S.Seifullin Kazakh Agrotechnical Research University

CATALOG OF ELECTIVE DISCIPLINES

For students in the direction of preparation 6B061 Information and communication technologies

Brief description of the elective disciplines of the educational program

EPG	EP	Form of education	The name of discipline	Code of subject	Discipline cycle	Component	Number of credits	Level of training	Cafedra	Course	Academic period	Pre-requisitions	Post-requisitions	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Basics of economics and law	OEP 2113	GER	Elective subjects	5.0	Bachelor	Economy	2	1	Political science and sociology, Cultural studies and psychology, Philosophy	Mathematical analysis, Mathematical logic and theory of algorithms	The discipline promotes knowledge of the subject of economic theory and methods of research, the basis of public production and forms of public economy, the mechanism of functioning of the market system, production, costs and income of the firm, national economy. To master the basics of the theory of the state and law, the basics of constitutional, administrative, civil, labor, family, criminal law.	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering, study innovative entrepreneurship and anti-corruption culture, formulate inventions	Basics of anti-corruption culture, Ecology and life safety fundamentals, Entrepreneurship, Methodology of academic research
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Entrepreneurship	Pre 2119	GER	Elective subjects	5.0	Bachelor	Economy	2	1	Political science and sociology, Cultural studies and psychology, Philosophy	Mathematical analysis, Mathematical logic and theory of algorithms	The discipline studies the development and implementation of entrepreneurial initiatives. Considers the skills and qualities necessary for a modern entrepreneur, aspects of the business environment, business organization issues, analyzes the problems and opportunities that entrepreneurs face in a competitive environment, pays attention to developing effective strategies for successful entrepreneurship.	Assess the interconnection and interdependence of business processes in the context of the digital economy. Organize entrepreneurial activities, demonstrate knowledge in the field of modern business and interpret the results of the activities of enterprises by industry. Model business processes to develop an enterprise development strategy	Basics of anti-corruption culture, Basics of economics and law, Ecology and life safety fundamentals, Methodology of academic research

Code	Program	Form	Discipline	Code	Lang	Type	Credits	Level	Field			Prerequisites		Description	Learning outcomes	Postrequisites
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Basics of anti-corruption culture	OAK 2121	GER	Elective subjects	5.0	Bachelor	Economy	2	1	Political science and sociology, Cultural studies and psychology, Philosophy	Mathematical analysis, Mathematical logic and theory of algorithms	The course forms a system of knowledge on combating corruption, and the development on this basis of a civil position in relation to this phenomenon. As a result of mastering the discipline, students will be able to: navigate the legislation; analyze and apply legal acts in specific situations, follow moral	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering, study innovative entrepreneurship and anti-corruption culture, formulate inventions	Basics of economics and law, Ecology and life safety fundamentals, Entrepreneurship, Methodology of academic research
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Ecology and life safety fundamentals	EOBZh 2122	GER	Elective subjects	5.0	Bachelor	Ecology	2	1	Political science and sociology, Cultural studies and psychology, Philosophy	Mathematical analysis, Mathematical logic and theory of algorithms	The course forms practical skills in identifying dangerous and harmless natural conditions, in preventing the causes and conditions for the occurrence of dangerous situations, in protecting the population and the production facility from the possible consequences of dangerous situations. Features of labor protection for women and youth, supervision and control.	To be able to analyze the influence of environmental factors on the vital activity of living organisms and the environment; Possess the basics of economic and legal knowledge in the forestry sector; know and understand the goals and methods of state regulation of the economy. Evaluate and integrate the basic theories of motivation, leadership and power to solve strategic and operational management tasks, understand the importance of the principles and culture of academic integrity and anti-corruption culture.	Basics of anti-corruption culture, Basics of economics and law, Entrepreneurship, Methodology of academic research
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Methodology of academic research	MNI 2123	GER	Elective subjects	5.0	Bachelor	Information systems	2	1	Political science and sociology, Cultural studies and psychology, Philosophy	Mathematical analysis, Mathematical logic and theory of algorithms	The study of various techniques and methods of scientific research: analysis, synthesis and design in General. Determination of the purpose, objectives and factors affecting the design. Ability to apply research results in design. Work with sources. Analysis of analogues. Preparation of the concept.	To carry out professional and scientific communication in various forms in Kazakh, Russian and foreign languages to solve professional tasks in the field of ICT	Basics of anti-corruption culture, Basics of economics and law, Ecology and life safety fundamentals, Entrepreneurship
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Computer architecture and operating systems	AKOS 2277	BS	Elective subjects	5.0	Bachelor	Information systems	2	1	Information and communication technologies, Mathematical foundations of information technology, Application of discrete mathematics and numerical methods	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, IoT programming, Machine learning technologies	Modern computer hardware. x86 architecture: development history, hardware implementation and assembly language. Linux operating system: deployment and operation using the command line interface. Tools for developing and debugging programs in Linux OS. GNU Toolkit. Linux family of operating systems: architecture and programming at the OS kernel level.	solve problems of varying complexity using programming technology, inspect software components; apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas; apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software; evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS; plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied	Digital circuitry and architecture of computer

