Ministry of Agriculture of the Republic of Kazakhstan

JSC "Kazakh Agrotechnical Research University named after S.Seifullin"

Faculty of «Energy»

Department «Radio engineering, electronics and telecommunication»

I APPROVE
Dean of the Energy Faculty Office
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«28» 06 2024 y.

7M06205
(Cipher Educational programs)

Radio–electronic technologies and systems
(Name Educational programs)

CATALOG ELECTIVE DISCIPLINE

2024 years
receipts

ASTANA, 2024

Catalog elective disciplines of the OP
developed on basis worker curriculum OP «Radio–electronic technologies and systems».

Catalog elective disciplines discussed on meeting departments «Radio engineering, electronics and telecommunication»

protocol № 13 from «23» 05 2024 y.

Catalog elective disciplines reviewed on meeting Faculty Council on Academic Quality

protocol № 15 from «11» 06 2024 y.

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Chairman of the SFAK _____ signature Zhantlessova A.B. Full name, rank , degree

Introduction

Dear student (master's student, doctoral student)!

Before you is the Catalogue of Elective Subjects. This is a systematized annotated list of elective academic subjects. It was developed for the purposes of providing the opportunity for independent, prompt, flexible and comprehensive formation of an individual learning path. This is your assistant in creating your individual curriculum. With the credit technology of education, all academic disciplines are divided into 3 cycles - General Education (GED), Basic (BD) and Profiling (PD). Within each of these cycles, academic disciplines are divided into 2 types - Compulsory Component and Elective Component (elective, i.e., elective academic disciplines). The compulsory component disciplines are established by the State Compulsory Education Standard and are studied by all students of this educational program without exception . Elective academic disciplines are offered to you for study by departments. Your advisor will help you choose elective academic disciplines.

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1. MAIN TERMS AND THEIR DEFINITIONS

An educational program is a single set of basic characteristics of education, including the goals, results and content of training, the organization of the educational process, the methods and techniques of their implementation, and the criteria for assessing the results of training.

The content of the educational program of higher education consists of disciplines of three cycles – general education disciplines (hereinafter – GED), basic disciplines (hereinafter – BD) and specialized disciplines (hereinafter – PD).

The cycle of the educational course includes disciplines of the compulsory component (hereinafter referred to as OC), the university component (hereinafter referred to as VC) and/or the elective component (hereinafter referred to as EC). The BD and PD include disciplines of VC and EC.

The working curriculum (hereinafter referred to as WCP) is an educational document developed by the OVPO independently. based on the educational program and individual educational plans of students;

The Catalogue of Elective Disciplines (CED) is a systematized annotated list of all disciplines of the elective component for the entire period of study, containing their brief description indicating the purpose of study, brief content (main sections) and expected learning outcomes. The CED reflects the prerequisites and postrequisites of each academic discipline. The CED should provide students with the opportunity to choose alternative elective academic disciplines to form individual educational trajectory. Based on the educational program and the KED, students develop individual educational plans with the help of advisors .

Individual educational plan (hereinafter IEP) is a student's educational plan, independently formed by him for each academic year with the help of an advisor based on the educational program and catalog of elective disciplines;

The mandatory component is a list of academic disciplines and the corresponding minimum volumes of academic credits established by the State Educational Standard and studied by students on a mandatory basis according to the curriculum;

University component (hereinafter referred to as UC) is a list of academic disciplines and corresponding minimum volumes of academic credits determined by the higher professional education institution independently for mastering the educational program;

Elective component – a list of academic disciplines and corresponding minimum amounts of academic credits, proposed by the OVPO independently chosen by students in any academic period, taking into account their prerequisites and postrequisites ;

Elective disciplines – academic disciplines included in the university component and the elective component within the established academic credits and introduced by the Higher Professional Education Department, reflecting the individual preparation of the student, taking into account the specifics of socio-economic development and the needs of a particular region, and established

scientific schools.

Prerequisites (Prerequisite) (prerequisite) – disciplines and (or) modules and other types of academic work containing knowledge, abilities, skills and competencies necessary for mastering the studied discipline and (or) modules;

Post-requisites (Postrequisite) (postrequisite) – disciplines and (or) modules and other types of academic work, the study of which requires knowledge, abilities, skills and competencies acquired upon completion of the study of a given discipline and (or) module;

Learning outcomes are the volume of knowledge, skills, and abilities acquired and demonstrated by the student in mastering the educational program, as confirmed by the assessment, and the values and attitudes formed;

Advisor - a teacher who performs the functions academic mentor of a student in the relevant educational field program, providing assistance in choosing a learning path (formation of an individual curriculum) and mastering the educational programs during the training period;

The register of educational programs is the information system "Unified Platform for Higher Education" (hereinafter referred to as the information system) of the authorized body in the field of science and higher education, which includes a list of educational programs developed by organizations of higher and (or) postgraduate education.

Competencies are the ability to practically use the knowledge, skills and abilities acquired during the learning process in professional activities.

