Module Handbook
Degree program 6B06102 «Computer Science»
Study period: 4 years

Module name and code	**HUM113 Modern history of Kazakhstan**
Responsible for module	Professor, Department of Social Studies Nurzhanova Aina Mardanovna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	1
Number of students	120
Module prerequisites	The goal is to give objective historical knowledge about the main stages of the history of modern Kazakhstan; direct students' attention to the problems of the formation and development of statehood and historical and cultural processes. Tasks: - systematization of historical knowledge about the main events of modern history that form the scientific worldview and civic position; - creation of a scientifically based concept of the modern history of Kazakhstan; - creation of an ideological and spiritual basis for the consolidation of a multi-ethnic and poly-confessional Kazakh society. Learning outcomes: - knowledge of the main periods of the history of the twentieth century and independent Kazakhstan; - the ability to analyze the features and significance of the modern Kazakh model of development; - be able to substantiate the fundamental role of historical knowledge in the formation of Kazakhstani identity and patriotism; - the ability to form one's own civic position on the priorities of mutual understanding, tolerance and democratic values of modern Kazakhstani society.
Module content	The course is intended for students of all undergraduate specialties. The versatility and significance of the discipline "Modern History of Kazakhstan" is due to its huge role in strengthening the Kazakh identity, self-awareness of the people, the implementation of tasks related to the need for an intellectual breakthrough in the new millennium. This course covers the period of Kazakhstan's history from the beginning of the 20th century, the Soviet period and independent Kazakhstan. During the study of the course, great importance

	is given to the formation of an active civic position of students. The course is aimed at the humanization of technical education.
Learning outcomes	The goal is to give objective historical knowledge about the main stages of the history of modern Kazakhstan; direct students' attention to the problems of the formation and development of statehood and historical and cultural processes. Tasks: - systematization of historical knowledge about the main events of modern history that form the scientific worldview and civic position; - creation of a scientifically based concept of the modern history of Kazakhstan; - creation of an ideological and spiritual basis for the consolidation of a multi-ethnic and poly-confessional Kazakh society. Learning outcomes: - knowledge of the main periods of the history of the twentieth century and independent Kazakhstan; - the ability to analyze the features and significance of the modern Kazakh model of development; - be able to substantiate the fundamental role of historical knowledge in the formation of Kazakhstani identity and patriotism; - the ability to form one's own civic position on the priorities of mutual understanding, tolerance and democratic values of modern Kazakhstani society
Teaching method	Student-centered learning
Exam form	Exam tickets
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbps; - Personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform; - Attendance at scheduled classes.
Module duration	Autumn and spring semesters (1 and 2) for students of the 1st year of education
References	1. The history of Kazakhstan (from ancient times to the present day) in five volumes. - Almaty, Atamura, 2010. 2. 2. Ayagan B., Abzhanov M.H., Seliverstov S.V., Bekenova M.S. Modern history of Kazakhstan: Textbook for students of non-historical specialties (bachelor's degree) of higher educational institutions/under the general editorship of B.G. Ayagan-Almaty: Raritet, 2010. 3. 3. Modern history of Kazakhstan: Textbook/author. A. Aunasova, A. Suleimenov. Entr.ed. B. Ayagan-Almaty, Raritet, 2010.
Update date	Annually Last updated 19.08.2022

Module name and code	**HUM124 Philosophy**
Responsible for module	lecture, practical exercises, SRO, SROP Mendybayev Serik Kukaevich
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	2
Number of students	120
Module prerequisites	Philosophy forms and develops critical and creative thinking, worldview and culture, provides students with knowledge about the most general and fundamental problems of existence and gives them a methodology for solving various theoretical and practical issues. Philosophy expands the horizon of the student's vision of the modern world, forms citizenship and patriotism, promotes self-esteem, awareness of the value of human existence. It teaches you to think and act correctly, develops practical and cognitive skills, helps you to search and find ways and ways of living in harmony with yourself, society, and the world around you.
Module content	Philosophy forms and develops critical and creative thinking, worldview and culture, provides students with knowledge about the most common and fundamental problems of being and endows them with a methodology for solving various theoretical practical issues. Philosophy expands the horizon of the student's vision of the modern world, forms citizenship and patriotism, contributes to the education of self-esteem, awareness of the value of human existence. It teaches how to think and act correctly, develops the skills of practical and cognitive activities, helps to seek and find ways and means of life in harmony with oneself, society, and the world around.
Learning outcomes	The goal is to know and understand the specifics of philosophy as a science, as the basis for the formation and development of critical thinking and worldview, to see the vital and practical purpose of philosophy. - to develop alternative ways of thinking and understanding to technocracy, the ability to see the universal, universal and valuable content in special scientific and vocational knowledge and cognition, to love and appreciate one's work, profession, to respect the work of other people - understand philosophy as the ethics of personal and social life, work and knowledge, as the basis of the morality of society, culture - to know the basic concepts, themes, schools and personalities of philosophy to master the historical experience of scientific critical and

	creative thinking Skills and abilities (professional, managerial, communicative…) obtained during the course - development of constructive critical thinking, outlook; - the ability to effectively use modern technologies for the development of critical thinking in the future practice of scientific and professional activities; - development of one's vision and understanding of the problems of life, society, practice, knowledge; - be able to substantiate and defend one's views, position, conduct a discussion, debate, dialogue; - development of a culture of professionalism, professional attitude to work, to practical life; - the ability to argue and defend one's views, positions, to lead a discussion, a constructive dialogue, the ability to work in a team; - development of personality skills, freedom and responsibility, social, political and business culture, religious tolerance and tolerance;
Teaching method	Student-centered learning
Exam form	Exam tickets
Criteria for getting credits	- availability of a computer and computer equipment; - availability of an Internet channel with a speed of at least 0.5 Mbps; - personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform; - attendance at scheduled classes.
Module duration	3,4
References	Merab Mamardashvili My experience is not typical, St. Petersburg, Azbuka, 2000 www.yanko.lib.ru 2 Bertrand Russell A History of Western Philosophy http://royallib.com/book/rassel_bertran/istoriya_zapodnoy_filosofii.htm 3 Skirbek G., Gilier N. History of Philosophy. M., Vlados, 2003 4 Philosophy. Textbook (under the editorship of V.D. Gubin and others) M., 2001 5 Golubintsev V.O. etc. Philosophy for technical universities. Rostov-on-Don, 2010, 6 Modern Western Philosophy. Minsk, Book House, 2009
Update date	Annually Last updated 19.08.2022

Module name and code	**LNG105 English Language**
Responsible for module	Associate Professor, Department of English Golovchun Aleftina Anatolevna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher

	75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (6 ECTS)
Study form	Full time
Semester	1, 2 for MA students
Number of students	30
Module prerequisites	Availability of the Teams platform
Module content	The content of the module is designed for undergraduates of technical specialties for the improvement and development of foreign communicative skills in the professional and academic sphere. The module introduces students to the general principles of professional and academic intercultural oral and alternative communication using modern pedagogical technologies (round table, debates, discussions, analysis of professionally-oriented cases, design).
Learning outcomes	The purpose of the module: to form a foreign language professionally-oriented competence among undergraduates The objectives of the course: to develop the ability to realize communicative intention in various situations of professionally-oriented oral and written communication based on four types of speech activity: listening, speaking, reading and writing. To teach how to use a foreign language as a means of accumulation Information for professional and academic communication. Prepare undergraduates for certified tests. Expected learning outcomes: Upon completion of the module, undergraduates will know: -language means of professionally-oriented and academic foreign language communication; - a system of rules for constructing meaningful statements in a foreign language; will be able to use a foreign language as a means of oral and written communication for professional and academic purposes; communicate and request information, express one's own opinion/judgment using reasoning, and evaluative means of language; - it is logical and consistent to build an oral / written statement (in connection with what was heard / read), expressing your personal attitude to the subject of speech; -use a foreign language as a means of professional and academic interaction
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in practical training sessions according to the schedule. In case of absence from the lesson, the student is obliged to notify the teacher within a day and provide a plan for independent study of the topic: - delivery of tasks on time. Penalties of -10% for late delivery are provided; - 20% of non-participation in classrooms (for good reason with supporting documents) - rating "F (Fail)"; - Plagiarism and cheating during the task are not allowed; - mandatory use of electronic gadgets in class, which is welcome, but unacceptable use on the exam.
Module duration	Autumn and spring semesters (1 and 2) for students of the 1st year of education
References	Oxford EAP Pre-Intermediate B1 by Richard Storton. Oxford University Press (e - version) Harrison R. (2015) Headway academic skills: listening, speaking, and study skills. Level 3, Student's book. Oxford: Oxford University Press De Chazal E. & Rogers L. (2013) Oxford EAP. A Course in English for Academic Purposes. Intermediate/ B1+. Oxford: Oxford University Press Zemach Dorothy E. & Rumisek Lisa A. (2005). Academic Writing: from paragraph to essay. MACMILLAN.
Update date	Annually Last updated 19.08.2022

Module name and code	**LNG107 Kazakh (Russian) language**
Responsible for module	Koyanbekova S.B., associate professor of KKIR; Nurmukhan A.S., tutor of KKIR a S.B., associate professor of KKIR; Nurmukhan A.S., tutor of KKIR
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	1,2
Number of students	30
Module prerequisites	Diagnostic testing
Module content	The language material of the course is selected in such a way that the student, assimilating the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and find himself in such situations, was able to correctly evaluate them and choose the appropriate model (strategy) of speech behavior.

	The main emphasis of learning is transferred from the process of knowledge transfer to learning the ability to use the language being studied during the implementation of various types of speech activities, which are reading (provided that the reading is understood), listening (under the same condition) and producing texts of a certain complexity with a certain degree of grammatical and lexical correctness.
Learning outcomes	The key question is: what learning outcomes should students achieve within the module? As a result of mastering the discipline "Kazakh language - basic level", the student must: to master the practical use of reading, writing and understanding skills of sounding speech based on the simultaneous mastering of the basics of grammar (phonetics, morphology and syntax) and word usage during constant repetition with gradual complication of tasks; demonstrate the ability to analyze, synthesize and design skills and abilities corresponding to the pan-European level B1 (Threshold according to the ALTE classification), that is, it appears on the threshold of the level of independent language proficiency; conduct a conversation on everyday topics; describe your experiences; express your opinion; retell and evaluate the content of the book you read, the movie you saw; create simple texts on well-known topics, including those related to professional activity.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbit/sec; - Personal account with a photo of the person on the avatar and corporate mail on theMicrosoft 365 platform; Attendance of classes according to the schedule.
Module duration	3,4
References	1. Kazakh language. Basic level / authors: The Purpose Of The Seminar Is To Familiarize Students With The History Of The Kazakh Language And The History Of The Kazakh Language.Astana: National Testing Center, 2016-320 pages. P 17 ISBN 978-601-7504-37-3 Electronic link: ttps://tilqural.kz/assets/books/0b2a5801ac721ebac75358f351c0dd33.pdf 2. Kuzekova, G. Masakova. Kazakh language: basic level (A2): manual. - Astana: 2018. - 224 pages. Electronic link: https://tilqural.kz/assets/books/d76b6b1027365e54f79e08d1acbe3fd8.pdf 3. Knigger-2. Learn Kazakh legko! - Almaty: School, 2011. - 192 P. vAK 80/81 66K 81.2 Kas-9 4. Kuzekova Z. S., Ayapova T. T., Orazbayeva F. Sh., Mamaeva M. K. Level thematic lexical minimum of basic knowledge of the Kazakh language / Second Edition. - Astana: RSE "National Testing Center", 2017. – 72 pages.
Update date	Annually Last updated 19.08.2022

Module name and code	**MAT101 Mathematics I**
Responsible for module	Associate professor Keltenova Raushan Turlybekova
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	Fall semester (1st semester)
Number of students	120
Module prerequisites	Start the course after passing the discipline "Mathematics I".
Module content	Module "Mathematics II" sections: Indefinite integral; Definite integral; Multiple integrals; Numerical series.Power series.Fourier series.
Learning outcomes	The key question is: what learning outcomes should students achieve within the module? As a result of mastering the discipline "Mathematics II", the student must: **know:** - concepts of indefinite and definite integral; - basic methods of integrating a function of a single variable; - the main applications of the integral; -multiple integrals; - numerical series with positive terms and alternating series; - functional and power series; - the main signs of convergence; - applications of power series. **be able to:** - apply theoretical knowledge in practical classes; - choose the right method for finding the primitive and calculating acertain integral; -calculate multiple integrals; - - investigate numerical and functional series for convergence; -decompose functions into Maclaurin and Taylor series.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbit/sec; - Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform; - Attendance of classes according to the schedule.
Module duration	3,4
References	Piskunov N.S. Differential and integral calculus. Volume 1. - M. Nauka. 1985. Danko P.E., Popov A.G., Kozhevnikov T.Ya. Higher mathematics in exercises and problems. In 2 h.Ch.I,2: M.: Higher School, 1999.

	Written D.T. Lecture notes on Higher Mathematics, Part 1, Part 2,- Moscow: Rolf, 2000.Titles of textbooks, articles, etc. Gusak A.A. Higher Mathematics, Vol.2, Mn.: TetraSystems, 2003. Berman G.N. Collection of problems on the course of mathematical analysis. St. Petersburg, 2004. Lungu K.N., Norin V.P. Collection of problems in Higher mathematics, part 2, Moscow: Iris Press, 2004. Ryabushko A.P. Collection of individual tasks in higher mathematics. Ch. 1, 2, 3, Minsk.:Higher School, 2006 Sobol B.V. Practicum on Higher Mathematics, Rostov n/A: Phoenix, 2006
Update date	Annually Last updated 19.08.2022

Module name and code	**MAT102 Mathematics II**
Responsible for module	Associate professor Keltenova Raushan Turlybekova
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	Spring semester (2nd semester)
Number of students	120
Module prerequisites	Start the course after passing the discipline "Mathematics I".
Module content	The course "Mathematics-II" provides an accessible presentation of the sections: elements of linear algebra and analytical geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".
Learning outcomes	The study of this discipline will allow you to apply in practice the received theoretical knowledge and skills with a high degree of their understanding in the course sections, use them at the appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbit/sec; - Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform; - Attendance of classes according to the schedule.
Module duration	3,4
References	Piskunov N.S. Differential and integral calculus. Volume 1. - M. Nauka.

