NJSC SHAKARIM UNIVERSITY OF SEMEY

EDUCATIONAL PROGRAM

6B06 - Information and Communication Technologies
(Code and classifcation of the feld of education)

6B061 - Information and communication technologies
(Code and classifcation of the direction of training)

0610
(Code in the International Standard Classifcation of Education)

B057 - Information technology
(Code and classifcation of the educational program group)

6B06106 - SMART systems and programming
(Code and name of the educational program)

Bachelor
(Level of preparation)

Semey

Educational program

6B06 - Information and Communication Technologies
(Code and classification of the field of education)

6B061 - Information and communication technologies
(Code and classification of the direction of training)

0610
(Code in the International Standard Classification of Education)

B057 - Information technology
(Code and classification of the educational program group)

6B06106 - SMART systems and programming
(Code and name of the educational program)

bachelor
(Level of preparation)

Semey 2023

PREFACE

Developed

The educational program 6B06106 - SMART systems and programming in the direction of preparation 6B061 - Information and communication technologies on the basis of the State Compulsory Standards of Higher and Postgraduate Education approved by the Order of the Ministry of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No 2 (as amended by the order) was developed by the Academic Committee dated 20.02.2023 No 66).

Members of the Academic Committee	Full name	Academic degree, academic title, position	Signature
Head of the Academic Committee	Nurimkhan Gulnur	Dean of the faculty of Engineering and Technology	
Educational program manager	Bekbayeva Roza	Senior Lecturer of the Department of Automation, Information Technology and Urban Planning, Ph.D.	
Member of the AC	Kozhakhmetova Dinara	Head of the Department of automation, information technology and urban planning, PhD	
Member of the AC	Zhanuzakov Yerzhan	Senior lecturer of the Department of automation, information technology and urban planning	
Member of the AC	Bekenov Alischer	Head of IP "Title Agency"	
Member of the AC	Zenkovich Vladimir	Head of the Technical Department Institution "Kazakh Network Information Center	
Member of the AC	Zhumashova Asel	Student of the VT-101 group	
Member of the AC	Tleboldy Ulpa	Student of the VT-101 group	

Reviewing

Full name of the reviewer	Position, place of work	Signature
Bidakhmetov Akylzhan	Head of IT Department, "Lombard Alka" LLP	

Reviewed

at the meeting of the Quality Assurance Commission of the Faculty of Engineering and Technology
Recommended for approval by the Academic Council of the University
Protocol № 4.6 "10" April 2023
Chairman of the Commission on Quality Assurance Abdilova G.

Approved at the meeting of the Academic Council of the University Protocol No. 8 "25" April 2023.

Approved

at the meeting of the Academic Council of the University
Protocol № 1 "01" of September 2023
Chairman of the Academic Council of the University Orynbekov D.R.

Content

1.Introduction

1.1.General data

Training under the educational program "6B06106 - SMART systems and programming" is carried out at the Department of "Automation, Information Technology and Urban Planning" of the Faculty of Engineering and Technology of the NAO "Shakarim University" in Semey. The developers are both teachers of the department who have extensive professional experience in the scientific and pedagogical field, and interested stakeholders. The educational program has been developed taking into account the needs of the regional labor market.

The educational program regulates the following aspects:

1. Objectives: the main goals and objectives of the educational program are determined.
2. Expected results: the knowledge, skills, skills and competencies that graduates are expected to have after successful completion of the program are determined.
3. Content: Describes the content of the educational process, including topics, modules, educational materials and resources.
4. Conditions and technologies of implementation: the methods and approaches that will be used for the implementation of the educational process are determined, including lectures, practical classes, project work, the use of modern information technologies and other resources.
5. Assessment of the quality of graduate training: criteria and methods for assessing the level of graduate training are determined, including exams, control papers, project assignments and other forms of assessment.
6. Characteristics of the program and areas of professional activity of the graduate: the main directions, spheres and objects of professional activity of the graduate are described.
7. Learning outcomes and acquired competencies: specify the specific skills, knowledge and competencies that students will receive at the end of the program.
8. Policy of evaluation of learning outcomes: the principles and approaches to the evaluation of educational achievements of students are determined.
9. Organization of the educational process: the structure of the program, the schedule of classes, resources and support that ensure the quality of training of students are described.
10. Modules of the educational program: the components of the modules that are included in the program and determine the educational units and their content are described.
11. Methodological materials: manuals, manuals, recommendations and other materials necessary for the implementation of educational technologies and methods are provided.

The educational program is the main document defining the main aspects of teaching and training students in this area of education.

The educational program allows graduates to acquire the following skills:

1. Programming: Graduates gain programming skills in various languages, such as HTML, CSS, JavaScript, Python, Java, Swift and others. They will learn how to create and maintain websites, mobile applications and smart systems.
2. Web development: Graduates will master the development of websites, including creating user interfaces, working with databases, using frameworks and tools for developing web applications.
3. Mobile Application Development: Graduates will learn how to create mobile applications for various platforms, such as iOS and Android. They will master the skills of developing user interfaces, working with mobile devices and using specialized tools and frameworks.
4. Working with Smart Systems: Graduates will gain knowledge about smart technologies and smart systems, such as smart home, Internet of Things (IoT), automation and device management. They will learn how to develop applications and integrate various devices and technologies to create smart systems.
5. Teamwork: Graduates develop teamwork, collaboration and communication skills. They will learn how to interact effectively with other developers, designers and information technology specialists.
6. Application Design and Architecture: Graduates will learn about the principles of application design and architecture, including best practices, design patterns and principles for the development of scalable and reliable systems.
7. Problem Solving and Analytical Thinking: Graduates develop skills in analyzing, finding solutions and solving problems related to software development. They will learn how to effectively and systematically approach the solution of technical problems.

8. Testing and Debugging: Graduates will master the skills of testing and debugging software to ensure its quality and reliability.
9. Relevance and updating of skills: Graduates will learn to follow the latest trends and new technologies in the field of web programming, mobile applications and smart systems in order to update and update their skills.
The educational program provides an individual approach to students with special educational needs, taking into account their specific requirements. It is aimed at ensuring equal opportunities for quality education and the development of social skills.

1.2.Completion criteria

The main criterion for the completion of bachelor`s degree programs is the development of at least 240 academic credits for the entire period of study, including all types of student`s educational activities.

1.3.Typical study duration: 3 years

2.PASSPORT OF THE EDUCATIONAL PROGRAM

2.1.EP purpose	Training of highly qualified specialists in the field of software development for web and mobile applications, smart technologies capable of effectively applying their knowledge and skills to create innovative and functional solutions that meet modern requirements of the information industry
2.2.Map of the training profile within the educational program	
Code and classification of the field of education	6B06 - Information and Communication Technologies
Code and classification of the direction of training	6B061 - Information and communication technologies
Code in the International Standard Classification of Education	0610
Code and classification of the educational program group	B057 - Information technology
Code and name of the educational program	6B06106 - SMART systems and programming
2.3.Qualification characteristics of the graduate	
Degree awarded / qualification	Bachelor`s degree in Information and Communication technologies in the educational program
Name of the profession / list of positions of a specialist	Web developer; mobile developer; Smart system development specialist; Full-stack developer; UI/UX designer; software architect; Software tester; DevOps engineer; Game development specialist; Project manager; interface designer; database administrator
OQF qualification level (industry qualification framework)	6
Area of professional activity	Website and application development, mobile application development, interface design and user experience, databases and data storage, adaptive and responsive design, testing and debugging, integration and deployment, security, project management: Planning, organizing and coordinating the development of web projects, mobile applications and smart systems.
Object of professional activity	1. Educational institutions: Universities, colleges and schools that offer courses and programs on web programming and mobile application development. 2. Online stores and e-commerce: Companies that sell goods and services online need to develop and support websites and platforms for e-commerce. 3. Media and Entertainment: Media companies, publishers, game studios and entertainment platforms need to develop websites, mobile applications and smart systems to provide content and interactive services. 4. Banks and Financial Institutions: Financial institutions develop web and mobile applications for online banking, electronic payments, financial management and other financial services. 5. Consulting and IT services: Companies providing consulting services in the field of information technology and software development are looking for specialists with web programming and mobile development skills. 6. Web studios and agencies: Companies specializing