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Digital circuitry and architecture of computer	CSAK 2291	BS	Elective subjects	5.0	Bachelor	Information systems	2	1	Information and communication technologies, Mathematical foundations of information technology, Application of discrete mathematics and numerical methods	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, IoT programming, Machine learning technologies	Fundamentals of the algebra of logic. Basic logic elements. Decoders, encoders, code converters. Purpose and principle of operation of multiplexers. Purpose of digital comparators. Theorem de Morgana. The scheme and principle of operation of digital comparators. Purpose and principle of operation adders. Truth tables of adders. Appointment and classification of triggers. Passive and active logic levels. Asynchronous RS-triggers on the elements NAND, NOR.	solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied	Computer architecture and operating systems
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Programming in Python	PYaP 2259	BS	Elective subjects	5.0	Bachelor	Information systems	2	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Machine learning technologies	Features of the Python language. Data types, operations, operators. Input/Output features. Built-in object types: numbers, strings, tuples, lists, dictionaries, sets. File Input/Output. Reading lines with file iterators. Working with binary files. The numpy library for implementing mathematical objects and calculations. Functions and recursion. Range function. Sorting. Lambda functions.	Development, describe and explain the algorithm for solving the problem, determine the problem structure: linear, branched and cyclical; interpret the data structure: lists, arrays, sets, files, strings, etc. Explain, select and use "top-down" and "bottom-up" programming techniques, have practical programming skills in one of the programming languages, apply programming knowledge for developing applications. Analyze tasks, determine solutions and select efficient algorithms for task implementation. Define input and output data. Understand the integrity of the developing software. Pick a language and programming tools to it. Develop applications with a database, web portals, separate modules for them, integrate modules into applications.	Modern programming languages
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Modern programming languages	SYaP 2287	BS	Elective subjects	5.0	Bachelor	Information systems	2	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Machine learning technologies	Algorithms for solving common data processing problems. Algorithms on graphs. Libraries of programs and classes. General characteristics of assembly languages. The solution of computational problems in assembler. The interaction of programs with the OS and modular programming. Features of programming in multiprogram and multitasking environments. Programming Wiindows applications.	determine the language tool for solving problems and process information using the tools of programming languages and application programs solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Programming in Python

