6B06103
(Code of Academic Program)

Big data analytics
(Name of Academic Program)

CATALOGUE OF ELECTIVE DISCIPLINES

2021

2021

The catalogue of elective disciplines for the specialty/AP _____

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 department
„Information Systems"
minutes No. ___7___ from " _5_ " ___03.___ 20_21_.

Head of Department _____ Kassymova A.B. PhD, assoc.prof.
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The catalogue of elective disciplines was approved at a meeting of the Academic Council of "International Information Technology University" JSC minutes No. 4 from "30" 03. 2021.

Director of Academic Affairs _____ Mustafina A.K.
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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;

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.

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2 ELECTIVE DISCIPLINES

№	Cycle of discipline	Code of discipline	Name of discipline	Semester	Number of credits	Prerequisites
2 year						
	Basic disciplines (BD)	SFT6101	Fundamentals of Web Development	3	6	Information and communication technologies
	Basic disciplines (DB)	SFT6002	Object Oriented Programming	4	5	Introduction to programming
	Basic disciplines (DB)	SFT6003	Operating Systems	4	5	Information and communication technologies
3 year						
	Major disciplines	SFT6111	Design Patterns (ISD-1)	5	5	Object-oriented programming
	Major disciplines	SFT6119	Development of Web components on the Java EE platform (ISD-2)	6	5	Design Patterns (ISD-1)
	Major disciplines	SFT6132	An Introduction to Python and Libraries for Data Processing and Analysis (BDA-1)	5	5	Object-oriented programming
	Major disciplines	SFT6134	Big data storage and collection (BDA-2)	6	5	An Introduction to Python and Libraries for Data Processing and Analysis (BDA-1)
	Major disciplines	SFT6145	AWS Cloud Foundations (AWS-1)	5	5	Information and communication technologies
	Major disciplines	SFT6146	AWS Solution Architecture (AWS-2)	6	5	AWS Cloud Foundations (AWS-1)
	Major disciplines	SFT6117	Development of mobile applications for IOS (mobile 1)	5	5	Introduction to programming, Object-oriented programming
	Major disciplines	SFT6124	Development of mobile applications for Android (Mobile 2)	6	5	Introduction to programming, Object-oriented programming
	Major disciplines	SFT6113	Programming on PL / SQL (Oracle 1)	5	5	Data and information management
	Major disciplines	SFT6120	Programming with PL / SQL (Oracle 2)	6	5	Oracle SQL Basics (Oracle 1)
	Major disciplines	SFT6115	Multimedia technologies (GD-1)	5	5	Information and communication technologies
	Major disciplines	SFT6122	Basics of 3D modeling (GD-2)	6	5	Information and communication technologies
	Major disciplines	SFT6114	Introduction to the Internet of Things and Embedded Systems (IoT-1)	5	5	Physics
	Major disciplines	SFT6121	Robotic Systems and Internet of Things (IoT-2)	6	5	Introduction to the Internet of Things and Embedded Systems (IoT-1)
	Major disciplines	SFT6123	Introduction to ACM ICPC Problem Solving (ACM-1)	6	5	Object-oriented programming

Major disciplines	SFT6116	Basic algorithms for solving ACM ICPC problems (ACM-2)	5	5	Introduction to ACM ICPC Problem Solving (ACM-1)
Major disciplines	SFT6152	AR / VR theory	5	5	Introduction to programming, HCI
Major disciplines	SFT6153	AR / VR Unity Basics	6	5	Introduction to programming, HCI
Major disciplines	SFT6154	Go lang web development	5	5	Object-oriented programming, Web programing
Major disciplines	SFT6155	Blockchain technologies	6	5	Mathematics, ICT, Introduction to programming
Major disciplines	SFT6157	R programming	5	5	Object-oriented programming
Major disciplines	SFT6158	Parallel programming	5	6	Introduction to programming
4 year					
Major disciplines	SFT6127	Development of the web applications base on Framework (ISD-3)	7	5	Development of Web components on the Java EE platform (ISD-2)
Major disciplines	SFT6129	Разработка web-сервисов на платформе Java EE (ISD-4)	7	5	Разработка Web компонентов на платформе Java EE (ISD-2)
Major disciplines	SFT6131	Клиент-серверные приложения (ISD-5)	7	5	Разработка Web компонентов на платформе Java EE (ISD-2)
Major disciplines	SFT6135	Big Data Processing (BDA-3)	7	5	Big data storage and collection (BDA-2)
Major disciplines	SFT6159	Data Modeling (BDA-4)	7	5	Big data storage and collection (BDA-2)
Major disciplines	SFT6136	Data Visualization (BDA-5)	7	5	Big data storage and collection (BDA-2)
Major disciplines	SFT6147	AWS Solution Architecture (AWS-3)	7	5	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2)
Major disciplines	SFT6148	AWS development (AWS-4)	7	5	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Major disciplines	SFT6149	AWS development (AWS-5)	7	5	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Major disciplines	SFT6150	AWS SysOps Administration (AWS-6)	7	5	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Major disciplines	SFT6151	AWS SysOps Administration (AWS-7)	7	5	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)

3   DESCRIPTION OF ELECTIVE DISCIPLINES

Description of discipline	
Code of discipline	SFT6101
Name of discipline	Fundamentals of Web Development
Number of credits (ESTS)	6
Course, semester	2, 3
Department	Information Systems
Course author(s)	Umarov F.

Prerequisites	Information and communication technologies
Postrequisites	Web programming
The aim of study of a discipline	Learn the basics of HTML tags, CSS and Java Script for creating web pages.
Brief course description (main sections)	Computers play a critical role in almost everything that humans do, and software professionals need a deep understanding of human, business, and theoretical aspects. This gentle introduction to computing and problem solving gives students a realistic understanding of the computing realm. At the core of computing is a way of thinking and working that is more disciplined than many students have ever experienced, but the benefits of seeing, understanding, and then developing these skills can be overwhelming. This course prepares and launches students into educational paths in all areas of science and business, as well as in the careers of software developers, software engineers, and computer scientists.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Organize, view, edit and manage various types of files. 2. Design, test and debug simple interactive websites using HTML, CSS and JavaScript. 3. Describe basic software development tools, processes, and concepts such as debugging, data presentation, source code, executable code, verifiers, and APIs. 4. Create short, simple presentations and documents that are well thought out, persuasive, and supported by evidence. 5. Search and evaluate information. 6. Present results in an organized manner. 7. Discuss the notion that each problem has several solutions, each with its own advantages and disadvantages, and that success is associated with finding a technical solution that best fits the non-technical aspects of a particular problem.

