



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»

Mustafina A.K.

2024



6B06302

«Hardware security»

**CATALOGUE OF ELECTIVE DISCIPLINES
2024 entry year**

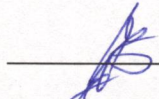
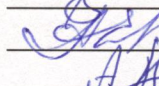
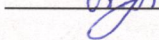
The catalogue of the elective disciplines for the educational program 6B06302 «Hardware security» is developed on the basis of the Curriculum of the educational program 6B06302 «Hardware security»

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

Minutes No. _____ from «___» _____ 2024

Head of the Cybersecurity department _____

Authors _____

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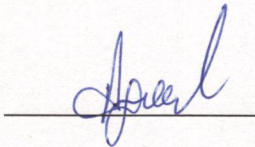
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The catalogue of the elective disciplines was approved at a meeting of the Academic Council of JSC IITU

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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
3rd year						
1	AS	MIN601	Minor 1	3	5	Computer Information Protection Technologies
2	BS	HRD6205	Computer Systems Architecture	4	4	Linux Operating System Essentials
3	BS	SEC6233	Introduction to Intelligent Cybersecurity	4	4	Mathematical foundations of information security
4	AS	MIN602	Minor 2	4	5	Minor 1
4th year						
5	AS	SEC6205	Mobile security technologies	5	4	Design Pattern
6	AS	SEC6252	Smart technologies	5	4	IoT technology
7	AS	SEC6211	Protection of database management systems	5	4	Organization database management systems
8	AS	SEC6239	Hardware security integration	5	4	IoT security
9	AS	SEC6208	Practical pentesting	5	6	Computer Information Protection Technologies
10	AS	SEC6240	Developing an application for hardware devices in Python	5	6	Design Pattern
11	AS	MIN603	Minor 3	5	5	Minor 2
12	GER	JUR 6507	Fundamentals safety of life activity and ecology	6	5	Information and communication technology
13	GER	FIN6720	Basics of Financial Literacy	6	5	Mathematical analysis
14	GER	JUR 6470	Fundamentals of law and anti-corruption culture	6	5	Legal Basics of Information Security
15	GER	MGT6706	Startups and entrepreneurship	6	5	Information and communication technology
16	GER	ECO6004	Economics and Industrial Engineering	6	5	Mathematical analysis

3 DESCRIPTION OF ELECTIVE DISCIPLINES

Discipline description	
Code of discipline	NET6207
Name of discipline	DevNet
Number of credits (ECTS)	4
Course, semester	3,6
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	3,6
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	3,6
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

Discipline description

Code of discipline	JUR6507
Name of discipline	Fundamentals safety of life activity and ecology
Number of credits (ECTS)	5
Course, semester	3,6
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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Discipline description	
Code of discipline	ECO6004
Name of discipline	Economics and Industrial Engineering
Number of credits (ECTS)	5
Course, semester	3,6
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

Discipline description	
Code of discipline	SEC6235
Name of discipline	Biometric Access Control Systems
Number of credits (ECTS)	5
Course, semester	3,6
Department	Cybersecurity
Prerequisites	IoT security
Postrequisites	Graduation project
Brief course description	The course examines the theoretical foundations of the development and operation of biometric access protection tools, modern tasks, scientific terminology, methods and means of choosing and justifying technical solutions in the construction of information security systems, studying the basic provisions of the BSDD theory and methods of their use in the tasks of identification, authentication, access control and management based on biometric characteristics of users and their Application
Expected learning outcomes	After successful completion of the course, students will: <ul style="list-style-type: none"> - apply methods of recognition of control images, - use technical means to obtain initial biometric data, - be able to design devices, devices and systems

Discipline description	
Code of discipline	SEC6242
Name of discipline	Managing the security of reconfigurable integrated systems
Number of credits (ECTS)	5
Course, semester	3,6
Department	Cybersecurity
Prerequisites	IoT security
Postrequisites	Graduation project

	hardware performance. It examines the basics of classical and modern processor design: performance and cost issues, instruction sets, pipelining, caches, physical memory, virtual memory, I/O superscalar, and an introduction to shared memory multiprocessors
Expected learning outcomes	Analysing of the structure of the main components of the computer, including the CPU, ALU and control unit, memory, I/O and storage. Explaining the execution of the program in a high-level language at the instruction level. Optimizing the operation of the cache memory. Applying a wide range of memory technologies, both internal and external. Creating a program code in the C language that controls the processes in the processor

Discipline description	
Code of discipline	SEC6233
Name of discipline	Introduction to Intelligent Cybersecurity
Number of credits (ECTS)	4
Course, semester	2,4
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

Discipline description	
Code of discipline	SEC6205
Name of discipline	Mobile security technologies
Number of credits (ECTS)	4

Name of discipline	Protection of database management systems
Number of credits (ECTS)	4
Course, semester	3,5
Department	Cybersecurity
Prerequisites	Organization database management systems
Postrequisites	Graduation project
Brief course description	The course provides an overview of various concepts and methods for ensuring the security of a database management system. The topics cover advanced SQL, transaction management language, data management language, functions and triggers, database management and monitoring, database backup and recovery, SQL injection, etc. During the course, students will solve various tasks using PostgreSQL DBMS
Expected learning outcomes	Knowing and conducting: <ul style="list-style-type: none"> - regular audit and monitoring, - backup, - encryption, - VPN and two-factor authentication, - automated protection systems (Database Activity Monitoring)

Discipline description	
Code of discipline	SEC6239
Name of discipline	Hardware security integration
Number of credits (ECTS)	4
Course, semester	3,5
Department	Cybersecurity
Prerequisites	IoT security
Postrequisites	Graduation project
Brief course description	This course integrates all security systems using hardware, studying methods and algorithms for managing and generating keys and their hardware and software implementation and application in automated systems. Hardware integration implies the integration of central processors of security subsystems (receiving and control devices (control panels) of the OS, PIC and PS, ACS controllers, etc.) with a common specialized information bus, which is used to monitor, configure, manage and interact systems with each other
Expected learning outcomes	After successful completion of the subject, students should be able to:

Expected learning outcomes	After successful completion of the subject, students should be able to: <ul style="list-style-type: none">- design and build Python web applications,- test Python web applications,- use the built-in tools of the framework to ensure the security of the web application
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