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Development for the Internet of Things	RDIV 2280	BS	Elective subjects	5.0	Bachelor	Information systems	2	2	Probability and statistics in computer science, Information and communication technologies, Mathematical foundations of information technology	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, Machine learning technologies	Introduction to the Internet of Things (IoT). Hardware: End devices - controllers, sensors, actuators. Network technologies and IoT: IPv4 and IPv6 protocols. Principles of connecting devices to the network and methods of information transfer. Data processing in IoT: examples of data collected and processed in IoT systems. Application of cloud technologies and service-oriented architectures in IoT. IoT services, applications and business models.	determine the language tool for solving problems and process information using the tools of programming languages and application programs solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Programming for IoT
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Programming for IoT	PDI 2283	BS	Elective subjects	5.0	Bachelor	Information systems	2	2	Probability and statistics in computer science, Information and communication technologies, Mathematical foundations of information technology	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, Machine learning technologies	Arduino and feature set; EEPROM library; Connecting the keyboard and mouse Arduino and touch panel, temperature sensors, humidity, gas, etc. Network communication using Arduino, Arduino and memory cards, LED arrays, Radio Frequency Identification (RDIF).	Determine the language tool for solving problems and process information using the tools of programming languages and application programs. Solve problems of varying complexity using programming technology, inspect software components. Apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas. Use technologies, principles of organization and functioning of the Internet, analyze threats to information security. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS. Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied.	Development for the Internet of Things
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Modern database technology (Oracle)	STBDO 3262	BS	Elective subjects	5.0	Bachelor	Information systems	3	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual Programming and Data Mining, Parallel Programming	Modern database technologies. Purpose and basic principles of database management systems architecture. Theoretical bases of relational database management systems. Using the SQL language in application programs. The concept of an active database. Stored procedures and triggers. Basic principles of database structure design. Fundamentals of transactional processing in database management systems. Security of database management systems. Elements of DataWarehousing technology.	solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Database technologies

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Database technologies	TBD 3284	BS	Elective subjects	5.0	Bachelor	Information systems	3	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual Programming and Data Mining, Parallel Programming	Purpose and basic principles of database management systems architecture. Theoretical bases of relational database management systems. Using the SQL language in application programs. The concept of an active database. Stored procedures and triggers. Basic principles of database structure design. Fundamentals of transactional processing in database management systems. Security of database management systems. Elements of DataWarehousing technology	Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied, as well as in scientific research. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS. Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied, as well as in scientific research	Modern database technology (Oracle)
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Professionally-oriented Foreign Language	POIYa 3273	BS	Elective subjects	3.0	Bachelor	Foreign Language	3	1	Foreign Language	Parallel Programming	Forms the professional foreign language speech of future specialists to increase the level of professional competence, proficiency in a professional foreign language for the implementation of written and oral information exchange, further development of speech activity. Rules of speech behavior in accordance with situations of professional communication, depending on the style and nature of communication in the social, household and academic spheres.	Use communication in oral and written forms in the state, Russian and foreign languages to solve professional problems of interpersonal and intercultural interaction.	English for special purposes
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	English for special purposes	AYaDSC 3292	BS	Elective subjects	3.0	Bachelor	Foreign Language	3	1	Foreign Language	Parallel Programming	The discipline is aimed at studying general scientific terminology and terminology for the language of the corresponding specialty in English, forms skills in four types of communicative activity: reading with a full understanding of authentic texts in the specialty, the ability to write an essay on a specialty problem, the ability to listen to authentic messages containing professional information, the ability to discuss specialty issues	Possess knowledge of socio-humanitarian and economic disciplines, willingness to demonstrate a well-formed worldview, civic and moral position of a highly educated person with a broad outlook and a culture of thinking. Has the skills of practical proficiency in the specialty language for the active use of Russian, state and foreign languages in professional communication. Knows professional terminology in English.	Professionally-oriented Foreign Language
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Internet technologies and e-commerce	ITEK 3261	BS	Elective subjects	5.0	Bachelor	Management and marketing	3	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, Machine learning technologies	Internet technologies and e-commerce as an integral part of electronic business. Organizational and technological foundations of e-commerce on the Internet. Characteristics of objects and subjects of electronic commerce. E-commerce in the consumer market for goods and services: business-to-consumer technologies. Organization of interfirm interaction in e-commerce processes: business-to-business technologies. Features of mobile and television commerce. Problems and prospects for the development of e-commerce in Kazakhstan.	The ability to collect, process, economic and statistical, mathematical analysis of data, to present the results of their own research in the form of analytical reports, reviews, theses, presentations, recommendations; use the tools of marketing research when choosing the organizational structure of the electronic marketing service; making calculations to optimize the product range, distribution system, product distribution and promotion; assess the effectiveness of marketing activities, develop economically sound recommendations. The ability to effectively use software applications, modern digital platforms, technologies, be able to adapt technical data processing tools for building distribution channels and delivering products to the final customer, organizing sales and customer service.	Internet application development

