
Faculty «Computer Technology and Cyber Security»
Department of “Radio engineering, electronics and telecommunications”

APPROVED BY
Vice-rector for academic affairs,
International Information
Technology University JSC



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(Signature) (Full name)

03 2021.

7M06201 – Telecommunication systems and networks

CATALOGUE OF ELECTIVE DISCIPLINES

2021

2021

The catalogue of elective disciplines for the specialty/AP 7M06201 – Telecommunication systems and networks is developed on the basis of the working curriculum of the specialty/AP.

The catalogue of elective disciplines was discussed at a meeting of the department «Radio Engineering, Electronics and Telecommunications»

minutes No. 8 from “26” 03.2021.

Head of Department

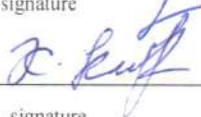


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Bakhtiyarova Y.A. associate professor

Full name, position, degree

CED compiler



signature

Khairoshева K. lecturer

Full name, position, degree

The catalogue of elective disciplines was approved at a meeting of the Academic Council of “International Information Technology University” JSC minutes No. 4 from “30” 03 2021.

Head of DPE



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G.U. Bektemisova

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1 TERMS AND ABBREVIATIONS

1.1 Academic program is a single set of basic characteristics of education, including goals, results and content of training, the organization of educational process, ways and methods for their implementation and criteria for assessing learning outcomes.

The content of academic program of higher education consists of three cycles of disciplines - general education disciplines (hereinafter - GED), basic disciplines (hereinafter - BD) and core disciplines (hereinafter - CD).

The cycle of GED includes disciplines of the compulsory component (hereinafter - CC), the university component (hereinafter - UC) and (or) the component of choice (hereinafter - COC). BD and CD include disciplines of UC and COC.

1.2 Catalogue of elective disciplines (CED) is a systematic annotated list of all COC disciplines, for the entire training period, containing a brief description indicating the purpose of study, a summary of main sections and expected learning outcomes. CED reflects the prerequisites and postrequisites of each academic discipline. It should provide the students with the possibility of an alternative choice of elective disciplines for the formation of an individual educational trajectory.

On the basis of academic program and CED, the students develop individual curriculum with the help of advisers.

1.3 Individual curriculum (IC) is a curriculum formed by the students independently with the help of an adviser for each academic year on the basis of the academic program, the catalogue of elective disciplines or modules;

IC defines an individual educational trajectory of each student separately. It includes disciplines and types of educational activities (internship, experimental research, forms of final certification) of the compulsory component (CC), the university component (UC) and the component of choice (COC).

1.4 Advisor is a teacher who performs the functions of an academic mentor of a student (according to the appropriate academic program), and assists in choosing a learning path (creating an individual curriculum) and mastering the academic program during the training period.

1.5 The university component is a list of compulsory educational disciplines determined by the university independently for the mastering of the academic program.

1.6 The component of choice is a list of academic disciplines and the corresponding minimum amounts of academic credits offered by the university and independently chosen by students in any academic period, taking into account their prerequisites and postrequisites.

1.7 Elective disciplines are educational disciplines that are a part of the university component and the component of choice in the framework of established academic credits, introduced by organizations of education reflecting the individual preparation of students and taking into account the specifics of socio-economic development, the needs of a particular region and established scientific schools.

1.8 Postrequisites are the disciplines and (or) modules and other types of academic work, the study of which requires knowledge, skills and competencies acquired at the end of the study of this discipline and (or) modules;

1.9 Prerequisites are the disciplines and (or) modules and other types of educational work containing knowledge, abilities, skills and competencies necessary for the mastering of the studied discipline and (or) modules;

1.10 Competencies are the ability of the practical use of acquired knowledge and skills in professional activities.

2 ELECTIVE DISCIPLINES

Cycle of discipline	Code of discipline	Name of discipline	Semester	Number of credits.	Prerequisites
1 course					
Elective course - 1	EEC 7601	Reliability of fiber-optic communication lines	1	5	Guide systems for telecommunications
Elective course - 2	EEC 7603	Methods of digital signal processing	2	5	Theory of Electrical Circuits
Elective course - 3	EEC 7608	Theory and technique of scientific experiment	2	5	-
Elective course -4	EEC 7609	Embedded systems in ICT	2	5	Computer science
2 course					
Elective course - 5	EEC 7602	Modern technologies of information security of telecommunication	3	5	-
Elective course - 6	EEC 7610	New Generation Network Technologies	3	5	Reliability of fiber-optic communication lines
Elective course - 7	EEC 7611	Modern methods and prospects for using RFS	3	5	-

3. DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	EEC 7601
Name of discipline	Reliability of fiber-optic communication lines
Number of credits (ESTS)	5
Course, semester	1,1
Department	Radio engineering, electronics and telecommunications
Course author (s)	Kemelbekov B.Zh.
Prerequisites	Guide systems for telecommunications
Postrequisites	Graduate master's work
The aim of study of a discipline	The purpose of this discipline is to study ways to increase the reliability of digital transmission systems, to teach students to the systematic approach of deepening theoretical knowledge. The educational goal of the discipline is the formation of a scientific, creative approach to mastering modern technologies of information systems among students
Brief course description (main sections)	The methodological direction of the discipline presupposes a systematic study of the principles of ways to improve the reliability of fiber-optic transmission systems. The ideological and political orientation of the discipline is determined by the tasks set by the President of the Republic of Kazakhstan in the effective use of the information and telecommunication potential of the country, the fulfillment of the assigned tasks within the established timeframe, using advanced domestic and foreign experience in the field of telecommunications. Lectures are based on a consistent systematic presentation by the teacher of the educational material, each lecture is accompanied by a presentation containing a brief theoretical material and illustrative material. A number of questions are submitted for independent study by the undergraduate under the guidance and supervision of the teacher.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<ul style="list-style-type: none"> - ability to determine the reliability of fiber-optic transmission systems; - the ability to choose the optimal algorithms for technical operation to predict the reliability of fiber-optic transmission systems; - in perfect use and implement theoretical knowledge in operation.

Description of discipline	
Code of discipline	EEC 7603
Name of discipline	Methods of digital signal processing
Number of credits (ESTS)	5
Course, semester	1, 2
Department	Radio engineering, electronics and telecommunications
Course author (s)	Imanbekova T.D.
Prerequisites	Theory of Electrical Circuits
Postrequisites	Moderndigitaltransmissionsystems
The aim of study of a discipline	Mastering the basics of digital signal processing, methods for describing discrete and digital signals and systems in the time and frequency domains, the main methods of analysis and synthesis of digital signal processing devices, methods for synthesizing digital filters, applying digital processing methods in theory and practice
Brief course description (main sections)	"Methods of digital signal processing" studies the theoretical foundations and basic methods of analysis of discrete signals and systems, methods of spectral analysis and digital filtering of discrete signals, methods of synthesis of digital and adaptive filters.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>Understand the basic theoretical methods and means of digital signal processing.</p> <p>Reproduce the physical and mathematical foundations of signal conversion in digital processing.</p> <p>Select and evaluate the most efficient signal processing algorithm.</p> <p>To analyze and synthesize digital filters, modeling processing. To evaluate and apply the obtained theoretical knowledge in the field of digital signal processing to solve applied problems of the future specialty.</p> <p>Explore synthesis methods and choose the optimal method for the synthesis of digital filters</p>

Description of discipline	
Code of discipline	EEC 7608
Name of discipline	Theory and technique of scientific experiment
Number of credits (ESTS)	5
Course, semester	1, 2
Department	Radio engineering, electronics and telecommunications
Course author (s)	Bakhtiyarova Y.A.
Prerequisites	-
Postrequisites	Graduate master's work
The aim of study of a discipline	Study of the principles of research and experimental work, including the actual planning of the experiment, the methodology of science, methods and conduct of experimental work, processing and processing of research results.
Brief course description (main sections)	The material of this educational and methodological complex is based on the study of the theory of experiment planning, the principles of processing the results of experimental measurements, methods of processing the results of experimental measurements, automation of experimental measurements and data collection and processing. Lectures are based on a consistent systematic oral presentation by the teacher of educational material that represents a logically complete whole. Each lecture is accompanied by a presentation containing brief theoretical material and illustrative material. A number of sections and questions of the discipline are submitted for independent study by a master's student, including under the guidance and supervision of a teacher.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>Planned learning outcomes:</p> <ul style="list-style-type: none"> - explain the principles of research and experimental work; - plan an experiment; - select the object of experimental research; - justify the feasibility of the selected experiments; - determine the form of presentation of the received material; - to understand the experimental data.

