



CATALOG OF ELECTIVE DISCIPLINES

For students in the direction of preparation 7M061 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-requisites	Post-requisites	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Comprehensive information security of the enterprise	KOIBP 5210	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	1	2	The methodology and methods of scientific experiments	Introduction to Ontological modeling	The concept of building an enterprise security system definition and basic concepts of the security system, information protection in the enterprise security system, conceptual models of enterprise security system components. The legal basis of the activity of the enterprise security service: organizational and functional documents of the enterprise security system, types of regulatory documents. Organizational design of the company's security service activities. Structure and functions of the enterprise security service: building a structural diagram of the enterprise security service management. Organization of the information security service. Management of the enterprise security service.	To master a foreign language to the extent necessary to obtain information of professional content and to present their ideas and options for solving professional problems in oral and written forms. Analyze problems arising in science at the current stage of its development and use methodological tools of philosophy to design complex scientific research, as well as independently plan scientific research, experiments, approaches and methods of data processing. Apply and configure hardware, technologies to build server infrastructure of any enterprise, as well as design a set of information systems and services for development, describe solutions for modernization and reorganization of IT infrastructure of the enterprise. Organize measures to regulate the quality of information systems in accordance with the established requirements, as well as to apply the technology of data processing of the complex system of quality management of IS. To choose modern technologies, means for monitoring, solutions for the automation of business processes in the digitalization of the enterprise of various directions, including the development of software solutions based on geosystems.	Cryptographic methods of information protection
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Cryptographic methods of information protection	KMZI 5214	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	1	2	The methodology and methods of scientific experiments	Introduction to Ontological modeling	The study of basic mathematical approaches to solving computer security problems and to the construction of modern cryptographic algorithms, modern cloud solutions and calculations. Contributes to the development of creative abilities of undergraduates, the use of mathematical apparatus to derive the properties of the developed methods, apply and independently improve their knowledge in the field of cryptography and information security. To acquaint undergraduates with modern scientific researches in the field of cryptography and the applied areas adjacent to it, to promote formation of the directions of own scientific researches.	The concept of building an enterprise security system. definition and basic concepts of the security system, information protection in the enterprise security system, conceptual models of enterprise security system components. The legal basis of the activity of the enterprise security service: organizational and functional documents of the enterprise security system, types of regulatory documents. Organizational design of the company's security service activities. Structure and functions of the enterprise security service: building a structural diagram of the enterprise security service management. Organization of the information security service. Management of the enterprise security service.	Comprehensive information security of the enterprise

M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Methods of data analysis and processing	MAOD 5311	AS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	1	2	The methodology and methods of scientific experiments	Introduction to Ontological modeling	Data analysis as a systematic scientific and practical activity. Introduction to data analysis. Basic theoretical concepts underlying data analysis. Areas of application of modern data analysis and processing technologies. Stages of data analysis. Structured and unstructured data. Data collection and preparation. Big data. Organization of collection and storage of large data sets. Restoring missing values in data arrays. Big data. Organization of collection and storage of large data sets. Data cleaning, integration and transformation. Software modules and packages for working with multidimensional data arrays. Data visualization. Probability theory and mathematical statistics. Machine learning methods	Data analysis as a systematic scientific and practical activity. Introduction to data analysis. Basic theoretical concepts underlying data analysis. Areas of application of modern data analysis and processing technologies. Stages of data analysis. Structured and unstructured data. Data collection and preparation. Big data. Organization of collection and storage of large data sets. Restoring missing values in data arrays. Big data. Organization of collection and storage of large data sets. Data cleaning, integration and transformation. Software modules and packages for working with multidimensional data arrays. Data visualization. Probability theory and mathematical statistics. Machine learning methods	Data analysis and processing tools
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Data analysis and processing tools	IAOD 5317	AS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	1	2	The methodology and methods of scientific experiments	Introduction to Ontological modeling	Basics of working with data. Theoretical and methodological foundations of working with data. Methods of working with data. Development of an empirical research program. Language usage statistics. Programming in the R language. Descriptive statistics using R. Building a multiple regression model in the R language. Network analysis using Pajek. Building a network using Pajek software. Using classifications to organize data. Calculations of peak centers and network centralization. Collecting text data. Types of data created by users, ways to obtain and organize them. Data collection via API. Collecting data without using an API. Website analysis software. Features of working with "big data". Special tools for IAS and BI. Data source analysis. Design of showcases of analytical solution data in a column DBMS. Create SQL queries to the data display. Advanced data models. Visualization of data.	Basics of working with data. Theoretical and methodological foundations of working with data. Methods of working with data. Development of an empirical research program. Language usage statistics. Programming in the R language. Descriptive statistics using R. Building a multiple regression model in the R language. Network analysis using Pajek. Building a network using Pajek software. Using classifications to organize data. Calculations of peak centers and network centralization. Collecting text data. Types of data created by users, ways to obtain and organize them. Data collection via API. Website analysis software. Features of working with "big data". Special tools for IAS and BI. Data source analysis. Design of showcases of analytical solution data in a column DBMS. Create SQL queries to the data display. Advanced data models. Visualization of data	Methods of data analysis and processing
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Design of enterprise IT infrastructure	PIIP 6206	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	In this discipline, materials will be presented on hardware, software, network solutions, hosting and Internet providers, methods and algorithms for organizing an enterprise's IT infrastructure. Designing a complex of interconnected information systems and services ensuring the operation and development of the enterprise. Modern technologies, methods and tools for managing the enterprise's IT infrastructure; implementation of projects for the development of information systems in various fields, optimization of the functioning of business processes.	To know a foreign language to the extent necessary to obtain information of professional content and to present their ideas and options for solving professional problems in oral and written forms. To analyze the problems that arise in science at the present stage of its development and use the methodological tools of philosophy for the design of integrated scientific research, as well as independently plan scientific research, experiments, approaches and methods of data processing. To apply and configure hardware, technologies for construction of server infrastructure of any enterprise, and also to design a complex of information systems and services for development, to describe decisions on modernization and reorganization of IT infrastructure of the enterprise. To organize measures to regulate the quality of information systems in accordance with the established requirements, as well as to apply the technology of data processing of an integrated IS quality management system. Choose IT solutions for business automation and integrate software with other systems to build the optimal IT infrastructure of the enterprise in different	Information management