	in the development of websites, web applications and interfaces. 7. IT companies: Technology companies providing various services in the field of information technology, including the development of web applications and mobile applications. 8. Enterprise IT departments: Large organizations and enterprises with their own IT departments that develop and support web applications, mobile applications and smart systems for internal use or interaction with customers. 9. Freelancers and independent developers: Independent specialists working on a self-employed basis, fulfilling orders for the development of web products, mobile applications and smart systems from different clients.
Types of professional activity	-Software development -System administration and network infrastructure -Information security and cybersecurity -Data analytics and machine learning -Project and product management -Design and user experience -Consulting and business development -IT service and support -Teaching and education -Internet marketing and digital advertising
Graduate Model	1. Knowledge and understanding: -Fundamentals of web technologies, including HTML, CSS and JavaScript. -Knowledge of various frameworks and libraries for web development, such as React, Angular or Vue.js -Understanding the principles of mobile application development for various platforms, such as Android and iOS. -Knowledge of programming languages for mobile development, for example, Java, Kotlin, Swift or Objective-C. -Understanding the architecture and the main components of smart systems. 2. Development skills: -Web development: the ability to create dynamic web pages, interactive elements, work with databases and APIs. -Mobile development: the ability to develop a user interface, work with the hardware capabilities of devices and integrate network services. -Development of smart systems: the ability to create applications that can control and interact with various devices and sensors. 3. Testing and debugging skills: -Testing of web and mobile applications, including functional testing and user interface testing. -Debugging and correcting errors in the code. -Ability to use tools for automated testing and quality control. 4. Teamwork and communication skills: -Ability to work in a team of developers and other specialists. -The ability to communicate effectively and transmit

	information. -Collaborative programming and the use of version control systems such as Git. 5. Analytical and problem-oriented skills: -Ability to analyze customer requirements and transform them into application functionality. -Problem solving, identification and correction of errors in the code. -Ability to design effective and optimized solutions.

3.Modules and content of the educational program

Module 1. Fundamentals of social and humanitarian knowledge

Foreign language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29305 (3011295)
Course	1
Term	1
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The content of the discipline «Foreign language» assumes the formation of students`linguo- cultural, socio- cultural, cognitive and communicative competencies at B2 level. The discipline is aimed at deep and extended study of productive and receptive language material. As a result, the student must be able to understand all types of speech activity in accordance with the requirements of B2 level and master the subject content of the discipline and speech.

Purpose of studying of the discipline

Formation of linguo- culturological, socio- cultural, cognitive and communicative competence of students in the process of foreign language education at the B2 level, pan-European competence. Depending on the level of training, the student at the time of completing the course reaches the level B2 of the pan-European competence, if the language level of the student at the start is higher than the level B1 of the pan-European competence.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Foreign language

Kazakh language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29306 (3011297)
Course	1
Term	1
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at deepening the acquired knowledge of students in the framework of the school curriculum, as well as the use of language and speech means based on a full understanding of vocabulary and grammatical system of knowledge; the formation of socio-humanitarian worldview of students within the framework of the national idea of spiritual revival; free expression of mobile thought as a means of speech communication and in the process of communication; awareness of the national culture of the people, the ability to distinguish features of national cognition.

Purpose of studying of the discipline

Forms through phraseological units the recognition of national culture, its meaning as a linguistic unit related to spiritual culture; skills of identifying facts of national and cultural significance in the formation of Kazakh phraseology.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Kazakh language

Bases of economics, law and ecological knowledge

Discipline cycle	General educational disciplines

Discipline component	University component
SubjectID	29312 (3011301)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The integrated discipline includes the main issues and principles in the field of fundamentals of law and anti- corruption culture, economics, entrepreneurship and leadership, ecology and life safety. Features of the use of regulatory legal acts, the ability to use the business, ethical, social, economic, entrepreneurial and environmental standards of society. Specifics of environmental-legal, economic, entrepreneurial relations, leadership qualities and principles of combating corruption.

Purpose of studying of the discipline

It consists in studying the basic patterns of the functioning of living organisms, the biosphere as a whole and the mechanisms of their sustainable development under the conditions of anthropogenic impact and emergency situations; in understanding the concept of corruption, the legitimacy of the fight against it, the content of the state penal policy; in the formation of students` basic fundamental stable knowledge on the basics of economic theory, in instilling the skills and abilities of economic thinking; in introducing students to the theory and practice of entrepreneurship, to the basics of creating their own business; in the formation of theoretical knowledge and practical skills for the development and improvement of leadership qualities.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Russian language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29311 (3011299)
Course	1
Term	1
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline is intended for the development of the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication; for teaching students practical mastery of the Russian language in various areas of communication and various situations, mastering the specifics of functional semantic types and genres of functional styles of speech, enriching the vocabulary with special vocabulary, forming and improving the skills of monologue and dialogic speech.

Purpose of studying of the discipline

The purpose of the program is to form the socio-humanitarian worldview of students in the context of the national idea of spiritual modernization, involving the development on the basis of national consciousness and cultural code of the qualities of internationalism, tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the modernization of the country and personal career growth of future specialists.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Russian language

Physical Culture

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29396 (3011307)

Course	1
Term	1
Credits count	2
Practical and seminar classes	60hours
Total	60hours
Knowledge control form	Examination

Short description of discipline
It provides for the joint cooperation of a teacher and a student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline, preparing students for participation in mass sports competitions; forms motivational and value attitudes towards physical culture and the need for systematic physical exercises and sports; gives basic knowledge about the use of physical culture and sports in the development of vital physical qualities.

Purpose of studying of the discipline
The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
School course

Postrequisites
Physical Culture

Kazakh language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29404 (3011298)
Course	1
Term	2
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at expanding language literacy, free communication with the environment and mental and ideological skills of the student, understanding the role of language in the process of mastering world- class knowledge through the formation of a future specialist`s worldview based on national consciousness and cultural code, improving the knowledge of the state language by future specialists, increasing the scope of use of the Kazakh language by specialists.

Purpose of studying of the discipline
Ensuring high- quality mastery of the Kazakh language as a means of social, intercultural, professional communication through the formation of communicative competencies at all levels of language use.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
Kazakh language

Postrequisites
Basic and profile disciplines of the EP

Foreign language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29403 (3011296)
Course	1
Term	2
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The content of the discipline «Foreign language» assumes the formation of students`linguo- cultural, socio- cultural, cognitive and

communicative competencies at B2 level. The discipline is aimed at deep and extended study of productive and receptive language material. As a result, the student must be able to understand all types of speech activity in accordance with the requirements of B2 level and master the subject content of the discipline and speech.

Purpose of studying of the discipline

Formation of linguo- culturological, socio- cultural, cognitive and communicative competence of students in the process of foreign language education at the B2 level, pan-European competence. Depending on the level of training, the student at the time of completing the course reaches the level B2 of the pan-European competence, if the language level of the student at the start is higher than the level B1 of the pan-European competence.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

Foreign language

Postrequisites

Basic and profile disciplines of the EP Information and communication technology

History of Kazakhstan

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29407 (3011305)
Course	1
Term	2
Credits count	5
Lections	30hours
Practical and seminar classes	15hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Qualification examination

Short description of discipline

The main stages of the history of Kazakhstan are studied with: nomadic statehood, Turkic civilization, the era of colonialism, the Soviet period, independence. The driving forces, trends, patterns of historical development are analyzed; problems: ethnogenesis of the Kazakh people, the formation of statehood, national liberation movements, demographic development. The skills of analyzing historical events and facts, working with historical literature are being formed.

Purpose of studying of the discipline

The purpose of the discipline is to provide objective knowledge about the main stages of the development of the history of Kazakhstan from ancient times to the present.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Philosophy

The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29406 (3011302)
Course	1
Term	2
Credits count	8
Lections	30hours
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	55hours
Independent work of the student	110hours
Total	240hours
Knowledge control form	Examination

Short description of discipline

The module of socio-political knowledge involves the study of four scientific disciplines – sociology, political science, cultural studies, psychology, each of which has its own subject, terminology and research methods. Interactions between these scientific disciplines are carried out on the basis of the principles of information complementarity; integrativity; methodological integrity of research approaches of these disciplines; generality of the methodology of learning, result-oriented; unified system representation of the typology of learning

outcomes as formed abilities.

Purpose of studying of the discipline

Formation of social and humanitarian worldview of students in the context of solving the problems of modernization of public consciousness, defined by the state program "Looking into the Future: Modernization of Public Consciousness".

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

School course

Postrequisites

Philosophy

Russian language

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29405 (3011300)
Course	1
Term	2
Credits count	5
Practical and seminar classes	45hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline is intended for the development of the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication; to teach the scientific style of speech as a language of specialty, the creation of secondary texts, the formation of skills for the production of oral and written speech in accordance with the communicative goal and the professional sphere of communication, instilling the skills of speech etiquette, business rhetoric.

