

Faculty of Computer Technology and Cybersecurity

Department of Computer Engineering and Information Security

APPROVED BY  
Vice-rector for academic affairs,  
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“31” 03 2021.

6B06109

(Code of Educational Program)

Network and System Administration

(Name of Educational Program)

## CATALOGUE OF ELECTIVE DISCIPLINES

2021 entry year

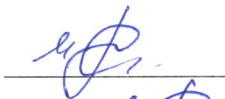
2021

The catalogue of elective disciplines for the specialty/EP 6B06109 «Network and System Administration» is developed on the basis of the working curriculum of the specialty/EP.

The catalogue of elective disciplines was discussed at a meeting of the Computer Engineering and Information Security department

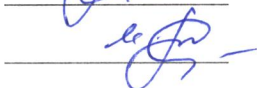
minutes No. 7 from "15" 02 2021.

Acting head of Department



M.T. Ipalakova

CED compiler



M.T. Ipalakova

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

minutes No. 4 from "30" 03 2021.

Head of the Department

of Academic Affairs



A.K. Mustafina



## 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.

## 2 ELECTIVE DISCIPLINES

№	Cycle of discipline	Code of discipline	Name of discipline	Number of credits	Prerequisites
<i>3 year</i>					
1	PD	NET6302	Systems administration	4	ICT6001
2	PD	NET6303	Switching, routing, and wireless essentials	6	NET6301
3	PD	NET6304	Cloud computing and virtualization	4	ICT6001
4	PD	NET6305	Enterprise networking	6	NET6303
5	PD	NET6306	DevNet	6	NET6301, SFT6002
<i>4 year</i>					
6	PD	NET6307	Network security	7	NET6303
7	PD	NET6308	Connecting networks	7	NET6303



### 3 DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	NET6302
Name of discipline	Systems administration
Number of credits	4
Course, semester	3, 5
Department	CE&IS
Prerequisites	ICT6001 Information and Communication Technology
Postrequisites	Diploma project
Brief course description	This course describes the architecture, components, file systems, regular expression, introduction to system administration, user administration, access control, linux networking. The course teaches how to configure linux servers. The course provides multimedia learning tools, including tests, address a variety of learning styles and promote increased knowledge retention. Hands-on labs and Cisco® Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem solving skills. Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.
Expected learning outcomes	After successful completion of the course students will be able to: <ul style="list-style-type: none"> <li>– write shell scripts for automated administration tasks;</li> <li>– install and delete software, create a new user and delete, using man and info pages;</li> <li>– use Linux text editors vim, nano and etc.;</li> <li>– understand the Linux access control/privilege mechanisms.</li> </ul>

Description of discipline	
Code of discipline	NET6303
Name of discipline	Switching, routing, and wireless essentials
Number of credits	6
Course, semester	3,5
Department	CE&IS
Prerequisites	NET6301 Introduction to computer networks
Postrequisites	NET6305 Enterprise networking
Brief course description	The course is devoted to switching technologies and the operation of routers for small and medium-sized businesses. The course also includes topics such as wireless LANs and security concepts. Students will be able to perform basic network settings and troubleshoot, identify and prevent local network security threats, and configure and protect the core WLAN.
Expected learning outcomes	After successful completion of the course students will be able to <ul style="list-style-type: none"> <li>– configure and verify static routing and default routing;</li> <li>– configure and troubleshoot basic operations of a small switched network;</li> <li>– configure and troubleshoot VLANs and inter-VLAN routing;</li> <li>– configure, monitor, and troubleshoot ACLs for IPv4;</li> </ul>

