraduate and graduate programs [Text] / VB Kudryavtsev, E. E. Gasanov, A. S. Podkolzin. - 2nd ed., Rev. and add. ; Moscow State University M.V. Lomonosov. - M.: Yurayt, 2017.- 219 p. 7. Yasnitsky, L.N. Introduction to artificial intelligence: textbook [Text] / L.N. Yasnitsky. - M .: Academy, 2010.- 176 p.

Course 4 of the Module 12

Module designation	*Intelligent systems*
Module level, if applicable	*Bachelor*
Code, if applicable	*COMS 42014*
Subtitle, if applicable	
Courses, if applicable	*ICSCS 4222 Intelligent control systems and cognitive systems*
Semester(s) in which the module is taught	Semester 7
Person responsible for the module	*Omarbekova A*
Lecturer	*Bekmanova G*

Language	Kazakh, Russian
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program and other Undergraduate Program in the IT faculty*
Type of teaching, contact hours	*Total Contact hours/semester - 60 hrs.:* *-Lecture:30* *-Laboratory:30* *Class size:25 students*
Workload	*Total workload is 150 hours per semester which consists of 60 minutes lectures, 120 minutes seminar session, and 420 minutes self-study per week for 15 weeks.*
Credit points	*6*
Requirements according to the examination regulation	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	*School Mathematics, Mat 1201 Mathematics*
Module objectives/intended learning outcomes	The discipline allows to study the principles of the structural and functional organization of modern computer systems, basic methods and algorithms implemented in various components of the computer system, elements and nodes of a digital computer are considered.
Content	Introduction. Artificial Intelligence. Five Laws of Intelligent Behavior. Main Directions of Advanced AI Research. Expert Systems and Knowledge Engineering Problems. Knowledge Representation Models. Propositional Logic. Script-based Knowledge Representation. Knowledge Processing. : Human Decision Making and Fuzzy Sets. Fuzzy Logic. From Fuzzy Logic to Fuzzy Systems. Genetic Algorithms: Theoretical Backgrounds and Applications. GA Application in Intelligent Control Systems Design. Artificial Neural Networks: Background and Application.
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium within the course.* *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 to solve tasks within the course*
Media employed	Syllabus, educational guide, computer, projector, interactive whiteboard

Reading list	1. Turing A.M. (1950) Computing machinery and intelligence. Mind, 59, 433-460. 2. Oxford dictionary of computing (1991) 3. Kasabov N.K. (1996) Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering, MIT Press, Cambridge, Massachusetts; Smolensky P. (1988) On the proper treatment of connectionism, Behavioral and Brain Sciences, Vol.2, N 1. 4. Rai R. (1996) The Challenge of Artificial Intelligence, Computer, Vol.29, N 10, 86-98. 5. Newell A. (1980) Physical symbol systems. Cognitive Science, 4, 135-183. 6. Minsky M. (1968) Semantic Information processing, MIT Press, Cambridge. 7. Computer Models of Thought and Language, (1973) (Ed. R.Schank, K.Colby)

Module 13

Module designation	*Entrepreneurship and IT StartUp*
Module level, if applicable	*Bachelor*
Code, if applicable	COMS 42015
Subtitle, if applicable	
Courses, if applicable	TEITSU 4222 Technology entrepreneurship and IT StartUp
Semester(s) in which the module is taught	Semester 7
Person responsible for the module	*Tursynova N*
Lecturer	*Tursynova N*
Language	Kazakh, Russian
Relation to curriculum	*Elective course for 6B06112-Artificial Intelligence Technologies educational program*
Type of teaching, contact hours	*Total Contact hours/semester - 60 hrs.:* *-Lecture:30* *-Laboratory:30* *Class size:25 students*
Workload	*Total workload is 180 hours per semester which consists of 120 minutes lectures, 120 minutes seminar session, and 480 minutes self-study per week for 15 weeks.*
Credit points	*6*
Requirements according to the examination regulation	*To attend at least 75% of lecture and seminars study.*
Recommended prerequisites	
Module objectives/intended learning outcomes	The course is aimed towards those students that one day will start their own digital startup, as well as towards those students that one day will work at or together with digital startups. The course addresses critical digital startup planning and building skills
Content	In this course, the participants will gain insight into how digital entrepreneurs start companies and build the toolbox necessary for building a successful venture. The importance of being able to critically evaluate business ideas, business models and business plans is therefore an extensive part of the course.
Study and examination requirements and forms of examination	*The final mark will be weighted as follows:* *-20 degrees for assignments, solving practical problems and Class work;* *-40 degrees for two Midterm exams;* *-40 degrees for final Written Exam.* *Two Midterms are completed by a colloquium within the course.* *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 to solve tasks within the course*
Media employed	Syllabus, educational guide, computer, projector, interactive whiteboard