	1985. Danko P.E., Popov A.G., Kozhevnikov T.Ya. Higher mathematics in exercises and problems. In 2 h.Ch.I,2: M.: Higher School, 1999. Written D.T. Lecture notes on Higher Mathematics, Part 1, Part 2,- Moscow: Rolf, 2000.Titles of textbooks, articles, etc. Gusak A.A. Higher Mathematics, Vol.2, Mn.: TetraSystems, 2003. Berman G.N. Collection of problems on the course of mathematical analysis. St. Petersburg, 2004. Lungu K.N., Norin V.P. Collection of problems in Higher mathematics, part 2, Moscow: Iris Press, 2004. Ryabushko A.P. Collection of individual tasks in higher mathematics. Ch. 1, 2, 3, Minsk.:Higher School, 2006 Sobol B.V. Practicum on Higher Mathematics, Rostov n/A: Phoenix, 2006
Update date	Annually Last updated 19.08.2022

Module name and code	**MAT128 Theory of Probability and Mathematical Statistics**
Responsible for module	Associate professor Keltenova Raushan Turlybekova
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	Spring semester (4th semester)
Number of students	120
Module prerequisites	Start the course after passing the discipline "Mathematics I".
Module content	This course is designed as an introduction to basic concepts of Probability Theory and Statistics with the emphasis on practical problems. Topics include -combinatorics, -conditional probability, -random variables, -limit laws, -statistical point estimation, -hypothesis testing. The main topics are also illustrated and studied in computer statistical programs such as R, Excel, Mathematica
Learning outcomes	• Is able to describe a random experiment and the set of all outcomes. • Is able to apply Classical Formula of probability. • Knows how to apply Bernoulli formula. • Knows the law of total probability. • Is able to calculate posterior probabilities by Bayes' formula. • Is able to construct random variables describing a given random experiment. • Is able to calculate the expected value and variance of these random variables. • Knows the main families of discrete and continuous random variables. • Calculates any probability for Normal Distribution.

	• Is able to approximate probabilities of large number of similar events by CLT. • Knows what is a population and what is a sample from population. • Calculates sample mean, sample variance, unbiased sample variance, sample proportion and quantiles. • Is able to calculate sample mean, sample variance, unbiased sample variance, sample proportion and quantiles in R. • Knows how to construct confidence intervals for the means and proportions. • Is able to show connection with the CLT. • Knows when and why one should use Student instead of Normal distribution for CI. • Knows the main approaches of hypotheses testing. • Is able to construct the null and the alternative hypothesis. • Is able to make a statistical inference by the significance level or by p-value.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbit/sec; - Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform; - Attendance of classes according to the schedule.
Module duration	3,4
References	1. Deep, R. (2006). Probability and Statistics : With Integrated Software Routines. Amsterdam: Academic Press. 2. Young, G. A., & Smith, R. L. (2005). Essentials of Statistical Inference. Cambridge: Cambridge University Press. **3.** Bruce, P. C. (2014). Introductory Statistics and Analytics : A Resampling Perspective. Hoboken, New Jersey: Wiley.
Update date	Annually Last updated 19.08.2022

Module name and code	**MAT113 Discrete Mathematics**
Responsible for module	Associate professor Keltenova Raushan Turlybekova
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	3 (5 ECTS)
Study form	Full time
Semester	Spring semester (2nd semester)
Number of students	120
Module prerequisites	Start the course after passing the discipline "Mathematics I".
Module content	The purpose of this course is to understand and use (abstract) discrete

	structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science.
Learning outcomes	After studying this course, the student will acquire the following knowledge and be able to: Outline fundamental concepts of mathematical logic. Describe how to represent relations in various ways, and how to perform operations on them. Recognize basic properties of Boolean algebras and Boolean functions. Design logic networks and optimize costs using different algorithms and techniques. Summarize certain basic concepts in graph theory, some special types of graphs, as well as some important typical applications of graph theory. Summarize certain notions related to trees, spanning trees and algorithms of find breadth-first and depth-first search trees, as well as typical applications of trees.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	- Availability of a computer and computer equipment; - Availability of an Internet channel with a speed of at least 0.5 Mbit/sec; - Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform; - Attendance of classes according to the schedule.
Module duration	3,4
References	Judith L. Gersting, W. H. Freeman & Company. Mathematical Structure for Computer Science.
Update date	Annually Last updated 19.08.2022

Name and code module	**PHY111 Physics I**
Responsible behind module	Associated Professor Bedelbaeva Gulnar Esmukhametovna
Type module	Base , required module
Level module	Bachelor
Hours per week	3 hours a week in the classroom 2 hours per week individual work of a student with a teacher 75 hours of individual student work per semester Total 150 hours behind semester
Total credits	3 (5 credits)
Form learning	full-time
Semester	Fall semester (1st semester)
Quantity students	120
Module Requirements _	Start off V well after passing school course _ _ " Physics " , " Mathematics "
Content module	Kinematics of Translational Motion Kinematics of Rotary Motion

	Translational Dynamics Energy, Work, Power, and Conservation Laws Mechanical Harmonic Vibrations Molecular Physics, Gas Laws, and Thermodynamics Electrostatics Electric Current and Ohm's Laws Power dissipation and the Joule-Lenz law.
Learning outcomes	Knows and understands the basics of physics used in solving standard problems of professional activity, and influencing the formation of a harmonious personality with a broad outlook and critical thinking. Selects typical methods and methods for performing professional tasks, evaluates their effectiveness and quality. -
Teaching method	student centered education
Exam format	Exam _ tickets, test questions .
Criteria receiving loan	Mandatory participation in training sessions according to the schedule, which determines the readiness for the class. In case of absence from the class, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
Used literature	[1] Trofimova T.I. Physics course: Proc. allowance for universities. M.: Academy, 2004.- 560s. (textbook in pdf format: https://fktpm.ru/file/45-kurs-fiziki-trofimova-taisija-ivanovna-ucheb - posobie.pdf) [2] Trofimova T.I. , Pavlova Z.G. Collection of problems in the course of physics with solutions: Textbook for universities. Ed. 2nd, corrected / 3rd - 591s. M: Higher School, 2002. [9] Trofimova T.I. Physics: 500 Basic Laws and Formulas: A Handbook for University Students. Ed. 3– f – 63 s. M: Higher School, 1999. [3] Saveliev I.V. Course of general physics. T.1. Mechanics, oscillations and waves, molecular physics. –M.: Nauka, Editor-in-Chief of Physics and Mathematics, 2005.- 508s. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t1.pdf) [4] Saveliev I.V. Course of general˘physics. T.2. Electricity. –M.: Nauka, Editor-in-Chief. phys. -math. , 2005.-426s. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t2.pdf) _ _ [5] Grabovsky˘R.I. Course of physics: Textbook for universities. Ed. 6th - 608 p. {Textbooks for universities: Special literature}, St. Petersburg: Lan, 2002. [6] Detlaf A.A., Yavorsky˘B.M. Course of physics: Textbook for technical colleges. Ed. 6th, rev . - 607 p. M: Higher School, 2003. [6] Detlaf A.A., Yavorsky B.M. Course of physics: Textbook for technical colleges. Ed. 6th, rev. - 607 p. M: Higher School, 2003.