Description of discipline	
Code of discipline	SFT6002
Name of discipline	Object Oriented Programming
Number of credits (ESTS)	5
Course, semester	2, 4
Department	Information Systems
Course author(s)	Beisembyiev B
Prerequisites	Introduction to programming
Postrequisites	Advanced algorithms
The aim of study of a discipline	• Create a system of knowledge about object-oriented concepts. • Knowledge of object-oriented language: Java • Gain knowledge and skills in object-oriented programming using Java • Develop an understanding and use of the advantages of the platform.
Brief course description (main sections)	Development of console or window applications using the Java programming language using object-oriented programming concepts. Course topics include the OOP paradigm, Java programming, file handling, exceptions, structures, collections, object-oriented programming concepts, drawing. All lab and homework will be done on Microsoft VisualStudio 2010 or newer.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. To recognize the concept and basic principles of object-oriented programming. 2. Define the basics of object-oriented programming in C #, including defining classes, invoking methods, using class libraries, and more. 3. Recognize important topics and principles of software development.

	4. Solving real-world problems through software development in a high-level programming language. 5. Explain the benefits of object-oriented design and understand when it is an appropriate methodology. 6. Develop object-oriented solutions for small systems that include many objects. 7. Implement object-oriented solutions in C #. 8. Test and debug implementations of object-oriented C # solutions.

Description of discipline	
Code of discipline	SFT6003
Name of discipline	Operating Systems
Number of credits (ESTS)	5
Course, semester	2, 4
Department	Information Systems
Course author(s)	Umarov F.
Prerequisites	Information and communication technologies
Postrequisites	Computer Systems Architecture, Information Security
The aim of study of a discipline	Introduce the inner workings of modern operating systems. Specifically, the course will cover processes and threads, mutual exclusion, CPU scheduling, deadlocks, memory management, and file systems. This general overview of Linux operating systems will include topics such as the Linux user environment, commands, file system, processes, and utilities. Special attention will be paid to the bash shell and user environment.
Brief course description (main sections)	This course will provide an introduction to operating system design and implementation. The course will begin with a brief historical overview of the evolution of operating systems over the past fifty years and then cover the major components of most operating systems. This discussion will look at the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Special attention will be paid to three main OS subsystems: process management (processes, threads, CPU scheduling, synchronization and deadlocks), memory management (segmentation, paging, paging), file systems, and operating system support for distributed systems. Knowledge of Bash, network management, network security.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	• describe the main responsibilities of a modern operating system and explain the history leading to their current form • study important issues in the design and implementation of the operating system • understand the goals of standardization of OS interfaces (and others) • develop and write bash scripts for Linux OS • demonstrate basic knowledge of OS processes • correctly allocate OS resources • implement the fundamental structures of the OS • define and process command line arguments.

Description of discipline	
Code of discipline	SFT6111
Name of discipline	Design Patterns (ISD-1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	Information Systems
Course author(s)	Seitkulov J., Beisembiev B.
Prerequisites	Object Oriented Programming
Postrequisites	Business Component Development on the Java EE Platform

The aim of study of a discipline	Start designing and developing applications and systems using design patterns and avoiding the knowledge of combating patterns accumulated and proven throughout the industry. The course is specially targeted and adapted to Java implementation and considerations. In this course, programmers will become familiar with ideas and techniques commonly referred to as Java language patterns. Patterns are reusable solutions to recurring problems in software development.
Brief course description (main sections)	Design Patterns in Java is designed to use design patterns to solve a variety of problems.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. List of design patterns in Java. 2. Development of an understanding of the principles of object-oriented programming 3. Implementation of design patterns 4. Solve practical problems by creating java programs with good style. 5. Modify and rewrite the created program using analysis. **6.** Explain the capabilities and limitations of basic design patterns

Description of discipline	
Code of discipline	SFT6119
Name of discipline	Development of Web components on the Java EE platform (ISD-2)
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Seitkulov J., Beisembiev B.
Prerequisites	Design Patterns (ISD-1)
Postrequisites	Development of a web application based on the Framework (ISD-3), Development of web services on the Java EE platform (ISD-4), Client-server applications (ISD-5)
The aim of study of a discipline	This course prepares students for OCPJBCD (Oracle Certified Professional Level : Business Component Developer for Java EE 5 platform) certification , which requires knowledge of the basics of developing Java components for distributed enterprise applications. Particular attention is paid to component development.
Brief course description (main sections)	This course prepares students for OCPJBCD (Oracle Certified Professional Level : Business Component Developer for Java EE 5 platform) certification , which requires knowledge of the basics of developing Java components for distributed enterprise applications. Particular attention is paid to component development.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. EJB and MDB API practices 2. Deploying and managing an application server (Glassfish) 3. use EJB, Hibernate, JPA, and JAVAMAIL API containers 4. Object Relational Mapping Identification (ORM) 5. Java Persistence API (JPA) practice

Description of discipline	
Code of discipline	SFT6132
Name of discipline	An Introduction to Python and Libraries for Data Processing and Analysis (BDA-1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	IS
Course author(s)	Moldagulova A.N.
Prerequisites	Object Oriented Programming
Postrequisites	Big data storage and collection (BDA-2)

The aim of study of a discipline	Learn the Python programming language and core libraries for data processing and analysis.
Brief course description (main sections)	This course will introduce the student to the basics of the Python programming environment, including fundamental Python programming techniques such as lambda expressions, reading and manipulating CSV files, and the numpy library. The course will introduce data manipulation and cleanup techniques using the popular python pandas data science library, as well as the Series and DataFrame abstraction as central data structures for data analysis, and tutorials on how to use functions such as groupby, merge, and pivot tables effectively. ... By the end of this course, students will be able to collect tabular data, cleanse it, manipulate it, and perform basic logical statistical analysis.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	-Students will understand the concept of abstract data types and how they can be implemented in Python using statically allocated and dynamically linked data structures. -Students will be familiar with the most important abstract data types used to store and retrieve information in modern software systems, including stack, queue, set, and map. -Students will be able to explore and quantify the relative performance of data structures and their underlying algorithms, as well as the scalability of structures as the size of datasets increases; -Students will be able to design and test data structures using software component development techniques; -Students will understand and be able to apply basic component design concepts (e.g. encapsulation, data hiding, invariants) through the use of Python. -Students will be able to write correct Python code that others can read, understand and modify.