															areas of the economy. Choose modern technologies, monitoring tools, solutions for automation of business processes in the digitalization of enterprises in various areas, including the development of software solutions based on geosystems.	
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Information management	IM 6213	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	Principles and methods of information management in the system of internal and external communications of the organization. Theoretical foundations and skills of describing and regulating information flows carried out within an organization, between an organization and its near and far environment. The current level of information technology development, with various types of information systems and information resources. Fundamentals of information description and modeling of business processes of the organization.	Principles and methods of information management in the system of internal and external communications of the organization. Theoretical foundations and skills of describing and regulating information flows carried out within an organization, between an organization and its near and far environment. The current level of information technology development, with various types of information systems and information resources. Fundamentals of information description and modeling of business processes of the organization	Design of enterprise IT infrastructure
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Quality Management of Information Systems	UKIS 6207	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	In this discipline, undergraduates will be presented with the requirements for information systems for standards, rules and norms approved by the authorized bodies of the Republic of Kazakhstan, as well as rules for the development of technical specifications, technical specifications for the development of information systems. The tasks, functions, structure, data processing technology of an integrated information system quality management system, as well as its creation, operation and development will be considered.	To know a foreign language to the extent necessary to obtain information of professional content and to present their ideas and options for solving professional problems in oral and written forms. To use modern educational technologies, systematic scientific knowledge about the theory and practice of teaching and upbringing processes in pedagogical activity, as well as independently conduct pedagogical research at the university. To apply and configure hardware, technologies for construction of server infrastructure of any enterprise, and also to design a complex of information systems and services for development, to describe decisions on modernization and reorganization of IT infrastructure of the enterprise. Choose modern technologies, monitoring tools, solutions for automation of business processes in the digitalization of enterprises in various areas, including the development of software solutions based on geosystems.	Audit of information systems
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Audit of information systems	AIS 6215	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	The history of the IP audit. Audit of information systems: concept, goals, objectives, standards, stages of audit. The state of the IT audit market in Kazakhstan: companies, types of services. IT infrastructure: concept, composition, security, configuration, management. The main types of IT audit: goals, objectives, brief description. IT audit in preparation of the company for certification according to international standards. IT audit before restructuring of IT departments. IT audit before the implementation of the information system. IT audit before the implementation of IT infrastructure configuration management systems. Information security audit. The methodology of the IP audit: audit planning, stages, problems during the audit and methods of their solution, the choice of a source of funding. Characteristics of IP audit standards. Conducting diagnostics and optimization of IS.	The history of the IP audit. Audit of information systems: concept, goals, objectives, standards, stages of audit. The state of the IT audit market in Kazakhstan: companies, types of services. IT infrastructure: concept, composition, security, configuration, management. The main types of IT audit: goals, objectives, brief description. IT audit in preparation of the company for certification according to international standards. IT audit before restructuring of IT departments. IT audit before the implementation of the information system. IT audit before the implementation of IT infrastructure configuration management systems. Information security audit. The methodology of the IP audit: audit planning, stages, problems during the audit and methods of their solution, the choice of a source of funding. Characteristics of IP audit standards. Conducting diagnostics and optimization of IS	Quality Management of Information Systems