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Internet application development	RIP 3293	BS	Elective subjects	5.0	Bachelor	Information systems	3	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual programming and data mining, Object-oriented programming (C#, Java), Parallel programming, Machine learning technologies	Technologies of using web programming languages in client applications; technologies of application Node.JS in server applications; use of web development tools; the use of modern web technologies for creating Internet applications. Layouts on CMS (Tilda, WordPress, Bitrix, Opencard). SEO principles.	Determine the language tool for solving problems and process information using the tools of programming languages and application programs. Apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software. Represent IT projects, maintaina culture of academic honesty, critically evaluate and interpret information in the field of ICT, economics and law. Apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels. To carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT. Use technologies, principles of organization and functioning of the Internet, analyze threats to information security. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS. Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied.	Internet technologies and e-commerce
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Software development technologies and standards	TSRPO 3275	BS	Elective subjects	5.0	Bachelor	Information systems	3	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	The main stages in the development of software development technology. Evolution of software life cycle models. Standards governing the software development process. Requirements development and external software engineering. Structural approach to software design. Design and programming of modules. Design and development of software interface. Testing, debugging and building software. Maintenance of software at the stage of operation. Software development management. Development and standardization of information technologies	determine the language tool for solving problems and process information using the tools of programming languages and application programs solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Tools and programming

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Tools and programming	ISRP 3288	BS	Elective subjects	5.0	Bachelor	Information systems	3	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Types of software development methodologies, depending on life-cycle models: cascading, iterative (1-RUP; 2 — flexible methodologies: SCRUM, KANBAN, DSDM, MSF, ALM, XP. RAD approach. Logical program design stage. System approach. Conceptual model. Subject area. Graphical, simulation, executable and / or functional behavioral, informational models. Types of software development approaches: structural; object oriented. Methods for modeling business processes.	Solve problems of varying complexity using programming technology, inspect software components. Apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas. Apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software. Represent IT projects, maintaina culture of academic honesty, critically evaluate and interpret information in the field of ICT, economics and law. Apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels. To carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT. Use technologies, principles of organization and functioning of the Internet, analyze threats to information security. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS. Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied.	Software development technologies and standards
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Statistical methods of data analysis	SMAD 4266	BS	Elective subjects	5.0	Bachelor	Information systems	4	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Multi-dimensional samples. Preliminary analysis of multidimensional data. Methods for modeling random variables. Robust statistical estimation. Methods of statistical estimation and comparison of samples. Non-parametric methods for testing sample homogeneity. Dispersion analysis. Methods for processing rank data. Component analysis. Methods for multidimensional data classification	Determine the language tool for solving problems and process information using the tools of programming languages and application programs. Solve problems of varying complexity using programming technology, inspect software components. Apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS.	Statistics for IT
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Statistics for IT	SDI 4290	BS	Elective subjects	5.0	Bachelor	Information systems	4	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Methods of statistical description of the results of observations. Fundamentals of correlation analysis. Fundamentals of regression analysis. Solution of typical examples. Fundamentals of dispersion analysis. Nonparametric methods of statistics.	Apply methods and means of organizing calculations in network systems, methods and means of organizing databases and knowledge bases in computer systems and networks, control and operation of hardware and software, as well as demonstrate knowledge in the field of classical and modern physics.Apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels	Statistical methods of data analysis