2. STRUCTURE KED

2.1 Catalog elective disciplines, contains next information:

- Cycle disciplines;
- Discipline code ;
- Name disciplines;
- Semester of study (semesters of study of prerequisite and postrequisite disciplines should not coincide with semesters of study of the discipline itself);
- Quantity loans;
- Prerequisites ;
- Post-requisites;
- Brief description of the discipline;
- Expected learning outcomes.

Cycle	Discipline code	Name disciplines	Semester	Number of credits	Department	Prerequisites	Post-requisites	Brief description of the discipline	Expected learning outcomes
KV	AYaDAC 6317	English for Academic Purposes	3	4	RET	Foreign language, professional English	Completion of a master's thesis	Comprehensive theoretical-linguistic, practical and information-analytical training for the purpose of performing functions related to the use of a foreign language in professional and scientific activities: mastery of public speaking skills, conducting a discussion, the ability to work with information from various sources, edit texts of professionally significant content in a foreign language	RO 1 Use the state and foreign languages to the extent necessary to obtain information of professional content and to present one's ideas and options for solving professional problems in oral and written forms. RO 11 Formulate theoretical and practical knowledge to solve educational, practical and professional problems in the studied area; use the principles and methods of

									scientific research, academic writing and apply them in the studied area; determine the meaning of the principles and culture of academic honesty.
KV	AP 6314	Academic writing	3	4	RET	English for Specific Purposes	Specialized courses in English	The course is aimed at developing and improving academic skills in written English, necessary for successful written communication in academic, professional and work settings. Students are introduced to the features of academic writing, using library catalogs and websites. Practice writing a discursive essay: plan, main idea, paragraphs and conclusion. Paraphrasing techniques. APA format: references and citations. Students study types of abbreviations, academic vocabulary, use of articles	RO 1 Use the state and foreign languages to the extent necessary to obtain information of professional content and to present one's ideas and options for solving professional problems in oral and written forms. RO 11 Formulate theoretical and practical knowledge to solve educational, practical and professional problems in the studied area; use

									the principles and methods of scientific research, academic writing and apply them in the studied area; determine the meaning of the principles and culture of academic honesty.
KV	TPTE 5212	Theory and practice of technical experiment	2	5	RET	History and philosophy of science, psychology of management	NIRM.EIRM	Allows you to form knowledge about the main stages of conducting experiments and processing their results. Basic provisions and concepts of probability theory and mathematical statistics. Theory of random errors. Processing experimental data of measurement results. Methods of graphic processing of measurement results	PO 6 Assess modern issues of radio-electronic technologies and systems according to the Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct research, analyze and process results in the design, development and instrument-technological modeling of elements of radio-electronic equipment using new technical

									solutions. RO 11 Formulate theoretical and practical knowledge to solve educational, practical and professional problems in the studied area; use the principles and methods of scientific research, academic writing and apply them in the studied area; determine the meaning of the principles and culture of academic honesty
KV	MONI 5209	Methodological foundations of scientific research	2	5	RET	History and philosophy of science, psychology of management	NIRM.EIRM	Review of the main directions of scientific research development in Kazakhstan and abroad. Methodology and methods of scientific research. Selection of the direction of scientific research and stages of scientific research work. Processing of experimental research results. Registration of	PO 6 Assess modern issues of radio-electronic technologies and systems according to the Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct

								scientific work results and transfer of information. Implementation and effectiveness of scientific research. Scientific organization of intellectual work. Basic principles of research group management	research, analyze and process results in the design, development and instrument-technological modeling of elements of radio-electronic equipment using new technical solutions. RO 11 Formulate theoretical and practical knowledge to solve educational, practical and professional problems in the studied area; use the principles and methods of scientific research, academic writing and apply them in the studied area; determine the meaning of the principles and culture of academic honesty

KV	FOMET 5215	Physical principles of materials for electronic engineering	1	5	RET	Mathematics, physics, electrical and radio materials science , fundamentals of micro and nanoelectronics	Embedded and sensor devices. Modern problems of theory and microwave technology	Forms basic knowledge of the physical foundations of materials of electronic engineering according to the content of the discipline. Interatomic bonds. Defects in crystals. Properties of conductors and their physical nature. Phenomenon of superconductivity. Properties of semiconductors. Band theory of semiconductors. Fermi level. Heterostructures. Dielectrics. Physics of magnetic materials	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and reasonably select the necessary equipment in accordance with the calculated and specified technical and economic data. PO 8 Select and use knowledge of modern achievements in the field of creation, operation and development prospects of radio-electronic technologies and systems.
KV	FPD 5216	Physics of conductors and dielectrics	1	5	RET	Physics, mathematics, computer science	Modern issues in electronics	Forms basic knowledge of the physics of conductors and dielectrics according to the content of the discipline. The most important properties of crystals. Bravais lattices . Types of bonding in materials. Classical	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and