Purpose of studying of the discipline

The purpose of the program is to form the socio-humanitarian worldview of students in the context of the national idea of spiritual modernization, involving the development on the basis of national consciousness and cultural code of the qualities of internationalism, tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the modernization of the country and personal career growth of future specialists.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

Russian language

Postrequisites

Basic and profile disciplines of the EP

Physical Culture

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29408 (3011308)
Course	1
Term	2
Credits count	2
Practical and seminar classes	60hours
Total	60hours
Knowledge control form	Examination

Short description of discipline

It provides for the joint cooperation of a teacher and a student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline, the ability to exercise control and self-control in the process of classes, gaining knowledge on health promotion, hardening and increasing the body`s resistance to the effects of adverse factors of labor activity, mastering methods of selection of physical exercises and sports.

Purpose of studying of the discipline

The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

Physical Culture

Postrequisites
Physical Culture

Physical Culture

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29512 (3011309)
Course	2
Term	1
Credits count	2
Practical and seminar classes	60hours
Total	60hours
Knowledge control form	Examination

Short description of discipline
Provides for the joint cooperation of the teacher and the student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline; increasing the level of physical fitness and developing physical qualities; mastering the technique of sports; education of discipline, collectivism, comradely mutual assistance; education of mental stability, development and improvement of basic motor qualities - endurance, strength, speed, dexterity, flexibility.

Purpose of studying of the discipline
The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
Physical Culture

Postrequisites
Physical Culture

World of Abai

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29530 (3011303)
Course	2
Term	1
Credits count	3
Lections	15hours
Practical and seminar classes	15hours
Independent work of a student under the guidance of a teacher	20hours
Independent work of the student	40hours
Total	90hours
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying historical facts, the philosophical and artistic foundations of the works of Abay Kunanbaev, Shakarim Kudaiberdiev, which form worldview and aesthetic values, the student`s ability to express his opinion, practical skills and perception of such human qualities as morality, honesty, artistic character. The genius of the writers of Kazakh literature and the role of M. Auezov in the study and popularization of Abai`s heritage, the significance of his works for history, literature and science are determined.

Purpose of studying of the discipline
Formation of the meaning of philosophical and ideological being, understanding of the problems raised in the works of Abai Kunanbayuly, Shakarim Kudaiberdiuly, Mukhtar Auezov and application of the acquired knowledge in the practice of everyday life.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

Postrequisites
Basic and profile disciplines of the EP

Information and communication technology

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29692 (3011304)
Course	2
Term	2
Credits count	5

Lections	15hours
Practical and seminar classes	15hours
Laboratory works	15hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at mastering the conceptual foundations of the architecture of computer systems, operating systems and networks by students; formation of the ability to critically understand the role and signifcance of modern information and communication technologies in the era of digital globalization, new "digital" thinking, knowledge about the concepts of developing network and web applications, skills in using modern information and communication technologies in various felds of professional activity, scientifc and practical work, for self-educational and other purposes.

Purpose of studying of the discipline
Formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Physical Culture

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	29689 (3011310)
Course	2
Term	2
Credits count	2
Practical and seminar classes	60hours
Total	60hours
Knowledge control form	Examination

Short description of discipline
Provides for the joint cooperation of the teacher and the student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline; acquisition of versatile abilities and skills for the development of physical abilities, socio-cultural experience and socio-cultural values of physical culture and sports; development of communication skills, thinking, self-development, the formation of experience in the implementation of sports and recreational and training programs.

Purpose of studying of the discipline
The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites
Physical Culture

Postrequisites
Physical Culture

Philosophy

Discipline cycle	General educational disciplines
Discipline component	Compulsory component
SubjectID	30031 (3011306)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at developing students` openness of consciousness, understanding their own national code and self-consciousness, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, a holistic view of philosophy as a special form of understanding the world, mastering key worldview concepts, as well as the development and strengthening of the values of tolerance, intercultural dialogue and a culture of peace.

Purpose of studying of the discipline

Formation in students of a holistic view of philosophy as a special form of knowledge of the world, its main sections, problems and methods of studying them in the context of future professional activities.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society

Prerequisites

The module of socio-political knowledge (sociology, political science, cultural studies, psychology) History of Kazakhstan

Postrequisites

Basic and profile disciplines of the EP

Module 2. Application development for mobile devices

Basics of programming in Kotlin

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29499 (3011160)
Course	1
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course introduces students to the basics of programming in Kotlin. The course is aimed at the formation of basic knowledge, programming skills necessary to create applications in the Kotlin language. During the training, students will learn the basics of syntax, the structure of the language, and also learn how to create and debug simple programs on Kotlin. The acquired knowledge will help students to create applications on Kotlin, use them in their further professional activities.

Purpose of studying of the discipline

The purpose of this course is to introduce students to the basics of programming in Kotlin.

Learning Outcomes

ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user

Prerequisites

Algorithms and data structures

Postrequisites

Mobile Application Development (Android)

Mobile Application Development (Android)

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29531 (3011153)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	15hours
Laboratory works	15hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The purpose of this course is to familiarize students with the Android platform and the basics of mobile application development. The course is aimed at developing the skills of developing user interfaces, using standard and third-party libraries, working with databases and network queries. The program also includes the development and refinement of real mobile applications for the practical application of the acquired knowledge.

Purpose of studying of the discipline

The purpose of this discipline is to familiarize students with the Android platform and the basics of mobile application development

Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
Prerequisites
Basics of programming in Kotlin
Postrequisites
Cross-platform mobile development

Cross-platform mobile development

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29781 (3011175)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The course is aimed at developing students` knowledge and skills in developing mobile applications that can work on different platforms. The course covers topics such as application development using React Native, Xamarin, Flutter, Cordova and other cross-platform technologies, working with APIs and databases, optimization and application testing. As a result of the training, students will be able to create high-quality, scalable mobile applications for different operating systems.
Purpose of studying of the discipline
Formation of students` knowledge and skills in the field of mobile application development that can work on various platforms
Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
Prerequisites
Advanced WEB technologies MySQL Database Management Systems Basics of programming in Kotlin Project management
Postrequisites
Own mobile development Game development on Unity Designing WEB applications

Mobile UI/UX design

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30403 (3011183)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline is devoted to the study of the user interface design process and user experience for mobile applications. It combines design principles, technical aspects of mobile interface development, in order to create user-friendly and attractive user interfaces. Students studying the discipline "Mobile UI/UX Design" will gain practical skills in creating effective and attractive mobile interfaces, as well as an understanding of the importance of user experience for the success of mobile applications.
Purpose of studying of the discipline
The purpose of the course "Mobile UI/UX Design" is to study the process of designing a user interface (UI) and user experience (UX) for mobile applications.
Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Game development on Unity

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	30172 (3011196)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline is the study of tools and technologies necessary to create computer games on the Unity platform. The discipline is aimed at teaching students how to create games on the Unity platform. This includes the study of various aspects of game creation, such as the creation of game objects, gameplay management, , user interface development. As a result of studying the discipline, students will have the skills necessary to create computer games on the Unity platform.

Purpose of studying of the discipline
The purpose of this discipline is to teach students the basics of developing computer games on the Unity platform.

Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
ON10 Manage the software lifecycle, including planning, development, testing and implementation.

Prerequisites
Basics of programming in Kotlin

Postrequisites
Final examination

Development of mobile applications for the Internet of Things (IoT)

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30240 (3011186)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline prepares students to create high-quality applications for managing IoT devices. Students study the basic principles of IoT, communication protocols, technologies for mobile applications, including planning, design, testing and deployment. They learn to use frameworks, tools such as Android Studio, Xcode, Kotlin and Swift to create applications connected to IoT devices via Bluetooth, Wi-Fi and Zigbee protocols.

Purpose of studying of the discipline
The purpose of the course "Development of mobile applications for the Internet of Things (IoT)" is to prepare students to create high-quality applications for managing Internet of Things (IoT) devices.

Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
ON10 Manage the software lifecycle, including planning, development, testing and implementation.

Prerequisites
Cross-platform mobile development

Postrequisites
Final examination

Own mobile development

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30400 (3011184)
Course	3
Term	1
Credits count	5

Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline prepares students to create high-quality mobile applications and trains them to the skills necessary to work in the mobile development industry. Within the framework of this discipline, students study the process of developing mobile applications, including planning, design, testing, deployment. They will learn how to create attractive, intuitive user interfaces, how to implement application functionality and how to test them on various devices and operating systems.

Purpose of studying of the discipline
The purpose of the course "Own Mobile Development" is to prepare students to create high-quality mobile applications and master the skills necessary to work in the mobile development industry, develop students` practical skills related to the mobile application development process, from planning and design to testing and deployment.

