

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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" 03 2021 .

B059 Communications and communications technology
6B06201 Telecommunication systems and networks

CATALOGUE OF ELECTIVE DISCIPLINES

2021

2021

The catalogue of elective disciplines for the specialty/ AP 6B06201 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



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Kamal R.D. 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.

Director of Academic Affairs



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Mustafina A.K.

Full name, position, degree



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 curricula 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.

Cycle of discipline	Code of discipline	Name of discipline	Sem .	EST S	Prerequisites
3 course					
Elective discipline – 1	EEC 6625	NGN and post - NGN networks	6	6	Wireless theory
Elective discipline – 2	EEC 6630	Fiber optic transmission systems	6	6	Physics
4 course					
Elective discipline – 3	EEC 6624	Basics of information security of networks and communication systems	7	4	ICT
Elective discipline – 4	EEC 6626	Radioengineering systems	7	5	TEC
Elective discipline – 5	EEC 6629	M2M networks and IoT	7	6	Radio access systems and networks
Elective discipline – 6	EEC 6631	Intelligent telecommunication systems	8	4	MWTT

Description of discipline	
Code of discipline	EEC 6625
Name of discipline	NGN and post - NGN networks
Number of credits (ESTS)	6
Course, semester	3 Course, 6 semester
Department	Radio engineering, electronics and telecommunications
Course author (s)	Khairoshva K.B
Prerequisites	Physics, wireless technology.
Postrequisites	Mobile communication systems
The aim of study of a discipline	Study of the main parameters And characteristics of telecommunication networks NGN and post-NGN
Brief course description (main sections)	The discipline "NGN networks and post - NGN" provides for the study of the main parameters And characteristics of new generation telecommunication networks, the fundamentals of their structural Building taking into account modern directions of development of communication networks, in-depth The study of functional schemes, design methods and integration Telecommunication networks and systems, as well as the evolution of technology telecommunications.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<ul style="list-style-type: none"> - know the basic concepts and methods of building telecommunications systems; - be able to calculate the parameters of networks and telecommunication systems; - classify and design communication systems and networks; - have the skills of experimental research of telecommunication networks; - evaluate and analyze the results; - put the acquired knowledge into practice;

Description of discipline	
Code of discipline	EEC 6630
Name of discipline	Fiber optic transmission systems
Number of credits (ESTS)	6
Course, semester	3 Course, 6 semester
Department	Radio engineering, electronics and telecommunications
Course author (s)	Luganskaya S.P
Prerequisites	Physics
Postrequisites	Diploma project
The aim of study of a discipline	The purpose and objectives of teaching the discipline is to study the General principles of construction and operation of fiber-optic communication systems (VSP), the principles of organization and calculation of parameters of digital fiber-optical linear paths(OLT), methods for calculating the parameters of channels and group paths organized by VSP, as well as issues of their technical operation. In addition, the purpose of teaching the discipline is to familiarize students with Russian and international standards in the field of telecommunications and prospects for the development of optical digital telecommunications systems.
Brief course description (main sections)	Within the discipline are studied in the following sections: elements of the theory of information transmission, the principles of open and waveguide optical systems of transmission of signals, basics of waveguide theory, fiber optic light guides, the purpose and characteristics of major optical components PHYS, methods of sealing information, the principles of operation of coherent optical transmission systems.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Ability to collect and analyze information to generate initial data for the design of communication facilities and networks and their elements, to make a competent choice of technology and methods of installation of optical fibers and cables at various stages of construction of fiber-optic communication lines. Have the skills to design fiber-optic communication lines laid on networks for various purposes.

Description of discipline

Code of discipline	EEC 6624
Name of discipline	Basics of information security of networks and communication systems
Number of credits (ESTS)	4
Course, semester	4 Course, 7 semester
Department	Radio engineering, electronics and telecommunications
Course author (s)	Amanzholova S.T., c.t.s assistant professor
Prerequisites	Information and communication technology
Postrequisites	Diploma project
The aim of study of a discipline	Studying the main existing methods of information security for use in communication networks and systems
Brief course description (main sections)	<p>The course consists of the following sections:</p> <p>Introduction to Information Security</p> <p>Information Security Technologies</p> <p>Cryptographic methods of information security</p> <p>Types of malware</p> <p>The main types of security threats</p> <p>Network security</p> <p>Information Security Audit</p> <p>Security monitoring</p> <p>Course Objectives:</p> <ul style="list-style-type: none"> • learn basic safety concepts; • study security issues; • understand the basic principles of cryptography; • develop knowledge in the field of security monitoring, including identification of sources and types of data and events;
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>As a result of training, students are able to:</p> <ul style="list-style-type: none"> - describe the principles of confidentiality, integrity and accessibility associated with the state of data and cyber security countermeasures; - identify the tactics, methods and procedures used by cybercriminals; - apply technologies, products and procedures used to protect confidentiality, ensure integrity, ensure high availability; - use network monitoring tools to detect attacks on network protocols and services;