Reading list	1. Maurya, Ash (2012). Running Lean. O'Rielly Media. ISBN-10 1449305172. 2. Blank, Steve and Dorf, Bob (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch Publishing. ISBN-10 0984999302. 3. https://web-app.usc.edu/soc/syllabus/20173/32055.pdf

Module 14

Module No & Name	**INEX 22004 Practical module**
Rationale and objective of the module	**Justification:** Machine learning is a field of scientific study concerned with algorithmic techniques that enable machines to learn performance on a given task via the discovery of patterns or regularities in exemplary data. Consequently, its methods commonly draw upon a statistical basis in conjunction with the computational capabilities of modern computing hardware. This course aims to acquaint the student with the main branches of machine learning and provide a thorough introduction to the most widely used approaches and methods in this field
	Objectives: On successful completion of this course, students will be able to: - know different machine learning model classes. - comprehend the difference between supervised, unsupervised, and reinforcement learning methods. - understand common machine learning models. - analyze trade-offs in the application of different models. - appropriately choose machine learning models according to a given task
Total ECTS of the module	**24**

Courses of the Module		
Course Number	**Course Name**	**ECTS**
EI 1205	Educational practice	3
IP 2209	Industrial practice	3
IP 3213	Industrial practice	6
IP 4307	Industrial practice	6
PP 4308	Pre – diploma practice	6

Course 1 of the Module 14

Module designation	*INEX 22004 Practical module:*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Teaching staff of Artificial Intelligence Technologies Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Seminars, master's students' independent work (MSIW).*
Workload (incl. contact hours, self-study hours)	*90*
Credit points	*3*
Required and recommended prerequisites for joining the module	*Programming in language C++, Programming in Python*
Module objectives/intended learning outcomes	*Objectives of the Educational internship:* *- consolidation and deepening of theoretical knowledge consolidation and deepening of theoretical knowledge on programming in C++ and Python* *- formation and improvement of basic professional skills*

	and abilities in the field of application of modern information technologies; *- introduction and development of skills to work with real research, industrial and educational projects;* *- formation of information competence for the purpose of successful work in professional activity;* *- getting skills of independent work, as well as working as part of a team;* *- processing of the received materials and preparation of the report on the educational practic.* Learning outcomes: *- able to learn, acquire new knowledge, skills, including in a field other than professional;* *- able to work with information: find, evaluate and use information from various sources;* *- able to describe problems and situations of professional activity using programming languages* *- able to write, design, debug, and optimize program code in Python and C++;*
Content	*1. Search, study and analysis of literature on the task at hand.* *2. Creating a mathematical model of the task.* *3. Development of an algorithm for solving the problem and search for optimal solutions.* *4. Writing and software implementation of the algorithm.* *5. Testing debugging of program code.*
Exams and assessment formats	*Report*
Study and examination requirements	*Based on the results of the practice, students provide a report on the practice in the format of a paper and electronic document, which reflects the performance of an individual assignment during the practice, acquired skills and abilities, formed competencies. The student reports on the results, answers the questions posed, provides a package of documents based on the results of the professional internship and expresses his conclusions and proposals to the commission.*
Reading list	*1. S. Lippmann, J. Lajoye, B. Mu. C ++ programming language. Basic course. 5th ed. - M .: Williams, 2014.* *2. Gaddis T. Let's start programming in Python. - 4th ed.: Per. SPb .: BHV-Petersburg, 2019. - 768 p* *3. Zlatopolsky DM Basics of programming in the Python language. - M.: DMK Press, 2017. - 284 p*

Course 2 of the Module 14

Module designation	*INEX 22004 Practical module: Industrial practice*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Teaching staff of Artificial Intelligence Technologies Department*
Language	*Kazakh, Russian*

