



International Information Technology University  
Faculty of Computer Technology and Cybersecurity  
Department of Cybersecurity

APPROVED BY  
Vice-rector for academic affairs of  
JSC «International Information  
Technology University»

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2024



**6B06303**  
«Network security»

**CATALOGUE OF ELECTIVE DISCIPLINES**  
**2024 entry year**




The catalogue of the elective disciplines for the educational program 6B06303 «Network security» is developed on the basis of the Curriculum of the educational program 6B06303 «Network security»

The catalogue of the elective disciplines was discussed at a meeting of the Cybersecurity department

Minutes No. \_\_\_\_\_ from «\_\_\_» \_\_\_\_\_ 2024

Head of the Cybersecurity department \_\_\_\_\_

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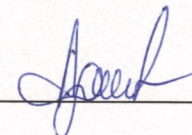
\_\_\_\_\_ Sagymbekova A.O.

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The catalogue of the elective disciplines was approved at a meeting of the Academic Council of JSC IITU

Minutes No. \_\_\_\_\_ from «\_\_\_» \_\_\_\_\_ 2024

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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 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.

## 2 ELECTIVE DISCIPLINES

№	Cycle	Discipline code	Name of the discipline	Term	Credits	Prerequisites
<b>3rd year</b>						
1	AS	MIN601	Minor 1	5	5	Computer Information Protection Technologies
2	BS	SEC6233	Introduction to Intelligent Cybersecurity	6	4	Mathematical foundations of information security
3	BS	SEC6247	Network infrastructure security	6	4	Mathematical foundations of information security
4	AS	MIN602	Minor 2	6	5	Minor 1
<b>4th year</b>						
5	AS	SEC6205	Mobile security technologies	7	4	Design Pattern
6	AS	SEC6249	Digital forensics of network infrastructure	7	4	Mathematical foundations of information security
7	AS	MIN603	Minor 3	7	5	Minor 2
8	AS	SEC6234	Introduction to Cloud	7	4	Security of operating systems
9	AS	SEC6211	Protection of database management systems	7	4	Organization database management systems
10	AS	SFT6206	Development of corporate applications on the Django framework	7	6	Design Pattern
11	AS	SEC6248	Intrusion detection and prevention systems	7	6	Network infrastructure security
12	GER	JUR 6507	Fundamentals safety of life activity and ecology	8	5	Information and communication technology
13	GER	FIN6720	Basics of Financial Literacy	8	5	Mathematical analysis
14	GER	JUR 6470	Fundamentals of law and anti-corruption culture	8	5	Legal Basics of Information Security
15	GER	MGT6706	Startups and entrepreneurship	8	5	Information and communication technology

### 3 DESCRIPTION OF ELECTIVE DISCIPLINES

Discipline description	
Code of discipline	NET6207
Name of discipline	DevNet
Number of credits (ECTS)	5
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Computer Networking Basics
Postrequisites	Graduation project
Brief course description	The course is aimed at understanding the meaning, configuration and use of software concepts, as well as tools related to network programming (scripting in Python, Git, JSON, Postman, API). Description of a proprietary approach to a software-defined network (SDN), including centralized management of application policies
Expected learning outcomes	Getting hands-on, up-to-date hands-on laboratory experience, including Python programming, using GIT and common data formats (JSON, XML and YAML), deploying applications as containers, using continuous integration/continuous deployment pipelines (CI/CD) and automating infrastructure using code. Developing skills for entry-level software development and infrastructure automation

Discipline description	
Code of discipline	SEC6238
Name of discipline	Blockchain technology
Number of credits (ECTS)	4
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Cryptographic methods of information security
Postrequisites	Graduation project
Brief course description	The course is dedicated to learning the basics of blockchain technologies. The course examines the practice of using blockchain technologies in cryptocurrencies bitcoin and Ethereum, as well as other industries. The discipline is based on cryptographic knowledge and includes materials on the development of smart contracts, various consensus algorithms, etc.