	[7] Saveliev I.V. Course of general˘ physics: Proc. allowance for technical colleges: In 5 books: Book. 2: Electricity and magnetism. M.: AST: Astrel, 2005. - 336 p.
Date updates	Annually Last update 08/19/2022

Name and code module	**PHY112 Physics II**
Responsible behind module	Associated Professor Bedelbaeva Gulnar Esmukhametovna
Type module	Base , required module
Level module	Bachelor
Hours per week	3 hours a week in the classroom 2 hours per week individual work of a student with a teacher 75 hours of individual student work per semester Total 150 hours behind semester
Total credits	3 (5 credits)
Form learning	full-time
Semester	Spring semester (2nd semester)
Quantity students	120
Module Requirements _	Start off V well after passing school course _ _ " Physics " , " Mathematics "
Content module	The discipline "Physics II" is a logical continuation of the study of the discipline "Physics 1", and forms a holistic view of the course of General physics as one of the basic components of General theoretical training of bachelors of engineering and technical profile. The discipline "Physics II" includes sections: magnetism, optics, nano-structures, fundamentals of quantum physics, atomic and nuclear physics.
Learning outcomes	Use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of methods of physical research as the basis of the system of professional activity
Teaching method	student centered education
Exam format	Exam _ tickets, test questions .
Criteria receiving loan	Mandatory participation in training sessions according to the schedule, which determines the readiness for the class. In case of absence from the class, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
Used literature	[1] Trofimova T.I. Physics course: Proc. allowance for universities. M.: Academy, 2004.- 560s. (textbook in pdf format:

	https://fktpm.ru/file/45-kurs-fiziki-trofimova-taisija-ivanovna-ucheb - posobie.pdf) [2] Trofimova T.I. , Pavlova Z.G. Collection of problems in the course of physics with solutions: Textbook for universities. Ed. 2nd, corrected / 3rd - 591s. M: Higher School, 2002. [9] Trofimova T.I. Physics: 500 Basic Laws and Formulas: A Handbook for University Students. Ed. 3– f – 63 s. M: Higher School, 1999. [3] Saveliev I.V. Course of general physics. T.1. Mechanics, oscillations and waves, molecular physics. –M.: Nauka, Editor-in-Chief of Physics and Mathematics, 2005.- 508s. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t1.pdf) [4] Saveliev I.V. Course of generalˇphysics. T.2. Electricity. –M.: Nauka, Editor-in-Chief. phys. -math. , 2005.-426s. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t2.pdf) _ _ [5] GrabovskyˇR.I. Course of physics: Textbook for universities. Ed. 6th - 608 p. {Textbooks for universities: Special literature}, St. Petersburg: Lan, 2002. [6] Detlaf A.A., YavorskyˇB.M. Course of physics: Textbook for technical colleges. Ed. 6th, rev . - 607 p. M: Higher School, 2003. [6] Detlaf A.A., Yavorsky B.M. Course of physics: Textbook for technical colleges. Ed. 6th, rev. - 607 p. M: Higher School, 2003. [7] Saveliev I.V. Course of generalˇ physics: Proc. allowance for technical colleges: In 5 books: Book. 2: Electricity and magnetism. M.: AST: Astrel, 2005. - 336 p.
Date updates	Annually Last update 08/19/2022

Module name and code	**CSE155 Algorithmization and programming basics**
Responsible for module	Senior Lecturer Seitbekova Yerkezhan Seitbekkyzy
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	spring semester (2nd semester)
Number of students	120
Module prerequisites	None
Module content	Studying the basics of task algorithmization, classification of programming languages, data types and classification of programming language operators, program development using subroutines, standard programming style modules, programming quality indicators, methods for debugging and testing programs, basics of object-oriented programming
Learning outcomes	At the end of the course the student should know: -modern ideas about the state of matter (matter and fields),

	achievements of science of the 20th-21st centuries in the field of fundamental physics; - the basics of conducting experimental studies with modern measuring equipment and processing their results;
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1 Thomas H. Cormen Charles E. Leiserson Ronald L. Rivest Clifford Stein. Introduction to Algorithms 3rd edition , The MIT Press Cambridg 2 Knut , The Art of Programming Volume 2. 3 Knut , The Art of Programming Volume 3. 4 C++. How to program. 9th edition. By Paul Deitel and Harvey Deitel . Pearson. 5 Michael Goodrich , Roberto Tamassia . Data Structures and Algorithms in Java. 4th edition. John Wiley & Sons , Inc. _ USA. 2006.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE164 Algorithms and data structures**
Responsible for module	Senior Lecturer Satymbekov Maksatbek Nurgaliuly
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (3rd semester)
Number of students	120
Module prerequisites	CSE155 Algorithmization and programming basics
Module content	This educational discipline is implemented as a cycle of lectures and laboratory classes, which acquaint students with the basics of application in solving different tasks, the structure of differentiated tasks (arrays, lists, queues, hashtags, hashtables, stacks, sets, graphs, deques, mapss). The C ++ programming language is used to solve

	various practical tasks . This course should form the skills of students based on the choice of data storage in the solution of the task of processing large volumes of information, which can make this solution effective and competitive.
Learning outcomes	- Knowledge: –Basic types of data structures used in problem solving; - information processing algorithms stored in different types of data structures; Skills: - to make a reasonable choice of the parameters used in the decision of the task of the data structure; - apply data structures and algorithms for their processing in solving different tasks - Competences: - apply the acquired knowledge and skills in their long-term professional activity.
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	Mandatory participation in school activities according to the schedule, which determines the readiness for the lesson. In case of absence of a student in the classroom, in the course of the day to inform the teacher and explain the plan of independent study : - on the basic reading of the presented materials before the lesson ; - with dacha tasks on time. Penalties are provided for -10% for late delivery ; - 20% of failures in the classroom (out of respect for the supporting documents) - assessment " F (Fail)" ; - plagiarism and writing while performing tasks are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but not allowed to use in the exam.
Module duration	1 semester
References	1. D.J. Ahmed-Zaki, Z.H. Yuldashev, G.A. Seralin Algorithms and Data Structure. 2014 2. George Hainamen, Gary Pollis, Stanley Selkov Algorithms Handbook, 2017.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE127 Object-oriented programming**
Responsible for module	Associate Professor Mukazhanov Nurzhan Kakenovich
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester

	150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	spring semester (4th semester)
Number of students	120
Module prerequisites	CSE155 Algorithmization and programming basics
Module content	Introduction. Basic principles of object -oriented Programming Object-oriented programming languages. Java Fundamentals . Simple data types and literals. Operators. Conditional statements: if , switch . Ternary operator Loops : for, while, do-while (commands break, continue). Arrays. Methods. Exception handling Create classes and objects. statistical elements. Access to class members. Area of visibility. Inner classes. anonymous objects. Constructors. Inheritance. Accessing superclass members Encapsulation and polymorphism. Multilevel inheritance. Abstract class. Packages and Interfaces
Learning outcomes	- Knowledge : • apply the Java programming language to solve various problems • describe the methodology of object-oriented programming • create object and class, work with them • explain the concepts of encapsulation, inheritance, polymorphism, abstract classes and interfaces. - Competencies: • Program in the programming language - Java • develop algorithms and programs according to the paradigm of object-oriented programming • design and apply Java classes • use the polymorphism property of classes and objects • handle exceptions in various errors while executing programs
Teaching method	Student-centered learning
Exam form	Exam tickets, test questions.
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson: - mandatory reading of the presented materials before class; - Submission of assignments on time. There are -10% penalties for late delivery; - 20% non-participation in the audience (for a good reason with supporting documents) - grade "F (Fail)"; - plagiarism and cheating when completing a task are not allowed; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable. As part of the training in the discipline, any corruption in any form is unacceptable. The organizer of such actions (teacher, students or third parties on their behalf) bear full responsibility for violation of the laws of the Republic of Kazakhstan.

Module duration	1 semester
References	1. Schildt , Herbert. SH57 Java . The Complete Guide, 10th Ed. : Per. from English. -SPb. LLC " Alfakniga "; 2018. - 1488 p.: ill. - Parallel tit . A 2. Guskova , Olga I. G968 Object - oriented programming in Java : textbook / OI Guskova . - Moscow: MPGU, 2018. - 240 p. ISBN 978-5-4263-0648-6 3. Dubakov A.A. Introduction to Java Object-Oriented Programming : textbook - St. Petersburg: ITMO University, 2016. - 248 p. 4. Vasiliev A. N. B19 Java . Object-Oriented Programming: Textbook. - St. Petersburg: Peter, ISBN 978-5-49807-948-6, 2011. - 400 p. 5. Weisfeld M. Object-oriented thinking. - St. Petersburg: Peter, 2014. - 304 p.: ill. - (Series "Programmer's Library"). ISBN 978-5-496-00793-1
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE607 Computer architecture and concurrency**
Responsible for module	Assistant Professor Alibieva Zhibek Meirambekovna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	spring semester (4th semester)
Number of students	120
Module prerequisites	CSE174 Information and Communication Technology
Module content	Basic concepts and trends in the development of architectures modern computers . processor architectures . Conveyor organization and principles of conveyor processing . Vector processors . Organizations of computer memory and systems . Devices and principles of computer control . GRID concept - technologies, metacomputing and cloud calculations
Learning outcomes	- Knowledge: - basic principles of organization of electronic computers; fundamentals of building modern computing systems; main architectures of modern processors; mechanisms of interaction of the processor with memory and peripheral devices; basic bus architectures .

	Skills: – choose the architecture of the computing system necessary for solving specific applied problems; optimize the structure and evaluate the efficiency of real computing systems; compose algorithms for solving problems that take into account the architectural features of computing systems; - Competencies: - methods for comparing different computer architectures; skills in analyzing the effectiveness of computing systems; skills in applying modern software and hardware to solve applied problems of various classes ;
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	[1] Gurov, V.V. Architecture and organization of computers / V.V. Gurov, V.O. Chukanov . - 2nd ed., rev . - Moscow: National Open University "INTUIT", 2016. - 184 p.: ill., diagrams. - (Fundamentals of information technology). - Bibliography . in book. - ISBN 5-9556-0040-X; The same [Electronic resource]. - URL: http://biblioclub.ru/index.php?page=book&id=429021. [2] Tanenbaum E., Austin T. Computer architecture (6th edition) - M.: Williams , 2013 - (ch.1-5) [3] M. Poshekhonov . The architecture of modern GPUs.-//electronic version on the site Radeon.ru. [4] David A. Patterson and John L. Hennessy, Computer Organization and Design, The Hardware/Software Interface 2013
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE626 Databases**
Responsible for module	Assistant Professor Akhmediyarova Ainur Tanatarovna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (3rd semester)
Number of students	120
Module prerequisites	CSE174 Information and Communication Technology
Module content	The concept of a database. Database management systems. Relational databases. Development and organization of database management systems. Review of software products for the development of database management systems. Development of tables and queries. Development of control programs in the Visual environment Basic for Applications . SQL language. Distributed database management systems. SQL Server 2000 System Databases. Oracle Distributed Database Management System . Post -relational databases. Object-oriented DBMS. Practical examples of using DBMS in production and business
Learning outcomes	Basic knowledge in the field of programming is formed, and algorithms and methods for organizing databases are proposed. The material content of the discipline is divided into five modules, including the concept of a database, reflecting the development and organization of database management systems related to technologies and basic tools of the Oracle DBMS , as well as object-oriented DBMS, which consider the main problems of distributed database management systems. At the end of the course the student should know: - Technologies and fixed assets of Oracle DBMS ; Oracle architecture Database 18C; - Fundamentals, structures of the SQL query language; - A methodology for using tools and operators to access relational databases.
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Kulikov S. Working with MySQL, MS SQL Server and Oracle in examples. EPAM Systems, RD Dep, 2021 2. Satimova E.G. Oracle : Features of SQL. Laboratory practice. – Almaty, 2013. 3. Arup Nanda and Steven Feuerstein , Oracle PL/SQL for DBAs. - Plus symbol. 2008. - 494 pages 4. Urman C. , Oracle Database 10g. Programming in PL/SQL. - M .: "Lori". 2010. 5. Price, D., Oracle 10g SQL. - M .: "Lori". 2010 6. Brown B., Oracle Database. Creation of Web applications. - M .: "Lori". 2010.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE186 Operating system**
Responsible for module	Senior Lecturer Ayapbergenova Asem Tultanovna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (5th semester)
Number of students	120
Module prerequisites	CSE174 Information and Communication Technology
Module content	The discipline "Operating Systems" forms a complex of knowledge, skills and abilities in the field of application of operating systems.