M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Digitization of an agricultural enterprise.	CSP 6306	AS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	In this discipline, undergraduates will be presented materials on the opportunities, tools and technologies for digitization of agricultural sectors in areas such as Agronomy and agricultural engineering; Animal husbandry; Veterinary medicine, where software solutions on the market, main business processes with the principles of digitalization will be considered.	To analyze the problems that arise in science at the present stage of its development and use the methodological tools of philosophy for the design of integrated scientific research, as well as independently plan scientific research, experiments, approaches and methods of data processing. Analyze, design management activities and use psychological methods of management and self-government in professional activities. To organize measures to regulate the quality of information systems in accordance with the established requirements, as well as to apply the technology of data processing of an integrated IS quality management system. Conduct a survey of organizations, identify information needs of users, analysis of methods and models of implementation and adaptation of information systems and participate in the reengineering of application and information processes. Choose IT solutions for business automation and integrate software with other systems to build the optimal it infrastructure of the enterprise in different areas of the economy. Choose modern technologies, monitoring tools, solutions for automation of business processes in the digitalization of enterprises in various areas, including the development of software solutions based on ecosystems.	Digital technologies in the agro-industrial complex
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	BigData Technologies	TB 6314	AS	Elective subjects	6.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	Definition of big data. Big data storage technologies. The process of analyzing big data. Big data analysis technologies. Scientific problems in the field of big data. Methods and techniques of analysis applicable to big data: methods of the Data Mining class: learning associative rules, cluster analysis, regression analysis; crowdsourcing, mixing and integration of data, machine learning, including teaching with and without a teacher, as well as Ensemble learning, artificial neural networks, network analysis, optimization, including genetic algorithms; pattern recognition; Forecasting methods. Statistical information processing programs.	Definition of big data. Big data storage technologies. The process of analyzing big data. Big data analysis technologies. Scientific problems in the field of big data. Methods and techniques of analysis applicable to big data: methods of the Data Mining class: learning associative rules, cluster analysis, regression analysis; crowdsourcing, mixing and integration of data, machine learning, including teaching with and without a teacher, as well as Ensemble learning, artificial neural networks, network analysis, optimization, including genetic algorithms; pattern recognition; Forecasting methods. Statistical information processing programs	BigData in practice
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	BigData in practice	BP 6318	AS	Elective subjects	6.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	1	Analysis and modeling of information systems, IT solutions for business	Research practice	In this discipline, undergraduates are offered a brief overview of The bigdata concept, tools available on the market of software solutions, as well as materials about their use on raw data. API services, examples of their use. Data collection and processing, understanding the work in Hadoop and Map Reduce programs, determining the big data characteristics necessary for improvement, working with cloud platforms. Tools, methods and techniques for processing large amounts of data.	To use modern educational technologies, systematic scientific knowledge about the theory and technology of teaching and upbringing processes in pedagogical activity, as well as independently conduct pedagogical research at the university. Choose IT solutions for business automation and integrate software with other systems to build the optimal it infrastructure of the enterprise in different areas of the economy. Choose modern technologies, monitoring tools, solutions for automation of business processes in the digitalization of enterprises in various areas, including the development of software solutions based on geosystems.	BigData Technologies

M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Enterprise cloud infrastructure	OTP 6310	AS	Elective subjects	6.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	2	Analysis and modeling of information systems, IT solutions for business	Research practice	Digital transformation of the enterprise, cloud provider services, a set of hardware and software components to support the provider's cloud services, cloud services, access to and management of hardware resources, scaling of the enterprise's IT infrastructure. Types of cloud infrastructures: public clouds, dedicated private cloud (VPC), private clouds, hybrid clouds, advantages of cloud infrastructure, the main physical components of cloud infrastructure: servers, data warehouses and network equipment, cloud infrastructure models. Virtualization platforms.	Digital transformation of the enterprise, cloud provider services, a set of hardware and software components to support the provider's cloud services, cloud services, access to and management of hardware resources, scaling of the enterprise's IT infrastructure. Types of cloud infrastructures: public clouds, dedicated private cloud (VPC), private clouds, hybrid clouds, advantages of cloud infrastructure, the main physical components of cloud infrastructure: servers, data warehouses and network equipment, cloud infrastructure models. Virtualization platforms.	Cloud technologies in practice
M094 - «Information technology»	7M06101 - «Information systems and IT solutions by industry»	Full-time (MS 2 years) semester	Cloud technologies in practice	OTP 6319	AS	Elective subjects	6.0	Master's program by specialization (Scientific & pedagogical direction)	Information systems	2	2	Analysis and modeling of information systems, IT solutions for business	Research practice	In this discipline, undergraduates will be presented with materials on the practical application of cloud technology, combining software, hardware and various communication channels in conjunction with the technical support service, the study of services and providers of cloud platforms. Practical tasks will strengthen the skills to use cloud solutions.	To analyze the problems that arise in science at the present stage of its development and use the methodological tools of philosophy for the design of integrated scientific research, as well as independently plan scientific research, experiments, approaches and methods of data processing To use modern educational technologies, systematic scientific knowledge about the theory and technology of teaching and upbringing processes in pedagogical activity, as well as independently conduct pedagogical research at the university Choose modern technologies, monitoring tools, solutions for automation of business processes in the digitalization of enterprises in various areas, including the development of software solutions based on geosystems.	Enterprise cloud infrastructure

The catalog of elective disciplines was reviewed and approved by the faculty council, protocol № 10.1 "26" 08 2023 y.

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