ХАЛЫҚАРАЛЫҚ УНИВЕРСИТЕТІ МЕЖДУНАРОДНЫЙ УНИВЕРСИТЕТ
INTERNATIONAL UNIVERSITY

Faculty of Information Technology and Cybersecurity

Department of «Computer Engineering»

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6B06106
(Code of Academic Program)

Computer Systems and Software Engineering
(Name of Academic Program)

CATALOGUE OF ELECTIVE DISCIPLINES

2023 entry year

2023

The catalogue of elective disciplines for the specialty/AP 6B06110 Software Engineering 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 Computer Engineering department

minutes No. _____ from "____" _____2023

Head of Department _____ Chinibayeva T.T.

CED compiler _____ Bekaulova Zh.M.

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

minutes No. _____ from "____" _____2023

Head of the Management Department _____ Adzhibayeva A.SH.

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

№	Code of profile discipline (PD)	Name of discipline	Number of credits	Prerequisites
		5 semester		
1	SFT6309	UX/UI development	5	Information and Communication Technology
2	SFT6310	Web-component development (Java EE)	6	Object-Oriented Programming
3	MIN601	Minor 1	5	Introduction to data science
4	NET6202	Switching, routing, and wireless essentials	6	Introduction to computer networks
		6 semester		
5	NET6306	Application development foundation .NET	6	Object-Oriented Programming
6	MIN602	Minor 2	4	Minor 1
7	EEC6002	Design and simulation of electronic devices	5	Basic Circuit Theory
8	SFT6312	Business component and Web-services development (Java EE)	5	Web-Component Development (Java EE)
9	NET6304	Cloud computing and virtualization	5	Information and Communication Technology
10	NET6302	Administration of systems	5	Operating Systems
11	SFT6313	Mobile technologies and applications	6	Object-Oriented Programming
12	NET6303	Network programming	5	Object-Oriented Programming
13	HRD6304	Sensor technologies	6	Introduction to Robotics
		7 semester		
14	SFT6315	DevOps	7	Application development foundation .NET
15	NET6308	Connecting Networks	7	Exploratory data analysis
16	MIN602	Minor 3	5	Minor 2

3 DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	SFT6309
Name of discipline	UX/UI development
Number of credits (ECTS)	5
Course, semester	3, 5
Department	CE
Prerequisites	Information and Communication Technology
Postrequisites	Diploma project
Brief course description	The course introduces students to the concept of designing systems that can effectively interact with people. Students will learn the principles of design and human behavior, as well as empirical research methods used to solve real problems in developing the interface.
Expected Learning Outcomes	After successful completion of the course students will be able to: Define and Discuss: – the concept of usability engineering, why and when to use it, why and when usage is justified, and its underlying benefits and principles; – the standard usability tools and methods such as personas and scenarios, competitive analysis, flow diagrams, generalized transition networks, site maps, storyboards, wireframes and mockups; – usability-testing methods. This includes understanding the process of planning and preparing a user test, determining and recruiting participants, designing test tasks, scripts, and scenarios, executing a user test, and recording and analyzing user-test data. Use and Design: – HCI tools, methods and concepts to design systems that are able to interact effectively with humans; – the principles of design and human behavior, computer science, and the empirical research methods used to solve real problems in the design and use of technology; – user interfaces from the perspective of the user, creating a design that supports its intended users' existing beliefs, attitudes, and behaviors as they relate to the tasks that the system is being designed to support; – an iterative design process to design interfaces that provide more efficient and satisfying experiences for the user; – design, plan, and conduct usability test and use the results of the test to create recommendations for design improvements and implement those recommendations.

Description of discipline	
Code of discipline	SFT6310
Name of discipline	Web-component development (Java EE)
Number of credits (ECTS)	6
Course, semester	3,5

Department	CE
Prerequisites	Object-Oriented Programming
Postrequisites	Business Component and Web-services Development (Java EE)
Brief course description	Introduction to Java Enterprise Edition (J2EE) technology. Learning the basic concepts of developing enterprise dynamic web applications in the Java programming language with high performance.
Expected Learning Outcomes	After successful completion of the course students will be able to: – analyze advanced web technologies for solving various types of tasks, – explain and justify of using java web development tools for certain purposes – know Java Programming Language. – basics of Servlets and JSP (Java Server Pages). – hibernate ORM library. – develop secured corporate server-client web applications.

Description of discipline	
Code of discipline	MIN601
Name of discipline	Minor 1
Number of credits (ECTS)	5
Course, semester	3,5
Department	CE
Prerequisites	
Postrequisites	Minor 2
Brief course description	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies

Description of discipline	
Code of discipline	NET6202
Name of discipline	Switching, routing, and wireless essentials
Number of credits (ECTS)	6
Course, semester	3,5
Department	CE
Prerequisites	Introduction to computer networks
Postrequisites	Enterprise networking, security, and automation
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.

Description of discipline	
Code of discipline	NET6306
Name of discipline	DevNet

Number of credits (ECTS)	6
Course, semester	3,6
Department	CE
Prerequisites	Object oriented programming
Postrequisites	ASP.NET application development
Brief course description	An overview of .NET technology that supports data and multimedia. Application of the concept for practical tasks related to the development of distributed applications (web servers, calendars and chat systems). Studying application protocols and approaches to distributed object-oriented programming using C #.