	Considered: memory management, file systems, information input and output, deadlocks, cloud virtualization, multiprocessor systems, security; OS architectures and application programming interfaces, designing parallel interacting computing processes, deadlock problems and methods of dealing with them. *The purpose of studying the discipline:* familiarization with the fundamental principles of the design of modern operating systems, the possibilities of applying fundamental concepts from the achieved technological level and specific requirements for a specific implementation, their relationship with various innovations in this area, as well as with modern trends in the development of operating systems. *The tasks of studying the discipline:* – the concept of a process, process management and methods of process dispatching; – concept of resource, types of resources and management of resources and memory; – devices, device types, disk file system and logical disk structure; – deadlocks, ways to deal with deadlocks; - Loading and configuring the OS.
Learning outcomes	*Know* : the composition and principles of operation of operating systems and environments; concept, basic functions, types of operating systems; machine-dependent OS properties: interrupt handling, process scheduling, I/O servicing, virtual memory management; OS machine-independent properties: work with files; task scheduling, resource allocation; principles of building operating systems; ways to organize device support, hardware drivers; concept, functions and methods of using the software interface of the operating system, types of user interface. *Be able to* : use the tools of operating systems and environments to ensure the operation of computer technology; work in a specific OS; install and maintain operating systems; support applications of various operating systems. *Possess skills* : work with various operating systems and their administration; use of software tools for solving practical problems; development of components of software systems and databases; the use of modern tools and programming technology (justify the design decisions made, set up and perform experiments to verify their correctness and effectiveness). *Be competent* : apply ICT to search and process information; be aware of the need to form new competencies to solve practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and disseminating information); determine the requirements for designing the network architecture, software and hardware of the computer network; develop information systems infrastructure, including databases, operating systems, application software, etc.
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Gordeev A.V., Molchanov A.Yu. System software. - St. Petersburg: Peter, 2012. - 736 p. 2. Tanenbaum E., Bos H. Modern operating systems. 4th ed. - St. Petersburg: Peter, 2018. - 1120 p. 3. Blinkov Yu.V. Study of computer operating systems using virtual machine technology: study guide / Yu.V. Blinkov. - Penza: PGUAS, 2015. - 276 p. 4. Kuryachiy G., Maslinsky K. Linux operating system . - M.: "Internet University of Information Technologies". URL : http :// www . intuit . ru / studies / courses /37/37/ info 5. Kolisnichenko D.N. Linux Tutorial . Installation, configuration, use. - St. Petersburg: Science and technology, 2016. - (Educational portal - Electronic library - Electronic educational literature - Computer science - Operating systems). 6. Kuznetsova, E.S. Laboratory workshop on the discipline "Operating systems": study guide / E.S. Kuznetsova, M.I. Zastavnoy. - Volgograd: IUNL VolgGTU, 2015. - 80 p. 7. Klimov A.P. Windows 7 Registry: Peter; St. Petersburg, 2012. - 325 p.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE633 R language in statistical analysis problems**
Responsible for module	Professor Yerimbetova Aigerim Sembekovna
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)

Study form	Full time
Semester	Fall semester (5th semester)
Number of students	30
Module prerequisites	CSE155 Algorithmization and programming basics
Module content	The purpose of teaching the subject "R language in statistical analysis" is to provide students with basic knowledge of data analysis methods, the main features and syntax of the programming language of the R script, as well as methods for solving basic applied problems of statistical data analysis. Topics covered: Learning R programming language and syntax; practical skills and abilities to work in a graphical environment for the development of RStudio to acquaint students with the methods and tools of intelligent data analysis; R knowledge of working with data analysis software environment; formation of skills of data analysis, structuring and processing; Studying the subject allows students to develop skills of data preparation and analysis in the R environment; mastering practical skills to solve applied problems of statistical data analysis. During the course the student learns the methods and tools of data retrieval, the capabilities of the R environment for the analysis of statistical and graphical data, the practical application of data retrieval stages : Basic knowledge and skills in the field of data analysis, as well as methods of mastering this field are presented.
Learning outcomes	Upon completion of the course the student: must know : Quality in R and digital data processing and of visualization basic methods ; must be : _ - programming in the language work to do for necessary statistical finding information ; must overcome : - Programming in R. Skills: - data analysis and processing skills.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	–Availability of computers and computer equipment . –Speed less 0.5 Mbit / s . availability of an Internet channel. –account and corporate e-mail with a photo of the teacher on the Microsoft 365 platform . –Attendance is required in accordance with the schedule.
Module duration	1 semester

References	1. Demeshev , B. Writing a package for R [Electronic resource]: Notes on R, 2016. http://bdemeshev.github.io/r_cycle/cycle_files/20_package.html 2. Мастицкий , С. Э. Статистический анализ и визуализация данных с помощью R [Electronic resource] / С. Э. Мастицкий , В. К. Shitikov. - 2014. http://www.ievbras.ru/ecostat/Kiril/R/Mastitsky%20and%20Shitikov%202014.pdf 3. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani . An Introduction to Statistical Learning with Applications in R [Electronic resource]. - 2017. - Mode of access: http://www-bcf.usc.edu/~gareth/ISL/ 4. Grolemund , G. R for Data Science [Electronic resource] / Garrett Grolemund , Hadley Wickham. - 2016. http://r4ds.had.co.nz/index.html 5. Victor Lavrenko . Introductory Applied Machine Learning [Electronic resource]. - 2017. https://www.youtube.com/channel/UCs7alOMRnxhzfKAJ4JjZ7Wg https://stepik.org/
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE647 Microservice technologies**
Responsible for module	Lecturer Mambetov Nurball Adilovich
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (5th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	Microservices - also known as microservice architecture - is an architectural style that structures an application as a collection of loosely coupled services that implement business capabilities. The microservice architecture provides continuous delivery/deployment of large complex applications. It also allows an organization to develop its technology stack . This course will allow students to gain knowledge of the basic concepts of microservices, including bounded contexts and the API layer. We'll also look at some of the more complex areas of architecture, as well as the importance of embracing the DevOps culture .
Learning outcomes	- Knowledge :

	-know why microservices are well suited for modern cloud environments that require short development and delivery cycles; -understand which architectures are best used when scaling the system; -know about the tools needed to successfully deploy, manage and monitor applications based on microservices; -understand why microservices are so well suited for cloud environments, DevOps environments in which microservices operate ; - understand interaction of microservices; Skills : - design components of microservice systems; - to provide fault tolerance of systems; - ensure system extensibility; - the ability to break into separate components of monolithic systems; - provide isolation containers ; Competencies: - learn about development methodologies; - explain monolithic and microservice architecture Agile / Scrum _ - Learn Smart endpoints and dumb pipes.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1 K. Richardson. Microservices. Patterns of development and refactoring , 2019 2. T. Laszczewski , Cloud Architectures. Development of sustainable and cost-effective cloud applications, St. Petersburg 2021 3. O. V. Grigoryevich , Computer networks. Principles, technologies, protocols, Progress book, 2020