Relation to curriculum	*Compulsory*
Teaching methods	*Seminars, master's students' independent work (MSIW).*
Workload (incl. contact hours, self-study hours)	*90*
Credit points	*3*
Required and recommended prerequisites for joining the module	*Algorithms and data structures, Neural network*
Module objectives/intended learning outcomes	*Objectives of the Industrial practice:* *- consolidation and deepening of theoretical knowledge consolidation and deepening of theoretical knowledge on programming in C++ and Python* *- formation and improvement of basic professional skills and abilities in the field of application of modern information technologies;* *- introduction and development of skills to work with real research, industrial and educational projects;* *- formation of information competence for the purpose of successful work in professional activity;* *- getting skills of independent work, as well as working as part of a team;* *- processing of the received materials and preparation of the report on the industrial practic.* *Learning outcomes:* *- is able to describe problems and situations of professional activity, using programming languages and the apparatus of mathematics* *- knows about the most important algorithms and data structures and the basic principles of their design and analysis;* *- knows pattern recognition methods, clustering methods, and their software implementation;* *- able to conduct written and oral communication in Kazakh and Russian.* *The knowledge, skills and abilities acquired during the internship are the basis for the practical training in the 3rd year, and can be used in the implementation of research work (program project, course work, final qualification work), when choosing a specialization in the 3rd year and the work of the graduate.*
Content	*1. Analysis of the terms of reference* *2. Development of an algorithm for solving the problem and search for optimal solutions* *3. Writing and debugging program code* *4. Writing a report*
Exams and assessment formats	*Report*

Study and examination requirements	*Based on the results of the practice, students provide a report on the practice in the format of a paper and electronic document, which reflects the performance of an individual assignment during the practice, acquired skills and abilities, formed competencies. The student reports on the results, answers the questions posed, provides a package of documents based on the results of the professional internship and expresses his conclusions and proposals to the commission.*
Reading list	*1. T. Cormen, C. Leiserson, R. Rivest, K. Stein. Algorithms: construction and analysis. 3rd ed. Per. From English. - M .: Williams, 2014.* *2. Structures and algorithms for data processing Author: Pavlov LA, Pervova NV Publisher: SPb .: Lan: 2020, 256 p* *3. Wirth N. Algorithms and data structures, DMK Press,, 2010.* *4. Levine D. S. Introduction to neural and cognitive modeling. – Routledge, 2018*

Course 3 of the Module 14

Module designation	*INEX 22004 Practical module: Industrial practice*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Teaching staff of Artificial Intelligence Technologies Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Seminars, master's students' independent work (MSIW).*
Workload (incl. contact hours, self-study hours)	*180*
Credit points	*6*
Required and recommended prerequisites for joining the module	*Architecture and organization of computer systems, Machine learning, Object-oriented programming on Java*
Module objectives/intended learning outcomes	*Objectives of the Industrial practice:* *- consolidate and deepen theoretical knowledge of the main methods used in machine learning and instill skills in working with software that implements machine learning algorithms;* *- improvement of basic professional skills and abilities in the field of artificial intelligence* *- development of skills for working with real research and industrial projects;* *- getting skills of independent work, as well as working as part of a team;* *- processing of the received materials and preparation of the report on the industrial practic* *Learning outcomes:* *- able to develop software and information support for computer systems, services, computing systems, databases;*

	- know the basic methods used in machine learning; *- implement machine learning algorithms in a programming language;* *- able to conduct written and oral communication in Kazakh and Russian.* *The knowledge, skills and abilities obtained during the industrial practice are the basis for the industrial practice in the 4th year, and can be used in the implementation of the program project, the final qualifying work and the work of the graduate.*
Content	*1. Analysis of the set terms of reference* *2. Execution of individual service assignments (assignments) of the head of the practice* *3. Writing and debugging program code* *4. Writing a report*
Exams and assessment formats	*Report*
Study and examination requirements	*Based on the results of the practice, students provide a report on the practice in the format of a paper and electronic document, which reflects the performance of an individual assignment during the practice, acquired skills and abilities, formed competencies. The student reports on the results, answers the questions posed, provides a package of documents based on the results of the professional internship and expresses his conclusions and proposals to the commission.*
Reading list	*1.Kuzmenko, N. G. Computer networks and network technologies / N. G. Kuzmenko. - St. Petersburg: Nauka i Tekhnika, 2013.* *2.Brink Henrik, Richards Joseph, Feverolf Mark 687 Machine-trained ie. - St. Petersburg: Piter, 201 7. - 336 p.: ill. - (Series "ISTA Program Library"). ISBN 978-5-496-02989-6* *3.Cubic Meters. Introduction to machine learning / M. Kubat. - 2nd ed. - Cham : Springer, 2017. - 348 p.: table-Springer. - Prem. edict: pp. 347-348; Bibliogr.: pp. 341 345. - ISBN 978-3-319-63912-3. - ISBN 978-3-319 63913-0* *4.Flach P. F70 Machine learning. The Science and art of constructing algorithms that extract knowledge from data / translated from the English by A. A. Slinkin. - Moscow: DMK Press, 2015. - 400 p.: ill. ISBN 978-5-97060-273-7*

Course 4 of the Module 14

Module designation	*INEX 22004 Practical module: Industrial practice*
Semester(s) in which the module is taught	*8*
Person responsible for the module	*Teaching staff of Artificial Intelligence Technologies Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Seminars, master's students' independent work (MSIW).*