Description of discipline	
Code of discipline	MIN602
Name of discipline	Minor 2
Number of credits (ECTS)	5
Course, semester	3,6
Department	CE
Prerequisites	Minor 1
Postrequisites	Minor 3
Brief course description	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies

Description of discipline	
Code of discipline	NSA3 3308
Name of discipline	Design and simulation of electronic devices
Number of credits (ECTS)	5
Course, semester	3, 6
Department	CE
Prerequisites	Basic Circuit Theory
Postrequisites	Fundamentals of logic design
Brief course description	The study of semiconductor materials, their characteristics, principles of operation and application. The physics of semiconductors, diodes of p-n junctions, heterojunctions, transistors, metal-semiconductor contacts are considered.
Expected Learning Outcomes	After successful completion of the course students will be able to: – analyze semiconductor devices, through numerical problems, using fundamental characteristics of semiconductor materials, such as carrier densities, transport, lifetime, generation and recombination; – use basic governing equations to calculate carrier concentrations, position of Fermi energy level, carrier drift current in given field, built - in potential barrier at the space charge region, and current-voltage characteristics of p- n junctions; – analyze main characteristics of electronic and optoelectronic devices such as BJTs, MOSFETs and LEDs.

Description of discipline

Code of discipline	SFT6312
Name of discipline	Business component and Web-services development (Java EE)
Number of credits (ECTS)	5
Course, semester	3, 6
Department	CE
Prerequisites	Web-Component Development (Java EE)
Postrequisites	Diploma project
Brief course description	The concepts of business components and web services, the search for differences between business logic and display logic, the distribution of tasks between the developer and Typesetter, training in working with a database connection, as well as object-relational mapping are considered. Topics include EJB3.0, Hibernate, JPA2.0, MDB technologies, writing business logic, identifying differences between web servers and application servers.
Expected Learning Outcomes	After successful completion of the course students will be able to: – analyze advanced web technologies for solving various types of tasks, – explain and justify of using java web development tools for certain purposes – know Java Programming Language. – basics of Servlets and JSP (Java Server Pages). – hibernate ORM library. – develop secured corporate server-client web applications.

Description of discipline	
Code of discipline	SFT6313
Name of discipline	Mobile technologies and applications(Android)
Number of credits (ECTS)	6
Course, semester	3, 6
Department	CE
Prerequisites	Object-Oriented Programming
Postrequisites	Diploma project
Brief course description	The purpose of the discipline "Mobile Technologies and Applications (Android)" is to teach students how to develop mobile applications for the Android platform. Upon completion of the course, students should be able to create functional and intuitive mobile applications using the Android toolkit.
Expected Learning Outcomes	After successful completion of the course students will: – Be exposed to technology and business trends impacting mobile applications; – Be competent with the characterization and architecture of mobile applications; – Be competent with understanding enterprise scale requirements of mobile applications; – Be competent with designing and developing mobile applications using one application development framework.

Description of discipline

Code of discipline	NET6303
Name of discipline	Network programming
Number of credits (ECTS)	5
Course, semester	3, 6
Department	CE&IS
Prerequisites	Object-Oriented Programming
Postrequisites	Diploma project
Brief course description	The study of network connectivity from local networks to the global Internet. We study standard problems and a number of solutions for each of them with special emphasis on the set of TCP / IP protocols. This course provides students with a working vocabulary, as well as the knowledge and skills necessary to implement, debug, and improve basic network applications.

Description of discipline	
Code of discipline	HRD6304
Name of discipline	Sensor technologies
Number of credits (ECTS)	6
Course, semester	3, 6
Department	CE
Prerequisites	Introduction to Robotics
Postrequisites	Diploma project
Brief course description	Familiarity with the various types of sensors that are used for industrial automation, environmental assessment, as well as for human-computer interaction.
Expected Learning Outcomes	After successful completion of the course students will be able to: – develop judgment of what sensors and modalities are appropriate for different applications; – know how to electronically condition the sensor, hook it up to a microcomputer, and process the signal (at least basically); – have some idea of how/where these sensors can be used; – have a reasonable idea of how different sensors work; – develop a sense for recognizing bad data and an intuition of how to resolve problems.

Description of discipline	
Code of discipline	NET6304
Name of discipline	Cloud computing and virtualization
Number of credits (ECTS)	3
Course, semester	3, 6
Department	CE
Prerequisites	Information and Communication Technology
Postrequisites	Diploma project
Brief course description	Introductory course from Linux Foundation experts. Learning the basics of cloud computing, terminology, tools and technologies associated with modern cloud platforms. The course displays the entire cloudy landscape and explains how various tools and platforms interact with each other.

Expected Learning Outcomes	After successful completion of the course students will be able to: – configure and verify OpenStack Administration Utilities; – configure OpenStack Identity Service; – configure and troubleshoot OpenStack Nova component.

Description of discipline	
Code of discipline	MIN603
Name of discipline	Minor 3
Number of credits (ECTS)	5
Course, semester	4, 7
Department	CE
Prerequisites	Minor 2
Postrequisites	Diploma project
Brief course description	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies

Description of discipline	
Code of discipline	NET6302
Name of discipline	Systems Administration
Number of credits (ECTS)	5
Course, semester	3, 6
Department	CE
Prerequisites	Operating Systems
Postrequisites	Diploma project
Brief course description	The course is based on the Linux operating system. It describes the architecture, components, file systems, regular expressions, user administration, access control, server configuration.

Description of discipline	
Code of discipline	SFT6315
Name of discipline	DevOps
Number of credits (ECTS)	7
Course, semester	4, 7
Department	CE
Prerequisites	OOP
Postrequisites	Diploma project
Brief course description	The course examines the key concepts and principles of DevOps, organizational factors and automation tools in the development of software products using this method.

Description of discipline	
Code of discipline	NET6308
Name of discipline	Connecting Networks
Number of credits (ECTS)	7

Course, semester	4, 7
Department	CE
Prerequisites	Network programming
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.