Description of discipline	
Code of discipline	SFT6134
Name of discipline	Big data storage and collection (BDA-2)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Seidakhmetova K., Sultan D.
Prerequisites	An Introduction to Python and Libraries for Data Processing and Analysis (BDA-1)
Postrequisites	Big Data Processing (BDA-3)
The aim of study of a discipline	Explore tools for collecting and storing data like Hadoop.
Brief course description (main sections)	The course is designed to introduce the concept of HDFS and the Sqoop and Flume injection tools. Flume and Sqoop play a special role in the Hadoop ecosystem. They transfer data from sources such as local file systems, HTTP, MySQL and Twitter that store / produce data to datastores such as HDFS, HBase, and Hive. Both tools have built-in functionality and distract users from the complexity of transferring data between these systems.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Learning outcomes: By the end of the course, students can: - To create and manage files in HDFS - To create tables and save data in Hive - To import and export data from / to hdfs and hive - Submitting Sqoop jobs and incremental imports - Use Flume to ingest data in HDFS and HBase - Retrieving data from various sources including HTTP, Twitter and Rest using Flume and Python

Description of discipline	
Code of discipline	SFT6145
Name of discipline	AWS Cloud Foundations (AWS-1)
Number of credits (ESTS)	5
Course, semester	2 course, 3 semester
Department	Information Systems
Course author(s)	Senior-lector Maulenov Y.S., PhD, associate professor Kassymova A.B.
Prerequisites	Information and communication technologies
Postrequisites	AWS Solution Architecture (AWS-2)
The aim of study of a discipline	Course is intended for students who seek an overall understanding of cloud computing concepts, independent of specific technical roles. It provides a detailed overview of cloud concepts, AWS core services, security, architecture, pricing, and support. The course could be recommended not only for students with technical specialty, but also for business and management specialty students. After passing this course you will be recommended to pass "AWS Certified Cloud Practitioner" exam and become officially AWS Certified (https://aws.amazon.com/certification/certified-cloud-practitioner/). As IITU is partner of Amazon in AWS Academy program you will be granted 50% discount for you first exam attempt and free access for paid sample exam.
Brief course description (main sections)	Below are the main and core topics/modules which will be covered in the course: 1) Cloud Concepts Overview 2) Cloud Economics and Billing 3) AWS Global Infrastructure Overview 4) Cloud Security 5) Networking and Content Delivery 6) Compute 7) Storage 8) Databases 9) Cloud Architecture 10) Automatic Scaling and Monitoring
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Define the AWS Cloud - Explain the AWS pricing philosophy - Identify the global infrastructure components of AWS - Describe the security and compliance measures of the AWS Cloud, including AWS Identity and Access Management (IAM) - Create a virtual private cloud (VPC) by using Amazon Virtual Private Cloud (Amazon VPC) - Demonstrate when to use Amazon Elastic Compute Cloud (Amazon EC2), AWS Lambda, and AWS Elastic Beanstalk - Differentiate between Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), Amazon Elastic File System (Amazon EFS), and Amazon Simple Storage Service Glacier (Amazon S3 Glacier) - Demonstrate when to use AWS database services, including Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB, Amazon Redshift, and Amazon Aurora - Explain the architectural principles of the AWS Cloud - Explore key concepts related to Elastic Load Balancing, Amazon CloudWatch, and Amazon EC2 Auto Scaling. Optional outcome: you will be granted 50% discount for passing "AWS Certified Cloud Practitioner" exam.

Description of discipline	
Code of discipline	SFT6146
Name of discipline	AWS Solution Architecture (AWS-2)
Number of credits (ESTS)	5
Course, semester	2 course, 4 semester
Department	Information Systems
Course author(s)	Senior-lector Maulenov Y.S., PhD, associate professor Kassymova A.B.
Prerequisites	Information and communication technologies, Amazon Web Services 1
Postrequisites	AWS Solution Architecture (AWS-3)
The aim of study of a discipline	Course covers the fundamentals of building IT infrastructure on AWS. The course teaches students how to optimize use of the AWS Cloud by understanding AWS services and how they fit into cloud-based solutions. After passing this course you will be recommended to pass "AWS Certified Solutions Architect – Associate" exam and become officially AWS Certified (https://aws.amazon.com/certification/certified-solutions-architect-associate/). As IITU is partner of Amazon in AWS Academy program you will be granted 50% discount for you first exam attempt and free access for paid sample exam.
Brief course description (main sections)	Below are the main and core topics/modules which will be covered in the course: 11) Welcome to AWS Academy Cloud Architecting 12) Introducing Cloud Architecting 13) Adding a Storage Layer 14) Adding a Compute Layer 15) Adding a Database Layer 16) Creating a Networking Environment 17) Connecting Networks 18) Securing User and Application Access
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Make architectural decisions based on AWS architectural principles and best practices - Use AWS services to make infrastructure scalable, reliable, and highly available - Use AWS managed services to enable greater flexibility and resiliency in an infrastructure Optional outcome: you will be granted 50% discount for passing "AWS Certified Solutions Architect – Associate" exam.

Description of discipline	
Code of discipline	SFT6117
Name of discipline	Development of mobile applications for IOS (mobile 1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	IS
Course author(s)	Adibek T.
Prerequisites	Introduction to programming, Object-oriented programming
Postrequisites	Diploma project
The aim of study of a discipline	Studying the development of mobile applications for the iOS platform.
Brief course description (main sections)	During this course, students will learn to use development tools such as Xcode, design interfaces and interactions, and evaluate their usability. Students will also learn how to properly design an application architecture and how to work with complex data coming from a local database or remote API.

Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Write Swift programs 2. Development of mobile application architecture 3. Development of complex iOS applications 4. Network requests and response processing 5. Storage and retrieval of data in iOS applications

Description of discipline	
Code of discipline	SFT6124
Name of discipline	Development of mobile applications for Android (Mobile 2)
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Mamen E.
Prerequisites	Introduction to programming, Object-oriented programming
Postrequisites	Diploma project
The aim of study of a discipline	Studying the development of mobile applications for the Android platform.
Brief course description (main sections)	The course is an introduction to programming mobile applications using the latest Android technologies. Topics include activity lifecycle, resources, layouts, intents for multiple activities, menus, snippets and dialogs, action bar, adapters, persistence using shared settings, SQLite, and content providers. The emphasis is on the practical use of these components in applications. Includes a significant team project.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. demonstrate the basic concepts and techniques for developing applications for an Android phone. 2. Be able to use the SDK and other development tools. 3. demonstrate the basic concepts of the features and capabilities of an Android phone. 4. Understand Java programming as it relates to developing applications for the Android platform. 5. demonstrate how to get additional resources and security information needed for various different types of functions and services of Android applications (cards, SMS, email, etc.). 6. Demonstrate how to work with database functions in the Android mobile application.

Description of discipline	
Code of discipline	SFT6113
Name of discipline	Programming on PL / SQL (Oracle 1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	IS
Course author(s)	Mukhitova K.E.
Prerequisites	Data and information management
Postrequisites	Programming with PL / SQL (Oracle 2)
The aim of study of a discipline	Build, deploy and manage robust database applications using Oracle database tools.
Brief course description (main sections)	Most of the topics covered are an understanding of basic procedural / structured query language, subroutine, query section and syntax, DML, advanced DML, and scripting. Starting with a basic outline of what PL / SQL is, students will establish a foundation to expand their knowledge by exploring data types, flow control, errors, and more. You will explore strings, numbers, booleans, and arrays.

Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1.design, create and manage database applications in Oracle 11g; 2. write PL / SQL codes for the development of stored procedures, triggers and packages; 3. management and creation of a sequence of databases, synonyms and tables; 4. improving security, performance and data integrity; 5. using SQL developer to manipulate and retrieve data efficiently; 6.working with various sections of PL / SQL such as declaration, execution and exception handling

Description of discipline	
Code of discipline	SFT6120
Name of discipline	Programming with PL / SQL (Oracle 2)
Number of credits (ESTS)	five
Course, semester	3, 6
Department	Information Systems
Course author(s)	Muratova K.
Prerequisites	PL / SQL Programming (Oracle 1)
Postrequisites	Graduation design
The aim of study of a discipline	Develop stored procedures, functions, packages, and more with PL / SQL.
Brief course description (main sections)	A PL / SQL-trained program begins with an introduction to PL / SQL and then explores the benefits of this powerful programming language. Students will learn how to design stored procedures, functions, packages, and more.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	- design, creation and management of database applications in Oracle 11g; - write PL / SQL codes for the development of stored procedures, triggers and packages; - management and creation of a sequence of databases, synonyms and tables; - improving security, performance and data integrity; - work with various sections of PL / SQL, such as declaration, execution and exception handling; - creation and debugging of stored procedures and functions; - optimization of system performance.

Description of discipline	
Code of discipline	SFT6115
Name of discipline	Multimedia technologies (GD-1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	IS
Course author(s)	Grigoriev A.
Prerequisites	Information and communication technologies
Postrequisites	Fundamentals of 3D Modeling (GD-2)
The aim of study of a discipline	is the formation of students' practical ideas about the essence and functions of modern multimedia systems and technologies, their place and role in the system of information systems and technologies, mastering practical skills for the effective use of multimedia technologies in the context of solving real practical problems.
Brief course description (main sections)	The discipline includes: the concept of multimedia technology; multimedia technology tools; stages and technology of creating multimedia technology products; design of software for multimedia technology; configuration of technical means of multimedia technology; implementation of static and dynamic processes using multimedia tools.
Expected Learning Outcomes (knowledge, abilities, skills and	Know: - theoretical foundations of converting analog information into digital and vice versa;

competencies acquired by students)	- basic types and formats of raster and vector graphics files; - basic technologies for obtaining digital audio and video processing; - approaches to creating animation and its main types; - hardware requirements that are used to create multimedia products; - stages and technology for creating multimedia products. Be able to: - to develop multimedia products; - create and edit multimedia elements; - create presentations containing multimedia elements; - to place multimedia products on the Internet. Own: - skills of detailed design of multimedia objects; - skills in processing multimedia information; - skills of placing, testing and updating multimedia objects; - approaches to the use of information technology when creating a project of multimedia objects; - tools for creating and modifying multimedia objects; - skills of presentation of the results obtained; - modern tools for creating, modifying and viewing a multimedia product.

Description of discipline	
Code of discipline	SFT6122
Name of discipline	Basics of 3D modeling (GD-2)
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Grigoriev A.
Prerequisites	Multimedia Technology (GD-1)
Postrequisites	Diploma project
The aim of study of a discipline	The goal of teaching the discipline is to master a graphic editor, with which you can model three-dimensional images of objects, as well as the basic concepts of animation programs and fundamental tools that are necessary to create three-dimensional characters and animations.
Brief course description (main sections)	This discipline occupies an important place in the knowledge system, forming a modern approach to creativity through the use of computer technology.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	- to navigate in the three-dimensional space of the scene; - effectively use the basic tools for creating objects; - modify, change and edit objects or their individual elements; - to combine the created objects into functional groups; - create simple three-dimensional models of real objects.

Description of discipline	
Code of discipline	SFT6114
Name of discipline	Introduction to the Internet of Things and Embedded Systems (IoT-1)
Number of credits (ESTS)	5
Course, semester	5
Department	IS
Course author(s)	Nurlan Karimzhan
Prerequisites	Physics
Postrequisites	Robotics and IoT systems (IoT-2)
The aim of study of a discipline	The goal of this course is that students should deepen their understanding of the Internet of Things (IoT), how to design IoT based systems.