Learning Outcomes
ON2 Design and develop a user interface for mobile applications, taking into account the features of mobile devices and their interaction with the user
ON10 Manage the software lifecycle, including planning, development, testing and implementation.

Prerequisites
Cross-platform mobile development

Postrequisites
Final examination

Module 3. Algorithms, mathematics and data analysis

Algorithms and data structures

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29345 (3011148)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	15hours
Laboratory works	15hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course is aimed at developing an understanding of algorithms and data structures, which are the basis for the development of effective software solutions. The course includes the study of various algorithmic approaches and methods, such as sorting, searching, graphs and trees, and also covers various data structures. In the course of training, students will study a variety of algorithms and data structures and acquire the skills to use them to solve complex programming problems.

Purpose of studying of the discipline
The purpose of this discipline is to master and understand the basic algorithms and data structures necessary for the development of effective software solutions

Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them

Prerequisites
School course

Postrequisites
Basics of programming in Kotlin Basics of Java programming Educational practice

Mathematics

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29401 (3011199)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours

Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The purpose of this course is to provide students with fundamental training in mathematics. The course is aimed at forming a sufficiently high culture of mathematical thinking among students and developing the ability to creatively approach problem solving. In addition to studying the fundamental foundations of higher mathematics (elements of analytical geometry, linear algebra, mathematical analysis, differential equations), the course assumes consideration of various applications of mathematics to solving production problems from the field of professional specialization.

Purpose of studying of the discipline
creation of the basis for the development of logical thinking and mathematical culture. Formation of basic knowledge and acquisition of basic skills of using mathematical apparatus for solving theoretical and applied problems, as well as the necessary level of mathematical training for mastering other applied disciplines studied within a specific profile; skills of working with special mathematical literature

Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them

Prerequisites
School course

Postrequisites
Basics of Java programming

Applied information theory

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29400 (3011159)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
`Applied Information Theory` is a discipline that studies the basics of transmitting, processing and storing information. Students study various methods of information encoding, data compression algorithms, data transmission protocols, signal processing and filtering, cryptography, coding theory, information systems and information security. This discipline allows students to master the tools and methods necessary for effective work with information in various fields of application.

Purpose of studying of the discipline
The purpose of this discipline is to study the basics of transmission, processing and storage of information

Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them

Prerequisites
School course

Postrequisites
Signal analysis and processing

Business Analytics

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	30086 (3011190)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at teaching students methods of data analysis and statistical methods.As part of the course, students study the basics of business analytics, business process analysis, data analysis, project planning and management. They also study the principles and methods of visual modeling using UML. During the course, students will learn how to use UML to create class diagrams, sequence diagrams, state diagrams and other types of diagrams that allow you to model business processes and systems.

Purpose of studying of the discipline
The purpose of this discipline is to teach students methods of data analysis and statistical methods, as well as to master the basics of business analytics and project management
Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Signal analysis and processing

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30096 (3011194)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course is designed to study methods and techniques of analysis and processing of various types of signals. During the training, students will learn the basics of working with signals, study methods of signal conversion and filtering, as well as methods for detecting and extracting features. It helps students develop skills in working with signals, analyze their characteristics and apply appropriate processing methods to extract information and solve practical problems.
Purpose of studying of the discipline
The purpose of this discipline is to study methods and techniques of analysis and processing of various types of signals.
Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them
Prerequisites
Applied information theory
Postrequisites
Final examination

Optimization Methods

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30404 (3011182)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline "Optimization Methods" teaches students effective strategies for finding optimal solutions to various problems. The course studies various methods, such as gradient descent, linear and nonlinear programming methods, evolutionary algorithms, and others. Students will gain practical skills in developing and implementing optimization models, as well as learn how to use specialized software tools for analyzing and solving optimization problems.
Purpose of studying of the discipline
The purpose of the course "Optimization Methods" is to teach students effective strategies for finding optimal solutions in various tasks.
Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Statistical Data Analysis

Discipline cycle	Profiling discipline

Discipline component	Electives
SubjectID	30116 (3011202)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline "Statistical Data Analysis" teaches students the methods of statistical data analysis that allow them to effectively process, interpret, and visualize data. They also learn to use various tools and technologies, such as Python, R, SAS and others, for data analysis. In general, the discipline has a great practical application in various fields where the analysis and interpretation of large amounts of data is required.

Purpose of studying of the discipline
The purpose of this discipline is to teach students the methods and techniques of statistical data analysis.

Learning Outcomes
ON3 Work with large amounts of data, including processing, storing and managing them

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Module 4. Software development: from the basics of programming to advanced concepts in various development environments

Introduction to the profession

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29376 (3011149)
Course	1
Term	1
Credits count	3
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	20hours
Independent work of the student	40hours
Total	90hours
Knowledge control form	Examination

Short description of discipline
This course is aimed at familiarizing students with the basic concepts of the programmer`s profession, as well as with the specifics of working in web programming and mobile development. It is aimed at the formation of basic knowledge and skills necessary for a successful start in the profession of a programmer in this field. In the course of training, students learn the basics of programming, as well as modern tools and technologies used in web and mobile development

Purpose of studying of the discipline
The purpose of this discipline is to familiarize students with the basic concepts and principles of the programmer`s profession in the field of web programming and mobile development

Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Production practice 1

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29492 (3011204)
Course	1
Term	2
Credits count	3
Working practice	90hours

Total	90hours
Knowledge control form	Total mark on practice

Short description of discipline
"Industrial Practice 1" provides students with the opportunity to gain practical experience in solving problems in the field of programming, software development and testing. It is aimed at developing skills of teamwork, decision-making and problem solving, as well as the development of creativity and independence in the implementation of projects. During the internship, students will work under the guidance of experienced mentors and will be able to apply their knowledge in practice.

Purpose of studying of the discipline
The purpose of the "Production Practice 1" is to provide students with the opportunity to gain practical experience in solving problems in the field of programming, software development and testing. This practice is aimed at developing the skills of teamwork, decision-making and problem solving, as well as the development of creativity and independence of students in the implementation of projects.

Learning Outcomes
ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON12 To present the results of the work in front of the team and clients, demonstrating professionalism and knowledge of the subject area

Prerequisites
Educational practice

Postrequisites
Production practice 2

Educational practice

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29491 (3011203)
Course	1
Term	2
Credits count	2
Study practics	60hours
Total	60hours
Knowledge control form	Total mark on practice

Short description of discipline
The educational practice is aimed at familiarizing students with the professional environment and programming technologies, as well as the practical application of the acquired knowledge in real projects. The course promotes the development of teamwork skills, project planning and management, program code development and debugging. Students actively participate in real programming projects to gain practical experience and prepare for a future career in the IT field.

Purpose of studying of the discipline
The purpose of the training practice is to familiarize students with the professional environment and programming technologies, as well as in the practical application of the acquired knowledge in real projects.

Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object-oriented programming and functional programming

Prerequisites
Algorithms and data structures

Postrequisites
Production practice 1

Python object-oriented programming

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29532 (3011154)
Course	2
Term	1
Credits count	8
Lections	15hours
Practical and seminar classes	30hours
Laboratory works	30hours
Independent work of a student under the guidance of a teacher	55hours
Independent work of the student	110hours
Total	240hours
Knowledge control form	Examination

Short description of discipline
The Python object-oriented programming course is aimed at developing students` skills and knowledge in an object-oriented approach to programming in Python. The course includes the study of the basic concepts of OOP, such as encapsulation, inheritance and polymorphism, as well as training in application development using OOP and frameworks. At the end of the course, students will have the opportunity to develop high-quality software solutions in Python.

Purpose of studying of the discipline

The purpose of this discipline is to form students` skills and knowledge in an object-oriented approach to programming in Python

Learning Outcomes

ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites

Algorithms and data structures

Postrequisites

Basic and profile disciplines of the EP

Advanced programming in C#

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	33076 (3024256)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

In this course, students will deepen their knowledge in the field of programming C#. The course is aimed at developing advanced knowledge and skills necessary for the development of complex and large projects in C#. During the course, students will study advanced topics such as multithreading, working with databases, application architecture and testing. The acquired knowledge will allow students to create efficient, scalable software in C#.

Purpose of studying of the discipline

The purpose of the discipline "Programming in C#" is to form students with advanced knowledge and skills necessary for the development of complex and large projects in C#.

Learning Outcomes

ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites

Advanced WEB technologies

Postrequisites

Research project

Basics of Java programming

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29690 (3011163)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course will introduce students to the basics of programming in Java. The course is aimed at developing the basic knowledge and skills necessary to create simple Java applications. During the course, students will learn the basics of Java syntax, data structures, as well as gain experience in creating console applications and applying the basic language constructs. The knowledge gained will help students to begin development in the field of Java programming.