Description of discipline	
Code of discipline	EEC 6626

Name of discipline	Radioengineering systems
Number of credits (ESTS)	5
Course, semester	4 Course, 7 semester
Department	RET
Course author (s)	Bakhtiyarova Y.A.
Prerequisites	TEC
Postrequisites	Diploma project
The aim of study of a discipline	The purpose of this discipline is to study the foundations of the construction and functioning of radio engineering systems for various purposes, the classification of radio engineering systems, the study of methods for calculating the basic characteristics of radio engineering systems, the principles of functioning of the main units and blocks of mobile and base stations used in coding systems and types of modulation of HF oscillations.
Brief course description (main sections)	The material of this educational-methodical complex is based on the study of the fundamental issues of the construction and operation of radio engineering systems for various purposes. Lectures are based on a consistent systematic oral presentation by the teacher of educational material. Each lecture is accompanied by a presentation containing a brief theoretical material and illustrative material. A number of sections and questions of the discipline are submitted for independent study by the student, including under the guidance and supervision of a teacher.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	As a result of studying the discipline, the student must: <ul style="list-style-type: none"> - know the physical foundations, principles of operation, methods of construction, operation and use of various types of ReS; - be able to analyze the structure of the system and assess the degree of complexity of the equipment; - to have an idea of modern ReS and the prospects for their development.

Description of discipline	
Code of discipline	EEC 6629
Name of discipline	M2M Networks and IoT

Number of credits (ESTS)	6
Course, semester	4 Course, 7 semester
Department	Radio Engineering, Electronics and Telecommunications
Course author (s)	Aitmagambetov A.Z
Prerequisites	Networks and Radio Access Systems / Short Range Devices
Postrequisites	Diploma project
The aim of study of a discipline	The purpose of this course is to familiarize students with the basic principles of connections, the new technological concept of the Internet of Things (iot).
Brief course description (main sections)	Studying the principles of building the Internet of things and M2M networks, including the features of using the radio frequency spectrum, building access networks using technologies of the 3GPP Partnership Project (GSM, GPRS, UMTS, LTE, 5G), satellite technologies and LPWAN technologies (lora, sigfox, NB-iot, EC-GSM, XNB, Bluetooth, zigbee), its architecture and domains, interfaces, security, types of services and traffic management features. The program considers the concept of combining people, processes, data and things in order to increase the efficiency and value of network connections. In addition to the theoretical part, the practice-oriented educational program of the course is based on the study of real industrial cases on the implementation of the Internet of things technologies and the creation of prototypes of iot devices.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Planned learning outcomes: - freely navigate in the modern terminology of intelligent telecommunication networks, M2M technologies and the Internet of things; - apply wireless technology in M2M networks and the Internet of things; - navigate ITU and IEEE standards. Planned learning outcomes.

Description of discipline	
Code of discipline	EEC 6631
Name of discipline	Intelligent telecommunications systems

Number of credits (ESTS)	4
Course, semester	4 Course, 8 semester
Department	Radio Engineering, Electronics and Telecommunications
Course author (s)	Khairosheva K.
Prerequisites	Modern wireless telecommunications technologies
Postrequisites	
The aim of study of a discipline	The purpose of teaching the discipline is a systematic review of modern models of knowledge representation, to study and master the principles of building expert systems in the field of telecommunications, to consider promising areas of development of artificial intelligence systems and decision-making
Brief course description (main sections)	Studying and mastering the principles of building expert systems in the field of telecommunications, considering promising directions for the development of artificial intelligence systems and decision-making.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	<p>Know: - the definition of intelligent systems, the structure of static and dynamic expert systems; - the theoretical foundations of the construction and operation of applied intelligent systems and decision support systems, the key areas of application of new information systems in the automation of management decision-making processes; - methods of construction, operation and development of intelligent systems; - the theory of artificial intelligence technologies</p> <p>Be able to: - develop task statements for solving informal problems; - formulate goals and tasks for automating management information processing; - use intelligent systems to solve problems of evaluating and predicting the state of objects.</p>