Brief course description (main sections)	This course introduces the element base of the "Internet of Things" devices, with operating systems and programming languages. Students will master wired protocols for exchanging information between
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Understanding the IoT vision from a global context. 2. Determine the prospects for the development of the IoT market. 3. The use of devices, gateways and data management in the IoT. 4. Building modern architecture in the IoT. 5. Application of IoT in industrial and commercial building automation and real design constraints. 6. Briefly explain how the Internet and the Internet of Things work. 7. Understand the limitations and capabilities of wireless and mobile networks for the Internet of Things. 8. Use basic measurement tools to determine real-time performance of packet networks. 9. Analysis of tradeoffs in interconnected wireless embedded sensor networks.

Description of discipline	
Code of discipline	SFT6121
Name of discipline	Robotic Systems and Internet of Things (IoT-2)
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Nurlan Karimzhan
Prerequisites	Introduction to the Internet of Things and Embedded Systems (IoT-1)
Postrequisites	Diploma Project
The aim of study of a discipline	The purpose of teaching the course "Robotics" are: improving knowledge in the field of robotics; familiarization of students with the principles and methods of designing, building and programming control electronics based on the Arduino computing platform ; development of programming skills in a modern programming environment; deepen their knowledge, increase motivation for learning through the practical application of integrated knowledge gained in various educational fields (mathematics, physics, computer science); to develop interest in scientific, technical, engineering and design creativity. The Robotics course will provide a platform for programming a single-board computer with various sensors and a robot. This will focus on the comprehensive coverage of robotic science and technology from design to application. The course will provide opportunities for practical experience with Raspberry - pi and various sensors with a robotic arm. Finally, this course will develop the necessary skills for management and modeling and applied aspects in various real-world applications.
Brief course description (main sections)	the subject of the study is the principles and methods for the development, design and programming of control electronics based on the Arduino computing platform (controller) or its clone.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Understand the concept of degree of uncertainty in well-structured environments, such as assembly lines. The student will interact with the environment through actuators and sensors. 2. Use different types of sensors with an Arduino controller. In addition, multiple sensor fusion will be in practice. 3. To apply mathematics and the control part of robotics in practice. 4. Build a simulation of a common environment, sensors and robotics 5. Understand real-time control and task processing using a mathematical model. 6. Understand a single board computer, mechanical engineering and mathematics.

	7. Use the popular Raspberry Pi programming device.
	8. Create programs that use the Python programming language.
	9. Define methods of computer science materials.
	10. Combine Raspberry PI B + and Arduino.

Description of discipline	
Code of discipline	SFT6116
Name of discipline	Introduction to ACM ICPC Problem Solving (ACM-1)
Number of credits (ESTS)	5
Course, semester	3, 5
Department	IS
Course author(s)	Yeskendir Sultanov
Prerequisites	Object Oriented Programming
Postrequisites	Basic algorithms for solving problems ACM ICPC (ACM-2)
The aim of study of a discipline	Studying the data structure, principles of constructing algorithms and programs, methods for solving, programming, debugging and implementing programs.
Brief course description (main sections)	Introduction to Problem Solving ACM ICPC is designed to study the basic algorithms and data structures for solving various ACM ICPC problems.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. To analyze depending on the input data limitations and use appropriate algorithms 2. Use appropriate data structures depending on their properties. 3. Be able to solve problems, breaking them into subtasks 4. Solve practical problems quickly and efficiently. 5. Compare different methods of solving the problem after testing the program. 6. Modify and rewrite the created program using analysis.

Description of discipline	
Code of discipline	SFT6123
Name of discipline	Basic algorithms for solving ACM ICPC problems (ACM-2)
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Eskendir Sultanov, Senior Lecturer
Prerequisites	Introduction to ACM ICPC Problem Solving (ACM-1)
Postrequisites	Diploma Project
The aim of study of a discipline	The course " Basic algorithms for solving ACM ICPC problems " is designed to study the basic algorithms and data structures for solving various problems of ACM ICPC . For this purpose, data structures, principles for constructing algorithms and programs, methods for solving, programming, debugging and implementing programs are considered.
Brief course description (main sections)	The course " Basic algorithms for solving ACM ICPC problems " is designed to study the basic algorithms and data structures for solving various problems of ACM ICPC . For this purpose, data structures, principles for constructing algorithms and programs, methods for solving, programming, debugging and implementing programs are considered.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Perform analysis depending on input data limitations and use appropriate algorithms 2. Use appropriate data structures depending on their properties. 3. Be able to solve problems, breaking them into subtasks 4. Quickly and effectively solve practical problems.

	5. Compare and contrast different solutions to the problem after testing the program. 6. Modify and rewrite the created program using analysis.

Description of discipline	
Code of discipline	SFT6152
Name of discipline	AR / VR theory
Number of credits (ESTS)	5
Course, semester	3, 5
Department	РЭТ
Course author(s)	Daineko E.A.
Prerequisites	Information and communication technologies, HCI
Postrequisites	Diploma project
The aim of study of a discipline	The course is devoted to augmented and virtual reality, during which students will be told the history of technology development, use cases, development prospects.
Brief course description (main sections)	The course focuses on the history of technology development and covers AR / VR theory. Therefore, the discipline consists of the following sections: 1. Virtual reality: history of development and devices; 2. Augmented reality: history and devices; 3. VR and AR applications; 4. Design of interfaces for AR / VR applications; 5. AR / VR market; 6. Challenges and prospects for the development of AR / VR. "Virtual Reality: A History of Development and Devices" covers the stages of technology development in different years. Also at this stage, various devices and their structure are studied, which allow working in VR mode. The section "Augmented Reality: History and Devices" introduces students to how AR develops and what devices that can work with technology are made of. In the VR and AR Applications section, an introduction to current AR and VR projects takes place, during which users will be able to identify trends and best practices. "Interface Design for AR / VR Applications" contains information on how interfaces for AR VR applications should be developed, taking into account their specificity. The AR / VR Market section is devoted to the current state of the market for virtual and augmented reality applications, as well as development forecasts. At the final stage, "Challenges and Prospects for AR / VR Development," students will get acquainted with the complexities of the industry and the prospects for market development.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	This course will introduce students to the VR / AR industry and is suitable for anyone who does not have experience with technology. Expected results of the study, after completing the course: 1. Formation of knowledge about virtual and augmented reality; 2. Ability to distinguish between virtual and augmented reality; 3. Understanding the principles of virtual and augmented reality; 4. Ability to generate your own ideas for projects in AR / VR; 5. Identify good and bad projects; 6. Understand the structure of VR / AR devices. Students of the course will get acquainted with the history of AR / VR development, key personalities, technology prerequisites, key market players, problems that arise in the process of project development. After completing the course, students will understand exactly how the virtual and augmented reality industry works. How applications work, what factors need

