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Faculty of Computer Technology and Cybersecurity

Department of Computer Engineering

APPROVED BY

Vice-rector for academic affairs,

International Information

Technology University JSC

Mustafina A.K



” \_\_\_\_\_ 2023

8D06104

(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 8D06104 Computer Systems and 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

\_\_\_\_\_ 

T.T. Chinibayeva

CED compiler

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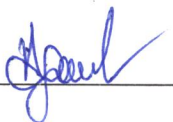
S.Z. Sapakova

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

minutes No. \_\_\_\_\_ from “ \_\_\_\_\_ ” \_\_\_\_\_ 2023

Department for Educational and

Methodological Affairs

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A.S. Ajibaeva

## **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**

<b>№</b>	<b>Cycle of discipline</b>	<b>Code of discipline</b>	<b>Name of discipline</b>	<b>Semester</b>	<b>Number of credits</b>	<b>Prerequisites</b>
<i>1 year</i>						
1	PD	HRD8301	Model-driven architecture	1	4	OOP, Software Engineering Technologies
2	PD	SFT8303	Algorithmic fundamentals of intelligent systems	1	4	OOP, Software Engineering Technologies
3	PD	ANL8302	Big Data technologies and big systems	1	4	Data analysis methods
4	PD	ANL8303	Information and knowledge management	1	4	Data analysis methods



### 3 DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	HRD8301
Name of discipline	Model-driven architecture
Number of credits (ECTS)	4
Course, semester	1, 1
Department	CE
Prerequisites	OOP, Software Engineering Technologies
Postrequisites	Doctor dissertation
Brief course description	The study of a new modern approach to software development - model-driven architecture.
Expected learning outcomes	After successful completion of the course students will be able to: <ul style="list-style-type: none"> <li>- explain advantages and disadvantages of traditional software lifecycle and that of MDA and differences between them;</li> <li>- reason about artifacts using their models;</li> <li>- build metamodels for different languages and notations;</li> <li>- implement transformation functions using Kermeta.</li> </ul>

Description of discipline	
Code of discipline	SFT8303
Name of discipline	Algorithmic fundamentals of intelligent systems
Number of credits (ECTS)	4
Course, semester	1, 1
Department	CE
Prerequisites	OOP, Software Engineering Technologies
Postrequisites	Doctor dissertation
Brief course description	The study and analysis of algorithms and tools for the design and development of intelligent systems and applications.
Expected learning outcomes	After successful completion of the course students will be able to: <ul style="list-style-type: none"> <li>- demonstrate good knowledge of basic theoretical foundations of the common intelligent systems methodologies (rule-based systems, fuzzy inferencing, artificial neural networks, etc.);</li> <li>- determine which type of intelligent system methodology would be suitable for a given type of application problem;</li> <li>- demonstrate, in the form of a major project work, the ability to design and develop an intelligent system for a selected application.</li> </ul>

Description of discipline	
Code of discipline	ANL8302
Name of discipline	Big Data technologies and big systems
Number of credits (ECTS)	4
Course, semester	1, 1
Department	CE

Prerequisites	Data analysis methods
Postrequisites	Doctor dissertation
Brief course description	The study of the latest advances in the analysis, storage and processing of big data.
Expected learning outcomes	After successful completion of the course students will be able to: <ul style="list-style-type: none"> <li>– explain fundamental programming concepts including data abstraction, storage and structures;</li> <li>– apply computational thinking which includes decomposition, pattern recognition and abstraction;</li> <li>– design algorithms for big data;</li> <li>– interpret the data representation and analysis;</li> </ul> apply analytical tools in R and Java.

<b>Description of discipline</b>	
Code of discipline	ANL8303
Name of discipline	Information and knowledge management
Number of credits (ECTS)	4
Course, semester	1, 1
Department	CE
Prerequisites	Data analysis methods
Postrequisites	Doctor dissertation
Brief course description	Such concepts as levels of knowledge and extracted data, analytical tools for mining and operational processing of information are considered.
Expected learning outcomes	After successful completion of the course students will be able to: <ul style="list-style-type: none"> <li>– explain the concept and different views of information and knowledge;</li> <li>– analyze the role of information and knowledge management in different spheres;</li> <li>– analyze and apply different information and knowledge management methods, models and technologies;</li> <li>– create the architecture of knowledge management systems.</li> </ul>