Number of credits (ECTS)	5
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Mathematical analysis
Postrequisites	Graduation project
Brief course description	The course "Fundamentals of Financial Literacy" is aimed at gaining knowledge and skills in the field of personal finance management. As part of the course, students will learn how to use all kinds of financial tools in practice, protect and increase savings, plan a budget competently, gain practical skills in calculating and paying taxes, and correctly filling out tax reports, learn how to analyze financial information and navigate financial products to choose an adequate investment strategy
Expected learning outcomes	Knowing all kinds of financial tools and knowing how to plan a budget competently

<b>Discipline description</b>	
Code of discipline	JUR6507
Name of discipline	Fundamentals safety of life activity and ecology
Number of credits (ECTS)	5
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Information and communication technology
Postrequisites	Graduation project
Brief course description	Studies the ways of safe human interaction with the environment (industrial, household, urban, natural), the sustainable functioning of business facilities (organizations) in emergency situations, issues of protection from negative factors, prevention and elimination of consequences of natural and man-made emergencies and the use of modern means of destruction. The course also reveals the role of ecology in solving modern economic, social and political problems, as well as the emergence of global environmental problems as a result of human production activities and the responsibility of the world community for them. International cooperation to ensure sustainable development is also a very important aspect. Various areas of practical application of ecology are also considered – natural resources and environmental pollution

	"Creating a company" is the ultimate goal of a startup, creating a formal company structure and business processes for further development
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<b>Discipline description</b>	
Code of discipline	ECO6004
Name of discipline	Economics and Industrial Engineering
Number of credits (ECTS)	5
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Mathematical analysis
Postrequisites	Graduation project
Brief course description	<p>New trends in economics and the organization of production are discussed with examples from real life and practice. The structure of the national economy, enterprises and the organization of its production are considered.</p> <p>The economics of an enterprise is a system of knowledge related to the process of developing and making business decisions in the course of an enterprise's activities. Therefore, the economy of an enterprise, as a system of knowledge and methods of managing the economic activity of an enterprise, occupies an important place in the organization of production and distribution of goods in any economic system.</p> <p>The course introduces the production structure of the enterprise, in relation to the type of production, the organization of the production cycle, issues of technical preparation of production and creation of the necessary production infrastructure, innovative activity of the enterprise, product quality, investment policy of the enterprise, environmental issues, foreign economic activity of the enterprise and the organization of the enterprise management process as a whole</p>
Expected learning outcomes	<p>Forming fixed and circulating funds, use capital, receive and distribute income (profits) of the enterprise.</p> <p>Developing strategies for the economic activity of the enterprise, to plan the production and sale of products.</p> <p>Knowing the financial resources of the enterprise, the efficiency of economic activity, to assess the risk in entrepreneurship.</p> <p>Solving the issues of material and technical support of production: supply of raw materials, materials, formation of stocks and their rational use</p>

Prerequisites	Minor 2
Postrequisites	Research methodology
Brief course description	An additional educational program (Minor) is a set of disciplines and (or) modules and other types of educational work defined by the student for study in order to form additional competencies
Expected learning outcomes	Be able to have the basic skills required for Minor 3

<b>Discipline description</b>	
Code of discipline	SEC6250
Name of discipline	Managing network infrastructure vulnerabilities
Number of credits (ECTS)	5
Course, semester	4,8
Department	Cybersecurity
Prerequisites	Intrusion Detection and Prevention Systems
Postrequisites	Graduation project
Brief course description	As part of the course, students also consider methods to ensure the security of network systems, including the use of multi-level security systems, security monitoring and incident management. They also study methods for evaluating the effectiveness of protection systems, as well as creating action plans for vulnerability management. Students study the basic principles of network security, including access control, protection against DDoS attacks, the use of cryptography and others
Expected learning outcomes	Skills in building a vulnerability management process: <ul style="list-style-type: none"> <li>- inventory,</li> <li>- scanning and analysis,</li> <li>- vulnerability management,</li> <li>- control</li> </ul>