Purpose of studying of the discipline

The purpose of this discipline is to familiarize students with the basics of programming in Java and the formation of basic knowledge and skills necessary to create simple applications in this language.

Learning Outcomes

ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites

Python object-oriented programming

Postrequisites

Software quality testing and assurance Research project Advanced programming in Java, JSP and JOBS Machine learning

Production practice 2

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29693 (3011205)
Course	2
Term	2
Credits count	7
Working practice	210hours
Total	210hours
Knowledge control form	Total mark on practice

Short description of discipline

"Industrial Practice 2" is aimed at consolidating and deepening the theoretical knowledge acquired by students during their studies, as well as at acquiring practical skills and competencies. The practice is aimed at developing teamwork skills, software design and development. Students participate in the development and implementation of the project using modern technologies and programming tools. The result of the practice is a finished product and practical experience in the field of programming.

Purpose of studying of the discipline

The purpose of the "Production Practice 2" is to consolidate and deepen the theoretical knowledge gained by students during their studies, as well as to acquire practical skills and competencies in the field of software development.

Learning Outcomes

ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites

Production practice 1

Postrequisites

Production practice 3

Creating Windows applications based on Visual C#

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29775 (3011164)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course forms the skills of creating Windows applications based on Visual C#. In the course of training, students study the creation of graphical interfaces, interaction with databases and application development using various technologies. Acquiring skills in creating Windows applications based on Visual C# will give students the opportunity to put them into practice and increase their chances in the labor market in the field of software development.

Purpose of studying of the discipline

The purpose of the discipline "Creating Windows applications based on Visual C#" is to form students` skills in developing Windows applications using the C# programming language and the Visual Studio development environment.

Learning Outcomes

ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites

Python object-oriented programming Advanced programming in C#

Postrequisites

Software quality testing and assurance Research project Advanced programming in Java, JSP and JOBS Machine learning

Development of multithreaded and parallel applications

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29974 (3011290)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours

Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline introduces students to the concepts and techniques of developing programs that can be executed in parallel and use multiple threads to efficiently use processor resources and improve performance.In the course of studying this discipline, students will learn about the principles of parallel programming and multithreading. They learn how to create and manage execution threads, synchronize access to shared resources, avoid race conditions, and ensure security when working with parallel processes.

Purpose of studying of the discipline
The purpose of this discipline is to familiarize students with the concepts and techniques of developing programs that can run in parallel and use multiple threads to efficiently use processor resources and improve performance.

Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites
Advanced WEB technologies Mobile Application Development (Android)

Postrequisites
Cloud technologies and web applications

Interface and user interaction

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	30068 (3011294)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
"Interface and User Interaction" is a discipline that studies the design, development and evaluation of user interfaces for software and other information systems. It focuses on creating a user-friendly, efficient and enjoyable user experience. During the course of studying this discipline, students will learn about the principles of user interface design, including aspects of visual design, usability, user interaction and ergonomics.

Purpose of studying of the discipline
The purpose of this discipline is to study the design, development and evaluation of the user interface for software and information systems.

Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming

Prerequisites
Blender computer graphics and visual effects Development using Vue.js

Postrequisites
Final examination

Advanced programming in Java, JSP and JOBS

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30230 (3011193)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline is a continuation of the study of the Java programming language and its application in web development. The purpose of the discipline is to train specialists who will be able to develop complex Java web applications using JSP (JavaServer Pages) and JOBS (Java Object Binding Service). Students will gain knowledge on how to use these technologies to create dynamic web pages that work with databases and other web services.

Purpose of studying of the discipline
The purpose of the course "Advanced Programming in Java, JSP and JOBS" is to prepare students for the development of complex web applications in the Java programming language using JSP (JavaServer Pages) and JOBS (Java Object Binding Service) technologies.
Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming
Prerequisites
Basics of Java programming
Postrequisites
Final examination

Software quality testing and assurance

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30229 (3011181)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course covers testing methods and tools, including functional and non-functional testing, test automation, security testing, and defect management and reporting techniques. The course is aimed at developing students` skills in developing and implementing test scenarios, as well as ensuring the quality of software. As a result of the training, students can apply various methods and tools for testing and ensuring the quality of software in real projects.
Purpose of studying of the discipline
The purpose of the course "Software Testing and Quality Assurance" is to develop students` skills and knowledge in the field of software testing, including functional and non-functional testing, test automation, security testing, defect management and reporting.
Learning Outcomes
ON4 Design, develop algorithms for solving various tasks and programs using the principles of object- oriented programming and functional programming
ON10 Manage the software lifecycle, including planning, development, testing and implementation.
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Module 5. Network and smart technologies, operating systems: security and administration

Administration of web servers and hosting

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29398 (3011158)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline introduces students to the basics of managing and maintaining web servers and hosting environments. In the course of studying this discipline, students learn about various types of web servers and study their functionality and capabilities. They study the principles of configuring and managing web servers, including setting up virtual hosts, managing SSL certificates, and routing traffic. They learn how to create, set up hosting accounts, manage domain names, set up databases and install web applications
Purpose of studying of the discipline
The purpose of this discipline is to familiarize students with the basics of managing and maintaining web servers and hosting environments.
Learning Outcomes
ON5 Manage and administer network systems, including configuring and maintaining network equipment, configuring network security

and solving problems in network systems.

Prerequisites

School course

Postrequisites

Computer network security

Computer networks

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29397 (3011157)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This discipline is designed to study the principles, protocols and architecture of computer networks. The course is aimed at developing students` deep understanding of network technologies and their application in the modern information society. During the training, students will learn how to configure and administer network equipment, diagnose and troubleshoot network connections. They will also get acquainted with protocols and standards used in computer networks, such as TCP/IP, Ethernet, Wi-Fi and others.

Purpose of studying of the discipline

The purpose of this discipline is to study the principles, protocols and architecture of computer networks

Learning Outcomes

ON5 Manage and administer network systems, including configuring and maintaining network equipment, configuring network security and solving problems in network systems.

Prerequisites

School course

Postrequisites

Computer network security

Computer network security

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29513 (3011155)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline "Computer Network Security" presents the basic principles and methods of information protection in network environments. It covers the main aspects of threats, vulnerabilities and protection mechanisms in computer networks. During the course, students study modern security standards, authentication and data encryption protocols, as well as methods for detecting and preventing cyber attacks. The course provides students with the necessary skills to ensure network security and protect important information resources.

Purpose of studying of the discipline

The purpose of the discipline "Computer Network Security" is to familiarize students with the basic principles and methods of information protection in network environments.

Learning Outcomes

ON5 Manage and administer network systems, including configuring and maintaining network equipment, configuring network security and solving problems in network systems.

Prerequisites

Computer networks

Postrequisites

Designing WEB applications

Cloud technologies

Discipline cycle	Basic disciplines

Discipline component	Electives
SubjectID	29517 (3011170)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline is the study of modern approaches and methods of using cloud computing and services. Students gain fundamental knowledge about the concepts, architecture and functionality of cloud environments, encryption methods, authentication and authorization mechanisms, as well as measures to ensure data privacy in the cloud environment. They deepen their knowledge of various types of cloud models, such as public, private and hybrid clouds.

Purpose of studying of the discipline
The purpose of this discipline is for students to master modern approaches and methods of using cloud computing and services

Learning Outcomes
ON5 Manage and administer network systems, including configuring and maintaining network equipment, configuring network security and solving problems in network systems.

Prerequisites
Computer networks

Postrequisites
Research project

Basics of operating systems

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29514 (3011169)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The purpose of this course is to familiarize students with the basic principles and functions of operating systems, as well as their role in the software development process. The course is aimed at developing skills to work with operating systems, configuring the development environment, administration and diagnostics of system errors. Students will learn how to use the command line, work with the file system, install and configure software

Purpose of studying of the discipline
The purpose of this discipline is to familiarize students with the basic principles and functions of operating systems, as well as to develop their skills to work with operating systems, configure the development environment, administer the system and diagnose system errors.

Learning Outcomes
ON6 Install operating systems on computers and servers, as well as configure them in accordance with the requirements and needs of users

Prerequisites
Computer networks

Postrequisites
Research project

Network operating systems

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29519 (3011171)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours

Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course builds students` knowledge and skills in the field of network operating systems, their device, functioning and administration. The course covers topics related to network protocols, hardware and software, network security and protection. As part of the course, students will also have the opportunity to practically apply their knowledge on the example of configuring and administering network operating systems.