Description of discipline	
Code of discipline	EEC 7609
Name of discipline	Embedded systems in ICT
Number of credits (ESTS)	5
Course, semester	1, 2
Department	Radio engineering, electronics and telecommunications
Course author (s)	Dzhaparkulov B.K.
Prerequisites	Computer science
Postrequisites	Mobile communications systems
The aim of study of a discipline	The discipline aims at teaching basic knowledge on the organization of the testing process and debugging of embedded systems using modern technologies and approaches
Brief course description (main sections)	<p>The course discusses the key principles of building embedded systems, provides an overview of embedded operating systems and real-time systems.</p> <p>The architecture of the processor nodes, the hierarchy and memory technology, the structure of interrupt controllers, devices and I / O interfaces of the embedded system are described. The differences between the Android, Linux and Windows CE platforms and the main ways to load the embedded system are described. The principles of organization of embedded systems and the interaction of their components are given.</p>
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>As a result of studying the course, students should be able to:</p> <ul style="list-style-type: none"> • Describe the main components of an embedded system. • Distinguish the differences between the Android, Linux, and Windows CE platforms. • Identify the main methods for loading the embedded system. • own the principles of design and development of embedded systems. • Explain the principle of debugging software used in embedded systems

Description of discipline	
Code of discipline	EEC 7602
Name of discipline	Modern technologies of information security of telecommunication networks
Number of credits (ESTS)	5
Course, semester	2, 3
Department	Radio engineering, electronics and telecommunications
Course author (s)	Amanzholova S.T.
Prerequisites	-
Postrequisites	Graduate master's work
The aim of study of a discipline	study of the fundamental principles of information security using cryptographic methods and examples of implementation of these methods in practice
Brief course description (main sections)	<p>The course consists of the following sections:</p> <p>Introduction to cryptology.</p> <p>Symmetric cryptography algorithms</p> <p>Asymmetric cryptography algorithms</p> <p>HASH functions</p> <p>Digital signatures</p> <p>Authentication algorithms</p> <p>Course objective:</p> <p>System approach to the organization of protection of information transmitted and processed by technical means based on the use of cryptographic methods. Principles of synthesis and analysis of ciphers, mathematical methods used in cryptanalysis.</p>
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>As a result, undergraduates are able to:</p> <ul style="list-style-type: none"> - Be able to use existing cryptographic systems; - Know the principles of encryption and decryption of information; - To understand the methods of cryptanalysis - Implement existing information security solutions in existing telecommunications systems - Implement new information security technologies in telecommunications systems - Conduct system security analysis

Description of discipline	
Code of discipline	EEC 7610
Name of discipline	New Generation Network Technologies
Number of credits (ESTS)	5
Course, semester	2, 3
Department	Radio engineering, electronics and telecommunications
Course author (s)	Bakhtiyarova Y.A.
Prerequisites	Reliability of fiber-optic communication lines
Postrequisites	Modern methods and prospects for using the radio Frequency spectrum, Problems of electromagnetic compatibility of Frequency spectrum
The aim of study of a discipline	it consists in mastering the principles of building architectures and working principles of modern and advanced network technologies for various purposes, the basics of their design, management methods and network analysis
Brief course description (main sections)	it provides for the study of the principles of modern technologies, computer network architectures, and network management system architectures.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>know:</p> <ul style="list-style-type: none"> - about the architecture of computer networks; - about problems and prospects of development of network technologies, protocols and operating systems. <p>know:</p> <ul style="list-style-type: none"> - architecture of computer networks, - basic and high-speed local area network technologies, global networks; - routing protocol; - basics of Internet technology. <p>be able to:</p> <ul style="list-style-type: none"> - perform administration in networks; - evaluate and analyze the results obtained. - apply the acquired knowledge in practice. - be competent in modern issues of design of radio engineering devices.

Description of discipline	
Code of discipline	EEC 7611
Name of discipline	Modern methods and prospects for using the radio Frequency spectrum
Number of credits (ESTS)	5
Course, semester	2, 3
Department	Radio engineering, electronics and telecommunications
Course author (s)	Aitmagambetov A.Z.
Prerequisites	-
Postrequisites	Graduate master's work
The aim of study of a discipline	Study of methods devoted to the regulation and use of the radio frequency spectrum for modern radio technologies.
Brief course description (main sections)	The discipline is devoted to the management of the use of the radio frequency spectrum (RF). Legal documents of the Republic of Kazakhstan and the International telecommunication Union in the field of RF use are considered. We study methods for managing RFS at the national and international levels, the structure of public administration bodies, and methods for improving the efficiency of using the radio frequency spectrum.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	As a result of studying the course, undergraduates are able to: <ul style="list-style-type: none"> * analyze and classify the main processes of radio frequency spectrum management at the national and international levels; * use the normative documents of the International telecommunication Union, the RCC and the communications administration of Kazakhstan in the design, implementation and operation of radio systems and networks for various purposes; * know how to ensure electromagnetic compatibility and improve the efficiency of the use of RF for new radio engineering systems and networks being implemented • * use this knowledge in the design, development, and implementation of new generation wireless systems and telecommunications networks .