<b>Discipline description</b>	
Code of discipline	SEC6251
Name of discipline	Network Interconnection
Number of credits (ECTS)	4
Course, semester	4,8
Department	Cybersecurity



<b>Discipline description</b>	
Code of discipline	SEC6233
Name of discipline	Introduction to Intelligent Cybersecurity
Number of credits (ECTS)	4
Course, semester	3,6
Department	Cybersecurity
Prerequisites	Mathematical foundations of information security
Postrequisites	Mobile security technologies
Brief course description	The course contains lecture and laboratory material on knowledge management for cybersecurity purposes and on the use of software agents and other tools and systems for deep modeling of the environment and the agent itself, followed by machine learning, in particular deep learning and reinforcement learning and practical application of predicate and non-classical logic to build reasoning machines
Expected learning outcomes	Developing the skills of safe use of the Internet, selection and application of various ways to protect your personal data, analysis of possible security threats based on the AI system

<b>Discipline description</b>	
Code of discipline	SEC6247
Name of discipline	Network infrastructure security
Number of credits (ECTS)	4
Course, semester	3,6
Department	Cybersecurity
Prerequisites	Mathematical foundations of information security
Postrequisites	Intrusion Detection and Prevention Systems
Brief course description	The discipline is designed to teach students the basic aspects of protecting computer networks and information resources from cyber threats. During the course, students study methods of protecting networks from external and internal threats, analyze possible vulnerabilities and attack scenarios, and also study modern technologies and methods of information protection. As a result of studying this discipline, students will be able to effectively protect the network infrastructure from cyber attacks, be able to analyze vulnerabilities and take measures to eliminate possible problems

Brief course description	This course teaches you how to apply special techniques, methods and tools of digital forensics. The course is designed to study the methods of disclosure and investigation of computer crimes, the rules for collecting, securing and presenting evidence on them. The course examines popular tools for conducting forensic analysis and collecting digital evidence, the course provides an overview of utilities, frameworks and tools for forensic analysis
Expected learning outcomes	Explaining the requirements for workstations and data recovery software. Describing the components for building a business case for the development of a forensic laboratory. Explaining how to determine the best data collection method. Explaining the instructions for removing digital evidence at the scene. Describing the available software tools for digital forensics

<b>Discipline description</b>	
Code of discipline	SEC6234
Name of discipline	Introduction to Cloud
Number of credits (ECTS)	4
Course, semester	4,7
Department	Cybersecurity
Prerequisites	Security of operating systems
Postrequisites	Graduation project
Brief course description	The course is aimed at studying the technology of creating a cloud service, working with existing cloud services, and using cloud computing technology to solve cybersecurity problems
Expected learning outcomes	After successful completion of the subject, students should know: <ul style="list-style-type: none"> <li>- fundamentals of cloud computing,</li> <li>- examples of Microsoft cloud services,</li> <li>- web services in the Cloud,</li> <li>- virtualization technologies</li> </ul>

<b>Discipline description</b>	
Code of discipline	SEC6211
Name of discipline	Protection of database management systems
Number of credits (ECTS)	4
Course, semester	4,7

Name of discipline	Intrusion Detection and Prevention Systems
Number of credits (ECTS)	6
Course, semester	4,7
Department	Cybersecurity
Prerequisites	Network infrastructure security
Postrequisites	Managing network infrastructure vulnerabilities
Brief course description	This course is designed to teach students methods and technologies for building and configuring information security systems using tools for detecting and preventing external and internal cyber threats. The course teaches modern detection and prevention systems based on machine learning algorithms, intelligent analytical systems, and anti-malware technologies
Expected learning outcomes	After successful completion of the subject, students should be able to: <ul style="list-style-type: none"> <li>- demonstrate an understanding of the basics of Intrusion Detection and Prevention Systems,</li> <li>- analyze algorithms, architecture, and infrastructure security approaches,</li> <li>- check security protection measures, including software-defined security to prevent intrusions</li> </ul>