Purpose of studying of the discipline
The purpose of this discipline is to form students` knowledge and skills in the field of network operating systems

Learning Outcomes
ON6 Install operating systems on computers and servers, as well as configure them in accordance with the requirements and needs of users

Prerequisites
Computer networks

Postrequisites
Research project

Internet technologies

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29691 (3011180)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course builds students` knowledge and skills of working with basic Internet technologies such as HTML, CSS, JavaScript, PHP and basic principles of web development. The course covers topics related to the design and development of websites, the creation of dynamic user interfaces, adaptive layout and the use of modern tools and technologies. As a result of the training, students will be able to create effective and interactive websites using modern Internet technologies.

Purpose of studying of the discipline
Formation of students` knowledge and skills of working with basic Internet technologies, such as HTML, CSS, JavaScript, PHP, as well as basic principles of web development.

Learning Outcomes
ON5 Manage and administer network systems, including configuring and maintaining network equipment, configuring network security and solving problems in network systems.

Prerequisites
Computer networks

Postrequisites
Cloud technologies and web applications

Module 6. Development of WEB applications and Internet technologies

Basics of WEB development

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29402 (3011150)
Course	1
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course forms students` practical skills and knowledge in the field of WEB technologies. The course is aimed at learning the

programming languages HTML, CSS, JavaScript, as well as learning the basic principles of WEB development. Students will learn how to create static and dynamic web pages, work with databases, use frameworks, libraries for WEB development. In the course of training, students will gain practical skills and knowledge necessary to work in the field of WEB technologies.

Purpose of studying of the discipline

The purpose of this discipline is to form students` practical skills and knowledge in the field of WEB technologies

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

School course

Postrequisites

Advanced WEB technologies

Advanced WEB technologies

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29494 (3011151)
Course	1
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course continues to form students` knowledge and practical skills in the field of WEB technologies. The course is aimed at studying advanced technologies, frameworks for WEB development, such as React, Angular, Vue.js, Node.js. Students will learn how to create dynamic, interactive web applications, work with the backend of web applications, use modern tools for developing and testing WEB applications. In the course of training, students will gain practical knowledge necessary to work in the field of WEB technologies

Purpose of studying of the discipline

The purpose of this course is to continue the formation of students` knowledge and practical skills in the field of WEB technologies and to study advanced technologies and frameworks used in WEB development, such as React, Angular, Vue.js and Node.js .

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

Basics of WEB development

Postrequisites

Development and deployment of WEB applications Multilevel WEB applications and Internet technologies Internet technologies

Programming in PHP

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	33075 (3024257)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline "Programming in PHP" is intended for students who want to master one of the most popular programming languages in web development - PHP. During the course, students deepen their knowledge of PHP programming and learn the principles of database development in combination with PHP to create dynamic web applications that interact with databases. They master the syntax of a language that allows them to develop scalable and flexible web applications.

Purpose of studying of the discipline

Preparing students to create dynamic web applications interacting with databases using PHP

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

Advanced WEB technologies

Postrequisites

Research project

Multilevel WEB applications and Internet technologies

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29688 (3011179)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course builds students` knowledge and skills in developing multi-level web applications, as well as understanding the basic principles of Internet technologies. The course covers topics related to the architecture of multi-level web applications, client-server interaction, working with databases, as well as web application security. As a result of the training, students will be able to develop multi-level web applications, including the design and implementation of the frontend, backend, the use of modern web frameworks, tools, as well as to ensure the security of the created applications.

Purpose of studying of the discipline

The purpose of this discipline is to form students` knowledge and skills of working with basic Internet technologies, such as HTML, CSS, JavaScript, PHP, as well as the basic principles of web development.

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

Advanced WEB technologies

Postrequisites

Designing WEB applications

Development and deployment of WEB applications

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	25751 (3011178)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The course is aimed at developing students` knowledge and skills in the field of web application development and deployment. The course examines the architecture of web applications, working with databases, creating and configuring servers, using client libraries and frameworks, testing and deploying applications on the server. The training will allow students to develop effective web applications for various tasks, including the design and implementation of the frontend and backend, the use of modern web frameworks and tools.

Purpose of studying of the discipline

The purpose of the discipline "Development and deployment of web applications" is to form students` knowledge and skills in the field of development and deployment of web applications.

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

Advanced WEB technologies

Postrequisites

Designing WEB applications Designing Web Application design

Development using Vue.js

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29889 (3011288)
Course	2
Term	2
Credits count	5

Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This course forms students` knowledge and practical skills in developing web applications using the framework Vue.js . The course covers topics such as building components, routing, working with APIs, using Vuex for state management, as well as developing complex web applications. As a result of the training, students will be able to develop efficient and scalable web applications using Vue.js using modern tools and practices.

Purpose of studying of the discipline
The purpose of this discipline is to form students` knowledge and practical skills in developing web applications using a framework Vue.js

Learning Outcomes
ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites
Advanced WEB technologies Mobile Application Development (Android)

Postrequisites
Cloud technologies and web applications

JavaScript Frontend development using

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29929 (3011289)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
This discipline introduces students to the basics of developing a user interface and web applications using the JavaScript programming language.
Students also master the skills of using modern frameworks and libraries to create scalable and modular web applications. They learn how to create components, manage application state, route pages, and interact with the server API. They learn how to develop a user interface, interact with the server using modern frontend development tools and technologies.

Purpose of studying of the discipline
The purpose of this discipline is to introduce students to the basics of developing a user interface and web applications using the JavaScript programming language

Learning Outcomes
ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites
Advanced WEB technologies Mobile Application Development (Android)

Postrequisites
Cloud technologies and web applications

Cloud technologies and web applications

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	30082 (3011291)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline "Cloud technologies and Web applications" covers cloud computing technologies and their application in the creation of

web applications. Within this discipline, students study the principles of cloud platforms such as Amazon Web Services (AWS) and Microsoft Azure, and practical skills in developing web applications using these platforms.. Students learn how to use cloud platforms to deploy and scale web applications, as well as to manage data and resources.

Purpose of studying of the discipline

The purpose of this discipline is to form students` knowledge and skills on the use of cloud technologies for the development and deployment of web applications.

Learning Outcomes

ON8 Develop web applications and intuitive user interfaces using various programming languages, technologies and frameworks

Prerequisites

Blender computer graphics and visual effects Development using Vue.js

Postrequisites

Final examination

Module 7. Database development and management

MySQL Database Management Systems

Discipline cycle	Basic disciplines
Discipline component	University component
SubjectID	29409 (3011152)
Course	1
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course will introduce students to the MySQL database management system. The course is aimed at the formation of knowledge and skills of working with MySQL DBMS, including the creation, modification, filling, maintenance of databases. During the training, students will learn the basics of SQL, database concepts, and also gain experience in creating and optimizing queries. The knowledge gained will be useful for developing applications that require working with MySQL databases.

Purpose of studying of the discipline

The purpose of this discipline is to familiarize students with the MySQL database management system

Learning Outcomes

ON7 Design and develop databases, including choosing a suitable data model, creating tables, defining relationships between tables, constraints and indexes

Prerequisites

Algorithms and data structures

Postrequisites

Extended NoSQL databases

Client-server applications using databases

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29860 (3011174)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Laboratory works	0hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course introduces students to the principles of developing client-server applications based on the use of databases. The course covers such topics as application architecture, client and server technologies, SQL, data processing on the client and server side, as well as methods of protecting applications from external attacks. As a result of the training, students will be able to create client-server applications using databases and effectively manage them within projects.

Purpose of studying of the discipline

The purpose of this discipline is to familiarize students with the basic principles of developing client-server applications that are based on the use of databases.

Learning Outcomes

ON7 Design and develop databases, including choosing a suitable data model, creating tables, defining relationships between tables, constraints and indexes

Prerequisites

MySQL Database Management Systems

Postrequisites

Designing WEB applications

Extended NoSQL databases

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	29884 (3011172)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	15hours
Laboratory works	15hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course introduces students to the concepts and methods of working with extended NoSQL databases, develops practical skills of their use in projects. The course covers NoSQL data models, indexing, aggregation, transactionality, scalability, as well as features of working with specific solutions. The result of the training is the ability to create efficient, scalable NoSQL databases for various applications and task.

Purpose of studying of the discipline

The purpose of this discipline is to familiarize students with the concepts and methods of working with extended NoSQL databases (Not Only SQL), as well as the development of practical skills for their use in projects.

Learning Outcomes

ON7 Design and develop databases, including choosing a suitable data model, creating tables, defining relationships between tables, constraints and indexes

Prerequisites

MySQL Database Management Systems

Postrequisites

Designing WEB applications

Module 8. Visualization, graphics and interface design

Scientific graphics in Python

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	29733 (3011165)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course builds the skills of creating scientific graphics using the Python programming language and its libraries. In the course of training, students study various types of graphs, methods of their construction, and also learn how to use libraries for data visualization. Getting skills in scientific graphics in Python will help students create effective visualizations for their scientific research, present the results of their work in an understandable and visual form.