	<ul style="list-style-type: none"> <li>– configure and verify DHCPv4 and DHCPv6;</li> <li>– configure and verify NAT for IPv4.</li> </ul>
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Description of discipline	
Code of discipline	NET6304
Name of discipline	Cloud computing and virtualization
Number of credits	4
Course, semester	3, 6
Department	CE&IS
Prerequisites	ICT6001 Information and Communication Technology
Postrequisites	Diploma project
Brief course description	The focus of the course will be managing OpenStack using both the web-based dashboard and the command-line interface, in addition to managing instances and installing a proof-of-concept environment using SUSE OpenStack Platform director. Essential skills covered in the course include configuring SUSE OpenStack Platform (using the director UI); managing users, projects, flavors, roles, images, networking, and block storage; setting quotas; and configuring images at instantiation.
Expected learning outcomes	<p>After successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>– configure and verify OpenStack Administration Utilities;</li> <li>– configure OpenStack Identity Service;</li> <li>– configure and troubleshoot OpenStack Nova component.</li> </ul>

Description of discipline	
Code of discipline	NET6305
Name of discipline	Enterprise networking
Number of credits	6
Course, semester	3, 6
Department	CE&IS
Prerequisites	NET6303 Switching, routing, and wireless essentials
Postrequisites	Diploma project
Brief course description	The course describes the architectures and considerations related to designing, securing, operating, and troubleshooting enterprise networks. This course covers wide area network (WAN) technologies and quality of service (QoS) mechanisms used for secure remote access.
Expected learning outcomes	<p>After successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>– implement single-area OSPFv2;</li> <li>– implement IPv4 ACLs to filter traffic and secure administrative access;</li> <li>– configure NAT services on the edge router to provide IPv4 address scalability;</li> <li>– implement protocols to manage the network;</li> </ul>



	<ul style="list-style-type: none"> <li>– troubleshoot enterprise networks;</li> <li>– explain how network automation is enabled through RESTful APIs and configuration management tools.</li> </ul>
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Description of discipline	
Code of discipline	NET6306
Name of discipline	DevNet
Number of credits	6
Course, semester	3, 6
Department	CE&IS
Prerequisites	NET6301 introduction to computer networks SFT6002 Object-Oriented Programming
Postrequisites	Diploma project
Brief course description	Students taking this course will learn the best practices of modern software development, DevOps, understand and learn how to securely use APIs, and how to automate network operations using those APIs.
Expected learning outcomes	<p>After successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>– use basic Python programming and Linux skills;</li> <li>– implement a development environment using DevNet resources;</li> <li>– use software development and design best practices;</li> <li>– create REST API requests over HTTPS to securely integrate services;</li> <li>– use current technologies to deploy and secure applications and data in a cloud environment;</li> <li>– compare software testing and deployment methods in automation and simulation environments.</li> </ul>

Description of discipline	
Code of discipline	NET6307
Name of discipline	Network security
Number of credits	7
Course, semester	4, 7
Department	CE&IS
Prerequisites	NET6303 Switching, routing, and wireless essentials
Postrequisites	Diploma project
Brief course description	Network Security course equips students with the knowledge and skills needed to prepare for entry-level security specialist careers and emphasizes practical experience. Network Security course aims to develop an in-depth understanding of network security principles as well as the tools and configurations required to secure a network.
Expected learning outcomes	<p>After successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>– explain network threats, mitigation techniques, and the basics of securing a network;</li> </ul>

	<ul style="list-style-type: none"> <li>– secure administrative access with AAA, implement firewall technologies to secure the network perimeter;</li> <li>– configure IPS to mitigate attacks on the network and implement secure virtual private networks;</li> <li>– test network security and create a technical security policy.</li> </ul>
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Description of discipline	
Code of discipline	NET6308
Name of discipline	Connecting networks
Number of credits	7
Course, semester	4, 7
Department	CE&IS
Prerequisites	NET6303 Switching, routing, and wireless essentials
Postrequisites	Diploma project
Brief course description	This course focuses on the LAN and WAN technologies and network services required in a complex network. Students will be able to integrate several LAN technologies and protocols from previous networking courses, implement WAN interconnection, provide security solutions for IP networks, manage networks in a unified manner.
Expected learning outcomes	<p>After successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>– improve performance at the data link layer by introducing functions and services, including link aggregation;</li> <li>– manage communication and maintain serial WAN links using various technologies;</li> <li>– provide effective security solutions using a variety of technologies, including IPsec and GRE;</li> </ul> <p>build corporate networks that meet business requirements.</p>