								Drude-Lorentz theory. Matthiessen's rule . Resistance of conductors. Physical processes in semiconductors. Photoconductivity. Dielectrics. Polarization mechanisms. Liquid crystals	reasonably select the necessary equipment in accordance with the calculated and specified technical and economic data. PO 8 Select and use knowledge of modern achievements in the field of creation, operation and development prospects of radio-electronic technologies and systems
KV	MOSRS 6307	Metrological support of radio engineering systems networks	3	5	RET	Physics, theory of electrical circuits, mathematics	Digital TV and Radio Broadcasting Systems. Embedded and Sensory Devices	The discipline is aimed at studying the main tasks of metrological support of radio engineering systems networks. Properties of measuring instruments and requirements imposed on them. Measuring radio signal parameters. Methods for measuring the standing wave ratio, the modulus and phase of the reflection coefficient, quality factor	PO5 Analyze and use intelligent methods of signal processing, metrological support and mathematical processing of measurement results. PO6 Assess modern issues of radio-electronic technologies and systems according to the

									Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct research, analyze and process results in the design, development and instrument-technological modeling of elements of radio-electronic equipment using new technical solutions.
KV	MORP 6313	Metrological support of radio-electronic production	3	5	RET	Physics, theory of electrical circuits, mathematics	Digital TV and Radio Broadcasting Systems. Embedded and Sensory Devices	The discipline is aimed at studying the main tasks of metrological support, tasks of metrological support solved by specialists at the stages of the product life cycle. Scientific, organizational, technical and regulatory framework for metrological support. Areas of activity of metrological services. Metrological control of technical documentation	PO5 Analyze and use intelligent methods of signal processing, metrological support and mathematical processing of measurement results. PO6 Assess modern issues of radio-electronic technologies and systems

									according to the Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct research, analyze and process results in the design, development and instrument-technological modeling of elements of radio-electronic equipment using new technical solutions.
KV	RS 5306	Radio automatic systems	1	4	RET	Fundamentals of Telecommunications, Radio Automatics and Telemetry, Radio Circuits and Signals	Metrological support of radio engineering systems networks, digital television and radio broadcasting systems, embedded and sensor devices	Study of the basic principles of construction of various radio automation systems. Typical radio automation systems are considered. Systems of automatic tracking of the range of objects. Transfer functions. System of tracking the time of a pulse signal. System of automatic determination of the direction of radio waves	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and reasonably select the necessary equipment in accordance with the calculated and specified

									technical and economic data. PO 7 Carry out innovative engineering projects for the development of hardware and software for radar, radio navigation and space systems using modern methods and automated design systems, and advanced experience in developing competitive products.
KV	ASUR 5313	Automatic control systems in radio electronics	1	4	RET	Higher mathematics, fundamentals of telecommunications, radio automation and telemetry, radio circuits and signals	Metrological support of radio engineering systems networks, digital television and radio broadcasting systems, embedded and sensor devices	Study of the basic principles of construction of various automatic control systems in radio electronics, typical means used for organization of these systems. Classification of control systems in radio electronics. Methods of analysis and synthesis of digital control systems. Mathematical description of automatic systems. Typical links and their characteristics	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and reasonably select the necessary equipment in accordance with the calculated and specified technical and

									economic data. PO 7 Carry out innovative engineering projects for the development of hardware and software for radar, radio navigation and space systems using modern methods and automated design systems, and advanced experience in developing competitive products.
KV	SVMNO 5217	Special issues of micro, nano and optoelectronics	1	5	RET	Mathematics, computer science, theory of electrical circuits, radio circuits and signals, CAD of electronic devices, digital devices and microprocessor technology	Physical bases of materials of electronic engineering. Instrument-technological modeling in electronics. Embedded and sensor devices	Modern problems of microelectronics. Physical foundations of IMS technology. Technological limitations of minimum sizes of IMS elements. Limitations associated with semiconductor doping processes. Physical limitations of topological sizes, degree and density of integration, speed and parameters of IMS elements. Molecular electronics as a direction of functional electronics	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and reasonably select the necessary equipment in accordance with the calculated and specified technical and economic data.

									PO 6 Assess modern issues of radio electronic technologies and systems according to the Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct research, analyze and process results in the design, development and instrument-technological modeling of elements of radio electronic equipment using new technical solutions.
KV	SVE 5210	Special electronics issues	1	5	RET	Physics, circuitry and electronics	Theory of Electronics and Communication Systems	The content of the discipline allows for an in-depth study of special issues of electronics, the fundamentals and features of IMS technology. Features of electrical transfer processes in quantum-dimensional devices. The principle of operation and architecture of molecular circuits. Quantum transitions.	PO 4 Solve problems related to the design and operation of radio-electronic technologies and systems, perform calculations and reasonably select the necessary equipment in

								Emitters based on heterostructures	accordance with the calculated and specified technical and economic data. PO 6 Assess modern issues of radio-electronic technologies and systems according to the Atlas of New Professions of the Republic of Kazakhstan. Be prepared to independently conduct research, analyze and process results in the design, development and instrument-technological modeling of elements of radioelectronic equipment using new technical solutions.