Purpose of studying of the discipline

The purpose of the discipline "Scientific Graphics in Python" is to develop students` skills in creating scientific graphics using the Python programming language and its libraries

Learning Outcomes

ON9 Design computer graphics using various tools and techniques to create unique visual compositions

Prerequisites

Python object-oriented programming

Postrequisites

Software quality testing and assurance Research project Advanced programming in Java, JSP and JOBS Machine learning

Blender computer graphics and visual effects

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	30011 (3011156)
Course	2
Term	2
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course is aimed at developing students` knowledge and skills of working with computer graphics and creating visual effects in the Blender program. The course covers topics such as 3D object modeling, texturing, lighting, animation, compositing and creating visual effects. As a result of the training, students will be able to create high-quality computer graphics and visual effects for various projects in the entertainment industry, advertising, architecture and many other fields.

Purpose of studying of the discipline

The purpose of this discipline is to form students` knowledge and skills of working with computer graphics and creating visual effects using the Blender program.

Learning Outcomes

ON9 Design computer graphics using various tools and techniques to create unique visual compositions

Prerequisites

Basics of WEB development Advanced WEB technologies

Postrequisites

Designing WEB applications Designing Web Application design

Big Data Visualization

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30398 (3011185)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline "Big Data Visualization" introduces students to the methods and techniques of visualization of complex and voluminous data. It teaches the basics of data visualization, including various types of graphs and charts. Students also study ways of processing and preprocessing large amounts of data, as well as the development of effective visualization algorithms. In addition, the discipline includes the study of visualization of time series, geographical data and interactive data visualization.

Purpose of studying of the discipline

The purpose of the course "Big Data Visualization" is to familiarize students with the methods and techniques of visualization of complex and voluminous data.

Learning Outcomes

ON9 Design computer graphics using various tools and techniques to create unique visual compositions

Prerequisites

Cross-platform mobile development

Postrequisites

Final examination

Computer vision and image processing

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30123 (3011201)
Course	3
Term	1
Credits count	5
Lections	15hours

Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline is the study of methods and technologies used for processing and analyzing images using computers. The discipline is aimed at studying methods and algorithms of image processing used in various fields, such as medicine, manufacturing, transport, robotics. In addition, within the framework of this discipline, students learn to use various tools and technologies, such as OpenCV, MATLAB, Python, to create and optimize image processing algorithms.

Purpose of studying of the discipline
The purpose of this discipline is to teach students methods and technologies of image processing using computers

Learning Outcomes
ON9 Design computer graphics using various tools and techniques to create unique visual compositions

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Optimization and modeling of smart systems

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30227 (3011195)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The course "Optimization and modeling of smart systems" is a study of methods and techniques of optimization and modeling in order to improve the efficiency of smart systems. During the training, students master the skills of building mathematical models, applying optimization methods and analyzing the effectiveness of smart systems.

Purpose of studying of the discipline
"The purpose of the course "Optimization and modeling of smart systems" is to teach students methods and techniques of optimization and modeling to improve the efficiency of smart systems and develop skills in building mathematical models and applying optimization methods to optimize and improve the functioning of smart systems."

Learning Outcomes
ON9 Design computer graphics using various tools and techniques to create unique visual compositions

Prerequisites
Computer networks

Postrequisites
Final examination

Module 9. Software development process management and design

Project development in an Agile environment

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29535 (3011167)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline
The discipline "Project Development in an Agile environment" is aimed at developing software development skills in flexible methodologies, including Scrum, Kanban and others. The course covers all aspects of the development lifecycle, from planning and

evaluation to product testing and delivery. The training includes practical tasks, including teamwork and the use of project management tools.

Purpose of studying of the discipline

The purpose of the discipline "Project Development in an Agile environment" is to form the skills and knowledge of students in software development in flexible methodologies such as Scrum, Kanban and others.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Own mobile development Research project

Project management

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29534 (3011166)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline "Project Management" is aimed at the formation of knowledge and practical skills of project management in the field of web and mobile development. Students will learn the basic methods and tools of project planning, control and management, learn how to assess risks and communicate effectively with team members and customers. The course will also allow students to develop the skills of leadership and coordination of team work and achieving project goals in accordance with business requirements.

Purpose of studying of the discipline

The purpose of this discipline "Project Management" is to form students` knowledge and practical skills of project management in the field of web and mobile development.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results
ON12 To present the results of the work in front of the team and clients, demonstrating professionalism and knowledge of the subject area

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Own mobile development Research project

Managing the software development process

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	29536 (3011168)
Course	2
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This course is also aimed at developing practical skills in planning and managing the software development process, including controlling deadlines, budget and product quality. Students will learn basic project management techniques such as Waterfall, Agile and Scrum, as well as learn how to work with project tools and task management systems. The course also includes analysis, optimization of the development process adapted to the specific needs and features of the project.

Purpose of studying of the discipline

The purpose of the discipline "Software Development Process Management" is to form practical skills and knowledge of students in

planning and managing the software development process, developing their skills to control deadlines, budget and product quality, as well as effectively manage the project.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Own mobile development Research project

Designing Web Application design

Discipline cycle	Basic disciplines
Discipline component	Electives
SubjectID	30075 (3011293)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

Within the framework of this discipline, students are engaged in practical design, development of web applications with a design bias. It provides students with the opportunity to apply their knowledge and skills in creating aesthetically attractive and user-friendly web interfaces. Students are introduced to tools and technologies for the design of web interfaces, such as graphic editors, prototyping, visual style editors. They study the principles of composition, color, typography, iconography and other aspects of design.

Purpose of studying of the discipline

The purpose of this discipline is to form students` knowledge and skills for designing and developing aesthetically attractive and user-friendly web interfaces.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results

Prerequisites

Blender computer graphics and visual effects Development using Vue.js

Postrequisites

Final examination

Research project

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	30237 (3011187)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This discipline is intended for the implementation of projects in the field of IT. Within the framework of this discipline, students will receive the necessary knowledge and skills for conducting research in the field of IT, as well as for designing, developing, and implementing applications for mobile and web platforms. The purpose of the discipline is to develop the skills of independent research and analysis of technological solutions in the field of IT, as well as the ability to apply the knowledge gained to develop high-quality, functional applications.

Purpose of studying of the discipline

The purpose of the course "Research Project" is to teach students the basics of conducting research, designing, developing and implementing applications for mobile and web platforms in the field of information technology.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and

presentation of research results

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Machine learning

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30142 (3011200)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

This discipline is the study of technologies and methods used by computers to automatically improve and optimize their algorithms and functions based on large amounts of data and feedback. The discipline is aimed at the study and practical application of machine learning methods, algorithms and technologies for the purpose of data analysis and processing, as well as solving various tasks in various fields, including computer vision.

Purpose of studying of the discipline

The purpose of this discipline is for students to study machine learning technologies and methods, as well as optimization of algorithms and functions based on data and feedback.

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Designing WEB applications

Discipline cycle	Profiling discipline
Discipline component	University component
SubjectID	30107 (3011208)
Course	3
Term	1
Credits count	5
Lections	15hours
Practical and seminar classes	30hours
Independent work of a student under the guidance of a teacher	35hours
Independent work of the student	70hours
Total	150hours
Knowledge control form	Examination

Short description of discipline

The discipline "WEB Application Design" is the study of methods and technologies used for the design and development of WEB applications.
The main purpose of the discipline is to teach students the methods of designing WEB applications, as well as familiarization with the basic concepts and technologies used in their development. Students study various architectural models, interface design methods, as well as development technologies such as HTML, CSS, JavaScript, PHP, Ruby on Rails and others.

Purpose of studying of the discipline

The purpose of this discipline is to teach students methods and technologies for designing and developing WEB applications

Learning Outcomes

ON10 Manage the software lifecycle, including planning, development, testing and implementation.
ON11 Conduct a research project, including the formulation of a task, data collection and analysis, application of statistical methods and presentation of research results

Prerequisites

Blender computer graphics and visual effects

Postrequisites

Final examination

Pre-graduate practice

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30519 (3011207)
Course	3
Term	2
Credits count	15
Undergraduate practice	450hours
Total	450hours
Knowledge control form	Total mark on practice

Short description of discipline

During the internship, students work in companies or organizations engaged in web and mobile development, where they gain valuable experience and learn to work in a professional environment. They can participate in the development of websites, mobile applications or other projects related to web and mobile development.
Students perform real tasks, work in a team with other developers and receive feedback from experienced specialists. They can apply their knowledge of web technologies, programming languages, databases and other tools to create functional and effective web and mobile solutions.