	4. M. Adrian , Using Docker , O'Reilly Media , 2017 5. P.S. Kocher , Microservices and Docker Containers , DMK Press 2019
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE645 Programming of microcomputer controllers**
Responsible for module	Lecturer Mambetov Nurball Adilovich
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (5th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	The course "Programming of microcomputer controllers" is one of the main disciplines of the specialty. The course is devoted to the study of such issues as the composition and structure of control systems with microcontrollers, tools and programming languages for automation devices on microcontrollers. Tools for debugging programs are being studied. The study of the course " Programming of microcomputer controllers " is the basis for the subsequent study of disciplines related to the design and operation of automation equipment, has a practical significance for solving practical problems in the design of hardware and software, commissioning and operation of automation of enterprises in various fields, will help develop students ' necessary knowledge and practical skills, sufficient for their further activities and allowing them to independently develop new knowledge based on the achievements of science in the relevant industry.
Learning outcomes	In the field of application of microprocessors and microcontrollers in measurement and control systems; principles of construction and structure of microprocessors and microcontrollers, their parameters, features and operating conditions, principles of construction of measurement and control systems using microprocessors and microcontrollers, Assembly programming language and methods of debugging programs. Skills: in matters of microcontroller programming and operation of microprocessor measurement and control systems, be able to: develop software for microcontrollers at the "lower" level; develop software for

	the control computer at the "upper" level; understand the existing hardware and software system and configure it. Skills: developing programs for the microcontroller and debugging them, selecting elements of microprocessor measurement and control systems.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Kernighan, Brian W.Ritchie, Dennis M. The C programming language. 2. Martin M. Insiders guide on STM32 3. Mayorov, S.A., Kirillov, V.V., Pribluda, A.A. Introduction to Micro-ECM. 4. Trevor Martin. STMicroelectronics Microcontrollers on Cortex-M3 core. STM32 Series. 5. Frunze, A.V. Microcontrollers Are Easy. (Volumes 1-3) 6. Hamacher, C., Vranesic, Z., Zaky S. Computer Organization 7. Paul Scherz. Practical electronics for inventors.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE662 Web Programming**
Responsible for module	Lecturer Mukazhanov Nurzhan Kakenovich
Module type	Basic, compulsory module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)

Study form	Full time
Semester	Fall semester (3rd semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	The course is designed to learn the basics of Web programming and development. Before the end of the course, students will have to study: basics of operation, configuration, and administration of software that implements Internet services; • the HTML markup language; basics of web page layout using CSS; • the basics of the JavaScript language; • basic web page design templates; * basics of the PHP server language
Learning outcomes	Students will know: - Development of static sites (HTML, JS, CSS) - Development of dynamic sites (PHP) - Placing projects on the server- hosting side. Be able to: Create static and dynamic web sites and applications yourself. They will have the necessary knowledge for further and deeper study of the direction of web development
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	Steven A. Gabarro, Web Application Design and Implementation, Wiley, 2006.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE627 Human-computer interaction**

Responsible for module	Lecturer Mukazhanov Nurzhan Kakenovich
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (5th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	In this course, students are introduced to the fundamental theories and concepts of human-computer interaction (HCI). HCI is an interdisciplinary field that integrates theories and methodologies across many domains including cognitive psychology, neurocognitive engineering, computer science, human factors, and engineering design. Students will gain theoretical knowledge of and practical experience in the fundamental aspects of human perception, cognition, and learning as relates to the design, implementation, and evaluation of interfaces. Topics covered include: interface design, usability evaluation, universal design, multimodal interfaces (touch, vision, natural language and 3-D audio), virtual reality, and spatial displays. In addition to lectures, students will work on individual and team assignments to design, implement, and evaluate various interactive systems and user interfaces based on knowledge culled from class material and additional research.
Learning outcomes	Upon completion of this discipline, students will: - understand the basics of human and computational abilities and their limitations; - understand the basic theories, tools, and methods in HCI; - understand the fundamental aspects of interface design and evaluation; - understand various simple methods for evaluating the quality of the user interface; - apply appropriate HCI methods to design systems that can be used by people.
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Shneiderman, Plaisant, Cohen, and Jacobs. *Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition)*. Addison Wesley; 2009. 2. Dix, Finlay, Abowd and Beale. *Human-Computer Interaction* . Pearson, 2003. 3. Wickens, Lee, Liu, and Gordon-Becker. *Introduction to Human Factors Engineering* .Pearson, 2004.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE628 Scientific Python**
Responsible for module	Lecturer Moldagulova Aiman Nickolayevna
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (5th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	Currently, Python is recognized as the most common programming language for data processing tasks. This is due to its simplicity and intuitive syntax, which abstracts the connection with the hardware of the computer with a strong emphasis on creating small efficient algorithms. The course provides a quick overview of the syntactic features of the language and its strengths.

	The main attention is paid to the mechanisms of working with data, such as: loading, filtering, transformation, analysis and interpretation of data using well- known models of classification, clustering, regression, etc. the main methods of working with matrices and matrix operations based on the NumPy library are Studied. Students study MatPlotLib data visualization tools in the form of various types of graphs that allow us to analyze performed operations, calculation results, or understand the nature of the data.
Learning outcomes	As a result of completing the course, students get the necessary knowledge about the Python language. Get knowledge in the field of matrix operations programming and working with data. They will learn how to use tools for loading, filtering, processing, and interpreting data. Learn how to use data analysis models such as classification, clustering, and regression. Learn how to use effective approaches when writing software code in Python. Readily use the Python programming language. Apply various data types and control structure.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015, ISBN: 978-9352134755. 2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014. 3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365. 4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176. 5. ReemaThareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173

	6. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE439 Data analysis**
Responsible for module	Lecturer Moldagulova Aiman Nickolayevna
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Spring semester (6th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	This course prepares students to gather, describe, and analyze data, and use advanced statistical tools to make decisions on operations, risk management, finance, marketing, etc. Analysis is done targeting economic and financial decisions in complex systems that involve multiple partners. Topics include probability, statistics, hypothesis testing, regression, clustering, decision trees, and forecasting.
Learning outcomes	1. Gather sufficient relevant data, conduct data analytics using scientific methods, and make appropriate and powerful connections between quantitative analysis and real-world problems. 2. Demonstrate a sophisticated understanding of the concepts and methods; know the exact scopes and possible limitations of each method; and show capability of using data analytics skills to provide constructive guidance in decision making. 3. Use advanced techniques to conduct thorough and insightful analysis, and interpret the results correctly with detailed and useful information. 4. Show substantial understanding of the real problems; conduct deep data analytics using correct methods; and draw reasonable conclusions with sufficient explanation and elaboration. 5. Write an insightful and well-organized report for a real-world case study, including thoughtful and convincing details. 6. Make better business decisions by using advanced techniques in data analytics.
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning: Data Mining, Inference, and Prediction.
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE634 Theory of neural networks**
Responsible for module	Lecturer Mukhamediyev Ravil Ilgizovich
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (7th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	The course provides a comprehensive foundation to artificial neural networks and machine learning with applications to pattern recognition and data mining; learning processes: supervised and unsupervised, deterministic and statistical; clustering; single layer and multilayer perceptrons; least-mean-square, back propagation, deep learning ; Al-Alaoui pattern recognition algorithms; radial basis function networks; committee machines; principal component analysis; self-organizing maps; current topics of interest.
Learning outcomes	Have a knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks. Evaluate whether neural networks are appropriate to a particular application.