Program	Specialty	Form	Discipline	Code		Component	Credits	Level	Module			Prerequisites	Post-req	Course content	Learning outcomes	Related
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Introduction to artificial intelligence	VII 4279	BS	Elective subjects	5.0	Bachelor	Information systems	4	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Representation of knowledge in intelligent systems. Algorithms for logical inference based on knowledge. Representation of fuzzy knowledge. Decision making under conditions of incomplete certainty. Stages of development of expert systems. Modern Machine Learning. Problems of classification and regression. Evaluation of the quality of machine learning algorithms. Clustering tasks. Search for outliers and anomalies in data.	determine the language tool for solving problems and process information using the tools of programming languages and application programs solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas use technologies, principles of organization and functioning of the Internet, analyze threats to information security	Machine learning technology
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Machine learning technology	TMO 4285	BS	Elective subjects	5.0	Bachelor	Information systems	4	1	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Logical models of machine learning. Ranking trees. Learning ordered lists of rules. Learning unordered rule sets. Learning rule-based descriptive models. Probabilistic training models Probabilistic models of categorical data Discriminant learning by optimizing conditional likelihood. Probabilistic models with hidden variables. Compression based models. Metric models.	Determine the language tool for solving problems and process information using the tools of programming languages and application programs. Solve problems of varying complexity using programming technology, inspect software components. Apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas. Evaluate and select modern operating environments and ICT for informatization and automation of solving applied problems and creating IS. Plan the work of an IT project, take part in the implementation, adaptation and customization of software and applied.	Introduction to artificial intelligence
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Mathematical modeling of technical systems in MatLab	MMTSM 4257	BS	Elective subjects	5.0	Bachelor	Information systems	4	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	The essence of computer simulation of a complex system. Architectural construction of modeling systems of dynamic systems. Modeling and analysis of dynamic processes in technical devices by the method of equivalent circuits. Functional modeling of technical systems.	determine the language tool for solving problems and process information using the tools of programming languages and application programs apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Specialized Mathematical Packages
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Specialized Mathematical Packages	SMP 4286	BS	Elective subjects	5.0	Bachelor	Information systems	4	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Parallel Programming	Modern mathematical software: main types, possibilities, applications. Programming languages and libraries of programs for numerical calculations. Specialized and universal mathematical packages. Approaches to interface organization, command language. Computer algebra systems and universal numerical calculation systems (Mathematica, Maple, Matlab, Mathcad). Open source math packages (Octave, Scilab, Sage, Axiom, Maxima).	determine the language tool for solving problems and process information using the tools of programming languages and application programs apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels to carry out professional communication in various forms in Kazakh, Russian and foreign languages to solve professional problems in the field of ICT	Mathematical modeling of technical systems in MatLab

B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Neural networks and their applications	NSIP 4278	BS	Elective subjects	5.0	Bachelor	Information systems	4	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual programming and data mining, Parallel programming, Machine learning technologies	Artificial neural networks. Architecture of artificial neural networks. A set of tools for creating, initializing, training, modeling and visualizing a network. Methods and algorithms for training artificial neural networks. Gradient learning algorithms. Algorithms based on the use of the conjugate gradient method. Application of neural networks for designing control systems for dynamic processes.	solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels use technologies, principles of organization and functioning of the Internet, analyze threats to information security solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels use technologies, principles of organization and functioning of the Internet, analyze threats to information security	Basics of neural networks
B057 - «Information technology»	6B06101 - «Software engineering»	Full-time (bachelor 4 years) semester	Basics of neural networks	ONS 4289	BS	Elective subjects	5.0	Bachelor	Information systems	4	2	Information and communication technologies, Mathematical foundations of information technologies, Algorithms, data structures and programming	Visual programming and data mining, Parallel programming, Machine learning technologies	Introduction to the theory of neural networks. Models of neurons. Methods of learning a single neuron. Algorithms for learning networks of general form. Analytical teaching methods. Programming neural networks. Genetic Algorithms. Selection of the optimal architecture of neural networks.	solve problems of varying complexity using programming technology, inspect software components apply the mathematical apparatus of ICT to build algorithms for analysis, transformation, processing and to optimize information processes in various application areas apply application area analysis methods at the conceptual, logical, mathematical and algorithmic levels use technologies, principles of organization and functioning of the Internet, analyze threats to information security	Neural networks and their applications

The catalog of elective disciplines was reviewed and approved by the faculty council, protocol № 101 " 28 " 08 2023 y.

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