	to be considered when developing, what is needed to promote projects. In addition, students will be able to explore the internals of the devices used in AR / VR. 1. 1. After completing the discipline, students will be equipped with a set of skills necessary to generate ideas for their own projects. Knowledge of the structure of devices will allow you to take this into account in the process of their design and planning.

Description of discipline	
Code of discipline	SFT6153
Name of discipline	AR / VR Unity Basics
Number of credits (ESTS)	5
Course, semester	3, 6
Department	РЭТ
Course author(s)	Daineko E.A.
Prerequisites	Information and communication technologies, HCI
Postrequisites	Diploma project
The aim of study of a discipline	This course focuses on the basics of development in the Unity game engine. It will allow students to become familiar with the interface, basic tools and functions of the application. The main goal of the course is to teach students to create their own projects, introduce additional packages. In the course of studying the discipline, students will get acquainted with various projects of other developers, which will help them learn to distinguish good projects from bad ones. Subsequently, this will help students to take the knowledge gained into their own projects. The course is a starting one, and will allow students to acquire the minimum required set of skills for independent development of projects. The course will explore ways of creating an application interface, writing scripts to ensure interaction between project elements, importing external packages to provide a project with additional functionality, deploying an application on different platforms.
Brief course description (main sections)	The course consists of six main sections, each of which will introduce you to specific elements of the game engine. Each stage of the course is devoted to a specific topic, the detailed presentation of information will make it easier to assimilate. Course sections: 1. Acquaintance with Unity; 2. Basics of Unity; 3. Introduction to the game engine; 4. Familiarity with other platforms; 5. Writing code; 6. Development of the project. At the Acquaintance with Unity stage, students will become familiar with what a game engine is, its history, functions and capabilities. The next stage - "Unity Basics" - will tell you about the basic principles of development on the platform. "Introduction to the game engine" will allow you to practice the basic functionality and set of tools required for development. The section "Getting to know other platforms" is devoted to the study of analogs, will demonstrate to students different platforms and their capabilities, differences and similarities with Unity. "Writing Code" teaches students the basic concepts for working with their own project, after which they can write code for the project. The final stage "Project Development" is devoted to the development of the student's project, and will help to implement the knowledge gained during the course.

Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Taking the course will help students acquire the following skill set: 1. Work in the Unity environment; 2. Create a user interface for the application; 3. Develop your own projects; 4. Import third-party modules for additional features; 5. Write the code; 6. Analyze and correct the code; 7. Deploy applications across multiple platforms. During the training, students will learn how to work inside the Unity engine. The result of which will be the creation of a project that students implement from an idea to a finished application. In addition to working in the engine, students will master the C # programming bases necessary for writing application code. They also learn to analyze their code and correct errors. Students will learn how to create a user interface to interact with the application. They will also learn how to import the necessary objects and additional modules for the application to work. In addition, students will be able to customize the appearance of objects, change their texture, program and customize the interaction between them. The final stage in the development of the application will be teaching students to deploy their projects on one of the platforms that students can choose depending on the needs of the project.

Description of discipline	
Code of discipline	SFT6154
Name of discipline	Go lang web development
Number of credits (ESTS)	5
Course, semester	3, 5
Department	КИИБ
Course author(s)	Tolegenov A.M.
Prerequisites	Object Oriented Programming, Web Programming
Postrequisites	Diploma project
The aim of study of a discipline	Learn the basics of the language and web service development with Go
Brief course description (main sections)	Go (golang) is a modern programming language designed for the development of highly competitive applications running on multiprocessor systems.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	The course will give the basics of programming in the Go language, as well as experience in using the language in the basic tasks that are encountered today in server-side web development.

Description of discipline	
Code of discipline	SFT6155
Name of discipline	Blockchain technologies
Number of credits (ESTS)	5
Course, semester	3, 6
Department	Information Systems
Course author(s)	A.A. Kuatbaeva
Prerequisites	Mathematics, ICT, Introduction to Programming
Postrequisites	Data mining, Big data mining
The aim of study of a discipline	The goal of the discipline is to study blockchain technology on mathematical, cryptographic foundations and apply it to solving applied problems (smart

	contracts, supply chain management, digital signatures and algorithms for their verification).
Brief course description (main sections)	Blockchain is a mathematical algorithm that allows secure and private exchange of data across peer-to-peer networks. The main idea of blockchain technology is a chain of blocks with information about each transaction, which is stored in each unit of the computer network. Blockchain provides effective and reliable data protection, transparent and tamper-proof exchange of information. The discipline covers a number of mathematical methods of the family of elliptic curves and methods of creating software for blockchain systems in Java, Python. The discipline will introduce students to the basics of blockchain on various platforms.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	As a result of mastering the discipline, the student / master's student must Know: 1. RLA in the field of blockchain in the world and the Republic of Kazakhstan 2. Basic mathematical foundations of blockchain construction 3. Cryptographic basics of blockchain 4. Blockchain process management Be able to: 1. Build blockchain algorithms from scratch 2. Develop programs in Java for the blockchain 3. Design blockchain on elliptic curves Have knowledge of: 1. Designing blockchain models 2. Develop software for blockchain 1. 3. Design smart contract systems for an applied task /