	Apply neural networks to particular applications, and to know what steps to take to improve performance. Have knowledge of research literature on neural networks in one particular domain, and be able to put new work into context of that literature.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. S. Haykin: Neural Networks and Machine Intelligence, Third Edition, 2008. 2. Frank Y. Shih: Image Processing and Pattern Recognition 3. Andrew R. Webb and Keith D. Copsey: Statistical Pattern Recognition, 3rd Edition 4. J. T. Tou and R. C. Gonzalez: Pattern Recognition Principles, Addison-Wesley. 5. MATLAB Neural Networks Toolbox and Image Processing Toolbox. 6. C. M. Bishop: Neural Networks for Pattern Recognition
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE651 Natural language processing**
Responsible for module	Lecturer Erimbetova Aigerim Sembekovna
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time

Semester	Fall semester (7th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	Natural language processing (NLP) is a rapidly developing field of research, the results of which are actively used in the form of speech and text processing technologies. The need to develop this area is related to the huge amount of information currently generated. NLP as a research area includes a wide range of applied topics, which include: automatic translation, automatic abstracting, generating responses to user requests, information extraction, information retrieval, tonality analysis, etc. in solving these problems, linguistic, statistical methods, special language models, machine learning, etc. are used. The course covers the theoretical aspects of NLP, including basic information from the field of linguistics, and practical methods of text processing using the Natural Language ToolKit.
Learning outcomes	At the end of the course, students will: Understand: what is NLP, what is a statistical language model, what software methods and algorithms are used in the NLP field Know: -Basic concepts of NLP, methods and algorithms for text processing, methods of text classification, methods and algorithms for solving the main problems of NLP. Be able to: To develop software for word processing, database, NLTK Use text processing methods to solve specific information processing tasks.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Steven Bird, Ewan Klein, Edward Loper, Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit (O'Reilly 2009, website 2018) http://www.nltk.org/book/

	2. Dipanjan Sarkar, Text Analytics with Python (Apress/Springer, 2016) https://link-springer-com.proxy.uchicago.edu/book/10.1007%2F978-1-4842-2388-8
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE632 Enterprise Web programming**
Responsible for module	Lecturer Aizhulov Daniyar
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Spring semester (6th semester)
Number of students	30
Module prerequisites	CSE164, CSE127, CSE662
Module content	Enterprise web applications are a complex relationship between the client, server, and any additional back-end services. Web systems are becoming more supportive of users such that the system must adapt based on the needs and behaviors of the users. This course will support the understanding of the data that drives the enterprise web development, which includes the analysis of web traffic and usage, ads, and the personalization of the web experience. This course focuses on the development of an enterprise web application with specific emphasis on the server-side enterprise web application programming and an n-tier system approach. The students will design and develop a full enterprise web application including an n-tier implementation over the lifetime of the course. The development aspect will include server programming languages and systems (such as PHP, Django, Node) and database support (such as mySQL) as well as appropriate front-end development.
Learning outcomes	1. Understand the development of a server-side n-tier enterprise web system including its capabilities and limitations, along with the analysis of the web traffic and usage patterns. 2. Develop skills in server-side web application development technologies. 3. Design an enterprise web product based on data analytics approaches to provide an enriched content based system. 4. Apply features to create a functioning enterprise web application.
Teaching method	Student-centered learning
Exam form	Multivariate test

Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	Pratical Web Analytics for User Experience, Michael Beasley UXPin Web UI Design Patterns 2014
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE188 Basics of artificial intelligence**
Responsible for module	Lecturer Mukhamediyev Ravil Ilgizovich
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (7th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviors on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. The main topics in AI include: problem solving, reasoning, planning, natural language understanding, computer vision, automatic programming, machine learning, and so on.
Learning outcomes	1. Identify problems where artificial intelligence techniques are applicable 2. Apply selected basic AI techniques; judge applicability of more advanced techniques. 3. Participate in the design of systems that act intelligently and learn from experience.

Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson/Prentice Hall
Update date	Annually Last updated 19.08.2022

Module name and code	**CSE651 Introduction to Big Data**
Responsible for module	Lecturer Moldagulova Aiman Nickolayevna
Module type	Basic, elective module
Module level	Bachelor
Hours per week	3 hours per week in class 2 hours per week student individual work with teacher 75 hours student individual work per semester 150 hours total per semester
Credit amount	5 (ECTS)
Study form	Full time
Semester	Fall semester (7th semester)
Number of students	30
Module prerequisites	CSE164, CSE127
Module content	The course provides an introduction to one of the most common frameworks, Hadoop, that has made big data analysis easier and more accessible -- increasing the potential for data to transform our world! At the end of this course, you will be able to: Describe the Big Data landscape including examples of real world big data problems including the three key sources of Big Data: people, organizations, and sensors. Explain the V's of Big Data (volume, velocity, variety, veracity, valence, and value) and why each impacts data collection, monitoring, storage, analysis and reporting. Get value out of Big Data

	by using a 5-step process to structure your analysis. Identify what are and what are not big data problems and be able to recast big data problems as data science questions. Provide an explanation of the architectural components and programming models used for scalable big data analysis. Summarize the features and value of core Hadoop stack components including the YARN resource and job management system, the HDFS file system and the MapReduce programming model. Install and run a program using Hadoop
Learning outcomes	Be able to summarize the role of big data modeling and management as a precursor to integration and processing. Be able to describe the basic concepts in big data integration and processing. Be able to download, install, and run the Cloudera VM, the required data sets, and the Jupyter Notebooks for this course.
Teaching method	Student-centered learning
Exam form	Multivariate test
Criteria for getting credits	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for self-study of the lesson : - obligatory reading of the presented materials before class ; - Giving assignments on time. There are -10% penalties for late delivery ; - 20% non-participation in the audience (for a good reason with supporting documents) - grade " F (Fail)" ; - plagiarism and cheating when performing a task are not allowed ; - Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.
Module duration	1 semester
References	1. Dirk deRoos. Hadoop For Dummies. 2014. 2. Jimmy Lin and Chris Dyer, Data-Intensive Text Processing with MapReduce, Morgan & Claypool Publishers, 2010. http://lintool.github.com/MapReduceAlgorithms/ 3. Chuck Lam, Hadoop in Action, December, 2010 | 336 pages ISBN: 9781935182191, http://netlab.ulusofona.pt/cp/HadoopinAction.pdf
Update date	Annually Last updated 19.08.2022