Purpose of studying of the discipline

The purpose of the pre-graduate internship is to provide students with the opportunity to gain practical experience in the professional environment of web and mobile development, apply and consolidate the knowledge and skills acquired during training, and prepare them for future professional activities.

Learning Outcomes

ON12 To present the results of the work in front of the team and clients, demonstrating professionalism and knowledge of the subject area

Prerequisites

Production practice 2

Postrequisites

Final examination

Production practice 3

Discipline cycle	Profiling discipline
Discipline component	Electives
SubjectID	30517 (3011206)
Course	3
Term	2
Credits count	15
Working practice	450hours
Total	450hours
Knowledge control form	Total mark on practice

Short description of discipline

Industrial Practice 3 is an internship that provides students with the opportunity to gain real work experience in the industry.The main goal of the internship is to provide students with the opportunity to participate in real-world mobile and web application development projects, interact with the development team, and gain experience with tools and technologies used in the industry. Upon completion of the internship, students should have practical experience working with tools and technologies used in programming.

Purpose of studying of the discipline

The purpose of this internship is to enable students to participate in real-world projects and interact with the development team to understand and apply the processes and methodologies used in the programming industry.

Learning Outcomes

ON12 To present the results of the work in front of the team and clients, demonstrating professionalism and knowledge of the subject area

Prerequisites

Production practice 2

Postrequisites

Final examination

Final examination

Writing and defending a graduation project or preparing and passing a comprehensive exam.

Comprehensive exam

Credits count	8

Graduation project

Credits count	8

4.Summary table on the scope of the educational program

«6B06106 - SMART systems and programming»

Name of discipline	Cycle/ Component	Term	Number of credits	Total hours	Lec	SPL	LC	IWST	IWS	Knowledge control form
Module 1. Fundamentals of social and humanitarian knowledge										
Foreign language	GER/CC	1	5	150		45		35	70	Examination
Kazakh language	GER/CC	1	5	150		45		35	70	Examination
Bases of economics, law and ecological knowledge	GER/US	1	5	150	15	30		35	70	Examination
Russian language	GER/CC	1	5	150		45		35	70	Examination
Physical Culture	GER/CC	1	2	60		60				Examination
Kazakh language	GER/CC	2	5	150		45		35	70	Examination
Foreign language	GER/CC	2	5	150		45		35	70	Examination
History of Kazakhstan	GER/CC	2	5	150	30	15		35	70	Qualification examination
The module of socio-political knowledge (sociology, political science, cultural studies, psychology)	GER/CC	2	8	240	30	45		55	110	Examination
Russian language	GER/CC	2	5	150		45		35	70	Examination
Physical Culture	GER/CC	2	2	60		60				Examination
Physical Culture	GER/CC	3	2	60		60				Examination
World of Abai	BS/US	3	3	90	15	15		20	40	Examination
Information and communication technology	GER/CC	4	5	150	15	15	15	35	70	Examination
Physical Culture	GER/CC	4	2	60		60				Examination
Philosophy	GER/CC	5	5	150	15	30		35	70	Examination
Module 2. Application development for mobile devices										
Basics of programming in Kotlin	AS/US	2	5	150	15	30		35	70	Examination
Mobile Application Development (Android)	AS/US	3	5	150	15	15	15	35	70	Examination
Cross-platform mobile development	AS/US	4	5	150	15	30		35	70	Examination
Mobile UI/UX design	AS/CCh	5	5	150	15	30		35	70	Examination
Game development on Unity	AS/US	5	5	150	15	30		35	70	Examination
Development of mobile applications for the Internet of Things (IoT)	AS/CCh	5	5	150	15	30		35	70	Examination
Own mobile development	AS/CCh	5	5	150	15	30		35	70	Examination
Module 3. Algorithms, mathematics and data analysis										
Algorithms and data structures	BS/US	1	5	150	15	15	15	35	70	Examination

Mathematics	BS/US	1	5	150	15	30		35	70	Examination
Applied information theory	BS/CCh	1	5	150	15	30		35	70	Examination
Business Analytics	BS/US	5	5	150	15	30		35	70	Examination
Signal analysis and processing	AS/CCh	5	5	150	15	30		35	70	Examination
Optimization Methods	AS/CCh	5	5	150	15	30		35	70	Examination
Statistical Data Analysis	AS/CCh	5	5	150	15	30		35	70	Examination
Module 4. Software development: from the basics of programming to advanced concepts in various development environments										
Introduction to the profession	BS/US	1	3	90		30		20	40	Examination
Production practice 1	BS/US	2	3	90						Total mark on practice
Educational practice	BS/US	2	2	60						Total mark on practice
Python object-oriented programming	AS/US	3	8	240	15	30	30	55	110	Examination
Advanced programming in C#	AS/CCh	3	5	150	15	30		35	70	Examination
Basics of Java programming	BS/CCh	4	5	150	15	30		35	70	Examination
Production practice 2	BS/US	4	7	210						Total mark on practice
Creating Windows applications based on Visual C#	BS/CCh	4	5	150	15	30		35	70	Examination
Development of multithreaded and parallel applications	AS/CCh	4	5	150	15	30		35	70	Examination
Interface and user interaction	BS/CCh	5	5	150	15	30		35	70	Examination
Advanced programming in Java, JSP and JOBS	AS/CCh	5	5	150	15	30		35	70	Examination
Software quality testing and assurance	AS/CCh	5	5	150	15	30		35	70	Examination
Module 5. Network and smart technologies, operating systems: security and administration										
Administration of web servers and hosting	BS/CCh	1	5	150	15	30		35	70	Examination
Computer networks	BS/CCh	1	5	150	15	30		35	70	Examination
Computer network security	BS/US	3	5	150	15	30		35	70	Examination
Cloud technologies	BS/CCh	3	5	150	15	30		35	70	Examination
Basics of operating systems	BS/CCh	3	5	150	15	30		35	70	Examination
Network operating systems	BS/CCh	3	5	150	15	30		35	70	Examination
Internet technologies	BS/CCh	4	5	150	15	30		35	70	Examination
Module 6. Development of WEB applications and Internet technologies										
Basics of WEB development	AS/US	1	5	150	15	30		35	70	Examination
Advanced WEB technologies	AS/US	2	5	150	15	30		35	70	Examination
Programming in PHP	AS/CCh	3	5	150	15	30		35	70	Examination
Multilevel WEB applications and Internet technologies	BS/CCh	4	5	150	15	30		35	70	Examination
Development and deployment of WEB applications	BS/CCh	4	5	150	15	30		35	70	Examination
Development using Vue.js	AS/CCh	4	5	150	15	30		35	70	Examination

JavaScript Frontend development using	AS/CCh	4	5	150	15	30		35	70	Examination
Cloud technologies and web applications	BS/CCh	5	5	150	15	30		35	70	Examination
Module 7. Database development and management										
MySQL Database Management Systems	BS/US	2	5	150	15	30		35	70	Examination
Client-server applications using databases	AS/CCh	3	5	150	15	30	0	35	70	Examination
Extended NoSQL databases	AS/US	4	5	150	15	15	15	35	70	Examination
Module 8. Visualization, graphics and interface design										
Scientific graphics in Python	BS/CCh	4	5	150	15	30		35	70	Examination
Blender computer graphics and visual effects	AS/US	4	5	150	15	30		35	70	Examination
Big Data Visualization	AS/CCh	5	5	150	15	30		35	70	Examination
Computer vision and image processing	AS/CCh	5	5	150	15	30		35	70	Examination
Optimization and modeling of smart systems	AS/CCh	5	5	150	15	30		35	70	Examination
Module 9. Software development process management and design										
Project development in an Agile environment	AS/CCh	3	5	150	15	30		35	70	Examination
Project management	AS/CCh	3	5	150	15	30		35	70	Examination
Managing the software development process	AS/CCh	3	5	150	15	30		35	70	Examination
Designing Web Application design	BS/CCh	5	5	150	15	30		35	70	Examination
Research project	AS/US	5	5	150	15	30		35	70	Examination
Machine learning	AS/CCh	5	5	150	15	30		35	70	Examination
Designing WEB applications	AS/US	5	5	150	15	30		35	70	Examination
Pre-graduate practice	AS/CCh	6	15	450						Total mark on practice
Production practice 3	AS/CCh	6	15	450						Total mark on practice
Final examination										
Comprehensive exam		6	8	240						
Graduation project		6	8	240						