Description of discipline	
Code of discipline	SFT6157
Name of discipline	R programming
Number of credits (ESTS)	5
Course, semester	3, 6
Department	IS
Course author(s)	Moldagulova A.N.
Prerequisites	Object Oriented Programming
Postrequisites	Data modeling
The aim of study of a discipline	An Introduction to Programming in R helps students master the basics of this beautiful open source language, including factors, lists, and data frames. This course covers practical issues in statistical computing, including reading data in R, accessing R packages, writing R functions, and organizing and annotating R code with hands-on working examples.
Brief course description (main sections)	All lab and homework will be done on Microsoft Visual Studio 2010 or newer.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	• Learn basic syntax, programming grammar, and a range of vocabularies to aid in data analysis. • Make a list of motivations for learning R programming • Importing, viewing and modifying datasets in R Programming • Perform appropriate statistical tests in R programming

Description of discipline	
Code of discipline	SFT6158
Name of discipline	Parallel programming
Number of credits (ESTS)	6
Course, semester	3, 5

Department	IS
Course author(s)	Nayzabayeva L.K.
Prerequisites	Introduction to programming
Postrequisites	Diploma project
The aim of study of a discipline	Study of the main provisions of the modern concept of the process, the features of formal models of parallel programming, the principles of organizing the interaction of asynchronous processes, methods for parallelizing algorithms. Formation of skills in working with parallel computers, development and debugging of parallel programs in the environment of parallel operating systems, researching the features of the structure of parallel computers and taking these features into account when carrying out computations.
Brief course description (main sections)	In parallel computing, multiple processors work together to solve this problem. These are exciting times for parallel computing. The largest parallel machine has over one hundred thousand processors, and machines with over ten thousand processors are believed to be in the public domain by the end of the decade. Moreover, as most chip makers are moving to multi-core processors, most machines will soon be parallelized. Therefore, it is very important to learn how to use parallel machines effectively.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1. Define terminology commonly used in parallel computing, such as efficiency and speedup. 2. To create a parallel algorithm, implement it using MPI, OpenMP, pthreads, or a combination of MPI and OpenMP. 3. To write parallel code, analyze its performance, 4. To identify computational bottlenecks in order to optimize code performance. 5. To change and rewrite parallel code, debug it and fix errors. 6. To explain the problem, implement effective and correct code to solve it, analyze its performance. 7. Make persuasive written and oral presentations explaining achievements.

Description of discipline	
Code of discipline	SFT6127
Name of discipline	Development of a web application based on the Framework (ISD-3)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	Information Systems
Course author(s)	Beysembiev B., Seitkulov J.
Prerequisites	Development of Web Components on the Java EE Platform (ISD-2)
Postrequisites	Development of web services on the Java EE platform (ISD-4)
The aim of study of a discipline	This course prepares students for the OCPJWCD (Oracle Certified Professional Level Professional) certification, which provides a basic knowledge of developing Java components (servlets and JSPs) used in web applications.
Brief course description (main sections)	This course prepares students for the OCPJWCD (Oracle Certified Professional Level Professional) certification, which provides a basic knowledge of developing Java components (servlets and JSPs) used in web applications.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1.define the basic ideas of Java components; 2. be able to develop a Java component; 3. be able to implement servlets; 4. implement JSP pages; 5. understand web applications using servlets and JSP pages.

Description of discipline

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Code of discipline	SFT6129
Name of discipline	Development of web services on the Java EE platform (ISD-4)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Seitkulov J., Beisembiev B.
Prerequisites	Development of Web Components on the Java EE Platform (ISD-2)
Postrequisites	Diploma project
The aim of study of a discipline	This course prepares students for the OCPJWSD (OCPJWSD: Oracle Certified Professional Level: Web services developer for the Java EE 5 platform) certification, which includes the ability to develop web services using Java technologies such as the Java Web Services Developer Pack, JAX- WS and JAXB. In addition, this course covers XML, JSON, REST, and Security Fundamentals.
Brief course description (main sections)	This course prepares students for the OCPJWSD (OCPJWSD: Oracle Certified Professional Level: Web services developer for the Java EE 5 platform) certification, which includes the ability to develop web services using Java technologies such as the Java Web Services Developer Pack, JAX- WS and JAXB. In addition, this course covers XML, JSON, REST, and Security Fundamentals.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	1.be able to practice JAX-RS and JAX-WS 2.be able to demonstrate REST web services 3.explore the SOAP web service 4. Be able to work with sparse JSON and XML 5. Be able to integrate with Amazon SES, Google Maps

Description of discipline	
Code of discipline	SFT6131
Name of discipline	Client Server Applications (ISD-5)
Number of credits (ESTS)	five
Course, semester	4, 7
Department	Information Systems
Course author(s)	Seitkulov J., Beisembiev B.
Prerequisites	Development of Web Components on the Java EE Platform (ISD-2)
Postrequisites	Diploma project
The aim of study of a discipline	Students study the fundamental principles of application work in the client-server architecture; mastering technologies for storing and processing data in systems of client-server architecture.
Brief course description (main sections)	Studying the fundamental principles of application work in the client-server architecture; mastering technologies for storing and processing data in systems of client-server architecture.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	As a result of mastering the discipline, the student should be able to: • fundamentals of new information technologies for the development of client-server software, • features of development, organization, distribution and monetization of client-server software, • use the IDE for writing program code, • project management systems, team communication systems, version control systems, • fundamentals of the technology of object-oriented decomposition of software systems, basic design patterns • analyze the client-server architecture, • theoretically substantiate the need to use IT and the choice for solving specific professional tasks, • use specialized software for the development of client-server software,

	• use the principles of OOP when creating client-server software, • optimize the work of client applications with distributed databases

Description of discipline	
Code of discipline	SFT6135
Name of discipline	Big Data Processing (BDA-3)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Moldagulova A.N.
Prerequisites	Big data storage and collection (BDA-2)
Postrequisites	Diploma project
The aim of study of a discipline	Explore tools for processing big data.
Brief course description (main sections)	This course introduces research about data management and transformation. The course demonstrates some of the capabilities of the R language and the RStudio tool. Students will have some common challenges that arise when working with data. These tasks range from assembling different datasets into more usable forms and how to apply functions to different parts of the datasets.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Learning outcomes: by the end of the course, students will be able to: 1. identify major trends in data management; 2. to receive and retrieve information, wherever it is stored; 3. combining different types of data using data integration tools; 4. practice with spreadsheets, perform data consolidation, visualize the results of working with databases;

