Faculty of Computer Technology and Cybersecurity

Department of Computer Engineering and Information Security

APPROVED BY
Vice-rector for academic affairs,
International Information
Technology University JSC
Umarov T.F.

"31" 03 2021.

6B06110
(Code of Educational Program)

Software Engineering
(Name of Educational Program)

CATALOGUE OF ELECTIVE DISCIPLINES

2021 entry year

2021

The catalogue of elective disciplines for the specialty/EP 6B06110 «Software Engineering» 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
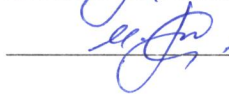
minutes No. _____7_____ from " 15 " _____02_____ 2021.

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
			3 year		
1	PD	SFT6309	UX/UI development	4	ICT6001
2	PD	SFT6310	Web-component development (Java EE)	6	SFT6002
3	PD	SFT6311	Front-end development	4	SFT6002
4	PD	SFT6312	Business component and Web-services development (Java EE)	6	SFT6310
5	PD	SFT6313	Mobile technologies and applications	6	SFT6002
			4 year		
6	PD	SFT6314	Full stack development	7	SFT6311, SFT6307
7	PD	SFT6315	DevOps	7	SFT6002, SFT6307

3   DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	SFT6309
Name of discipline	UX/UI development
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 introduces students to the concept of designing systems that are able to interact effectively with humans. The field of Human Computer Interaction involves understanding and creating methods and artifacts that improve human lives, tasks, goals, and social environments through education in design, computer science, and behavioral and social sciences. In this course, students will learn principles of design and human behavior and the empirical research methods used to solve real problems in the design and use of technology. The course also provides students with opportunities to work on their own as well as in small teams to solve design problems and use HCI methods and principles to model the problems, create solutions, and study the impact of their designs.
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	6
Course, semester	3,5
Department	CE&IS
Prerequisites	SFT6002 Object-Oriented Programming
Postrequisites	SFT6312 Business Component and Web-services Development (Java EE)
Brief course description	During the course, students will learn front-end development from defining functionality of web sites to layout of web pages and back-end development using modern web technologies. Content of the course covers following web technologies: REST API, JAX RS, Hibernate ORM, Spring MVC Framework, Spring Security, Tomcat Server, Servlet API, JSP. During the semester, students will learn development of corporate systems in Java programming language, and correct using of Servlets and JSP. Students must understand MVC pattern, developing secured web application. Students will be able to practice on real web projects and tasks. In addition, students will be able to study new trend technologies by researching.
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	SFT6311
Name of discipline	Front-end development
Number of credits	4
Course, semester	3,6
Department	CE&IS
Prerequisites	SFT6002 Object oriented programming
Postrequisites	SFT6314 Full Stack development
Brief course description	In this course, students will study in detail the process of creating the client side of the site, namely the layout of the site template and the development of the user interface. Relevant languages and frameworks are being studied.
Expected learning outcomes	After successful completion of the course students will be able to − create modern websites with HTML CSS and JavaScript; − improved use of HTML CSS and JavaScript; − develop web applications from scratch; − write more efficient web code.

Description of discipline	
Code of discipline	SFT6312
Name of discipline	Business component and Web-services development (Java EE)
Number of credits	6
Course, semester	3, 6
Department	CE&IS
Prerequisites	SFT6310 Web-Component Development (Java EE)
Postrequisites	Diploma project
Brief course description	During the course, students will learn front-end development from defining functionality of web sites to layout of web pages and back-end development using modern web technologies. Content of the course covers following web technologies: REST API, JAX RS, Hibernate ORM, Spring MVC Framework, Spring Security, Tomcat Server, Servlet API, JSP. During the semester, students will learn development of corporate systems in Java programming language, and correct using of Servlets and JSP. Students must understand MVC pattern, developing secured web application. Students will be able to practice on real web projects and tasks. In addition, students will be able to study new trend technologies by researching.
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
Number of credits	6
Course, semester	3, 6
Department	CE&IS
Prerequisites	SFT6002 Object-Oriented Programming
Postrequisites	Diploma project
Brief course description	Android programming concepts are reinforced through a set of thematic programming exercises that introduce these topics and incrementally allow the student to build a complex application; that is, programming labs form a set of components that collectively implement a continuous sensing application. The resulting phone app allows user to log their exercises (e.g., walks, runs) and display them on Google maps.
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	SFT6314
Name of discipline	Full stack development
Number of credits	7
Course, semester	4, 7
Department	CE&IS
Prerequisites	SFT6311 Front-end development, SFT6307 Web technologies
Postrequisites	Diploma project
Brief course description	A full stack developer is an engineer who can handle all the work of databases, servers, systems engineering, and clients. Depending on the project, what customers need may be a mobile stack, a Web stack, or a native application stack. In fact, "full stack" refers to the collection of a series of technologies needed to complete a project. "Stack" refers to a collection of sub-modules. These software sub-modules or components combined together to achieve the established function while without the need for other modules.
Expected learning outcomes	After successful completion of the course students will be able to: – create and deploy a database-backed web API (Application Programming Interface); – secure and manage user authentication and access control for an application backend; – deploy a web application to the cloud.

Description of discipline	
Code of discipline	SFT6315
Name of discipline	DevOps
Number of credits	7
Course, semester	4, 7
Department	CE&IS
Prerequisites	SFT6002 OOP, SFT6307 Web technologies
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.
Expected learning outcomes	After successful completion of the course students will be able to: – understand the key concepts and principles of DevOps; – apply the most common and popular DevOps tools; – discuss the critical success factors for DevOps implementation; – compare specific DevOps methodologies and frameworks.