Workload (incl. contact hours, self-study hours)	*180*
Credit points	*6*
Required and recommended prerequisites for joining the module	*Decision theory, Deep learning, Software and Systems Engineering Standards*
Module objectives/intended learning outcomes	*Industrial practices should be conducted in third-party organizations (IT companies, banks, research and design institutes), the main activity of which determines the availability of objects and types of professional activities of graduates in this specialty* *Objectives of the Industrial practice:* *- consolidate and deepen theoretical knowledge of the main methods used in deep learning and instill skills in working with software that implements deep learning algorithms;* *- improvement of basic professional skills and abilities in the field of artificial intelligence* *- development of skills for working with real research and industrial projects;* *- getting skills of independent work, as well as working as part of a team;* *- processing of the received materials and preparation of the report on the industrial practic* *Learning outcomes:* *- able to develop software in accordance with software standards;* *- know the modern deep learning models used in areas: computer vision, speech recognition, natural language processing, machine translation, data analysis and others;* *- implement deep learning algorithms in a programming language;* *- able to conduct written and oral communication in Kazakh and Russian.* *The knowledge, skills and abilities acquired during the industrial practice help to implement the software project, the final qualifying work and in the professional activity of the graduate.*
Content	*1. Analysis of the set terms of reference* *2. Execution of individual service assignments (assignments) of the head of the practice* *3. Writing and debugging program code* *4. Writing a report*
Exams and assessment formats	*Report*
Study and examination requirements	*Based on the results of the practice, students provide a report on the practice in the format of a paper and electronic document, which reflects the performance of an individual assignment during the practice, acquired skills and abilities, formed competencies. The student reports on the results, answers the questions posed, provides a package of documents based on the results of the professional internship and expresses his conclusions and proposals to*

	the commission.
Reading list	*1. Menshawy A. Deep Learning By Example: A hands-on guide to implementing advanced machine learning algorithms and neural networks. – Packt Publishing Ltd, 2018.* *2. Jan LeCun, Joshua Bengio, Geoffrey Hinton. Deep Learning / / Nature 521, 436-444 (May 28, 2015)* *3. Blagodatskikh V.A., Volnin V.A., Poskakalov K.F. Standardization of software development / Ed. O.S. Razumova. - M: Finance and Statistics, 2003. –286 p., ISBN 5-279-02657-3.* *4. Project Management: / M.V. Romanov. - M .: ID FORUM: NITs INFRA-M, 2014 .-- 256 p.*

Course 5 of the Module 14

Module designation	*INEX 22004 Practical module: Pre – diploma practice e*
Semester(s) in which the module is taught	*8*
Person responsible for the module	*Teaching staff of Artificial Intelligence Technologies Department*
Language	*Kazakh, Russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Seminars, master's students' independent work (MSIW).*
Workload (incl. contact hours, self-study hours)	*180*
Credit points	*6*
Required and recommended prerequisites for joining the module	

Module objectives/intended learning outcomes	*Pre-graduate practice is organized for students who perform a thesis (project). The purpose of the pre-graduate practice is to complete the writing of the thesis (project).* *Objectives of the Pre- diploma practice:* *- acquisition of professional skills, skills and competencies of students, expansion and systematization of knowledge gained in the study of academic disciplines;* *- improvement of basic professional skills and abilities in the field of artificial intelligence* *- development of skills for working with real research and industrial projects;* *- getting skills of independent work, as well as working as part of a team;* *- processing of the received materials and preparation of the report on the industrial practic* *Learning outcomes:* *- apply theoretical and practical knowledge in solving tasks of artificial intelligence.* *- be able to develop modules of artificial intelligence systems, taking into account the knowledge of regulatory documents and the subject area.* *- solve and analyze problems in the field of artificial intelligence* *- able to conduct written and oral communication in Kazakh and Russian.* *The knowledge, skills and abilities acquired in the course of practice help to implement the program project, write the final qualifying work and in the professional activities of the graduate.*
Content	*1. Study and analysis of special literature on the topic of the diploma work;* *2. Compilation of a literature review.* *3. Fulfillment of an individual task from the department;* *4. Writing and debugging program code* *5. Verification and testing of program code* *6. Writing the final qualifying work* *7. Writing a report*
Exams and assessment formats	*Report*
Study and examination requirements	*Based on the results of the practice, students provide a report on the practice in the format of a paper and electronic document, which reflects the performance of an individual assignment during the practice, acquired skills and abilities, formed competencies. The student reports on the results, answers the questions posed, provides a package of documents based on the results of the professional internship and expresses his conclusions and proposals to the commission.*
Reading list	*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.*