Description of discipline	
Code of discipline	SFT6159
Name of discipline	Data Modeling (BDA-4)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Moldagulova A.N.
Prerequisites	Big data storage and collection (BDA-2)
Postrequisites	Diploma project
The aim of study of a discipline	Study of data extraction technology and types of data extraction; extraction of structured and semi / unstructured data. As well as storage of various types of data (HDFS, NoSQL (key-value, document oriented, column base)); data processing methods; real-time processing / batch processing; working with raw data. Data cleansing. Various data formats, transformations and aggregations. Various conversion methods with Python as well as ETL tools (Pentaho).
Brief course description (main sections)	Data modeling: linear regression, logistic regression, decision tree. Model testing methods. Model validation
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	- know the technology of data extraction and types of data extraction; - extract structured and semi / unstructured data. - be able to store various types of data (HDFS, NoSQL (key-value, document oriented, column base)); - be able to apply data processing methods; - be able to process in real time / batch processing; - be able to work with raw data. - be able to clear data.

	- know and distinguish between data formats, transformations and aggregations. - apply various transformation methods using Python, as well as ETL tools (Pentaho).

Description of discipline	
Code of discipline	SFT6136
Name of discipline	Data Visualization (BDA-5)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	A.A. Kuatbaeva
Prerequisites	Big data storage and collection (BDA-2)
Postrequisites	Diploma project
The aim of study of a discipline	teaching students methods of data visualization, creating interactive dashboards, visual analytics and data storytelling using various tools.
Brief course description (main sections)	As part of the course, students study the basics of data visualization, the principles of effective data presentation, taking into account the psychology of perception, acquire the skills of visual analytics, creating interactive dashboards, and data storytelling.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Knows how to prepare various types of data from databases and other sources for subsequent visualization. Knows how to visualize data based on the principles of data storytelling and dashboard design. Uses Business Intelligence tools, libraries for data visualization in Python, R, Gephi, networkx, tools for working with geodata.

Description of discipline	
Code of discipline	SFT6147
Name of discipline	AWS Solution Architecture (AWS-3)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Senior Lecturer Maulenov E.S., PhD, Assoc. prof. Kassymova A.B.
Prerequisites	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2)
Postrequisites	AWS development (AWS-4-5), AWS SysOps Administration (AWS-6-7)
The aim of study of a discipline	The course covers the basics of building an IT infrastructure on AWS. The course teaches students how to optimize their use of the AWS Cloud by understanding AWS services and how they fit into cloud solutions. After completing this course, you will be encouraged to take the AWS Certified Solutions Architect - Associate exam and obtain an AWS Official Certification (https://aws.amazon.com/certification/certified-solutions-architect-associate/). Since IITU is an Amazon AWS Academy partner, you will receive 50% off your first exam attempt and free access to the paid practice exam.
Brief course description (main sections)	Below are the main topics / modules that will be covered in the course: 1) Welcome to AWS Academy Cloud Architecting 2) Familiarity with cloud architecture 3) Adding a storage layer 4) Adding a computational layer 5) Adding a database layer 6) Create a network environment 7) Connecting networks 8) Protecting user and application access

Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Make architectural decisions based on architectural principles and AWS best practices. - Use AWS services to make your infrastructure scalable, reliable, and highly available. - Use services managed by AWS to increase the flexibility and resiliency of your infrastructure. Additional bonus / result: You will receive a 50% discount for taking the AWS Certified Solutions Architect - Associate official exam.

Description of discipline	
Code of discipline	SFT6148
Name of discipline	AWS development (AWS-4)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Senior Lecturer Maulenov E.S., PhD, Assoc. prof. Kassymova A.B.
Prerequisites	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Postrequisites	AWS development (AWS-5)
The aim of study of a discipline	Build your technical skills for developing cloud applications on AWS by mastering the basics of cloud development and serverless technologies, containers, and more.
Brief course description (main sections)	Below are the main topics / modules that will be covered in the course: 1) Introduction to Serverless Development 2) Getting Started with .NET on AWS 3) Amazon API Gateway for Serverless Applications 4) AWS Lambda Basics 5) Development on AWS 6) Amazon Elastic Container Service 7) Advanced development on AWS After completing this course, you will be encouraged to take the AWS Certified Developer - Associate exam and become an AWS Official Certification. Since IITU is an Amazon AWS Academy partner, you will receive 50% off your first exam attempt and free access to the paid practice exam.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Develop cloud applications on AWS. - Master the basics of cloud development. Added Bonus / Outcome: You will receive a 50% discount on taking the AWS Certified Developer - Associate Official Exam.

Description of discipline	
Code of discipline	SFT6149
Name of discipline	AWS development (AWS-5)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Senior Lecturer Maulenov E.S., PhD, Assoc. prof. Kassymova A.B.
Prerequisites	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Postrequisites	Diploma Project

The aim of study of a discipline	Build your technical skills for developing cloud applications on AWS by mastering the basics of cloud development and serverless technologies, containers, and more.
Brief course description (main sections)	Below are the main topics / modules that will be covered in the course: 1) Introduction to Serverless Development 2) Getting Started with .NET on AWS 3) Amazon API Gateway for Serverless Applications 4) AWS Lambda Basics 5) Development on AWS 6) Amazon Elastic Container Service 7) Advanced development on AWS After completing this course, you will be encouraged to take the AWS Certified Developer - Associate exam and become an AWS Official Certification. Since IITU is an Amazon AWS Academy partner, you will receive 50% off your first exam attempt and free access to the paid practice exam.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Develop cloud applications on AWS. - Master the basics of cloud development. Added Bonus / Outcome: You will receive a 50% discount on taking the AWS Certified Developer - Associate Official Exam.

Description of discipline	
Code of discipline	SFT6150
Name of discipline	AWS SysOps Administration (AWS-6)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Senior Lecturer Maulenov E.S., PhD, Assoc. prof. Kassymova A.B.
Prerequisites	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Postrequisites	AWS SysOps Administration (AWS-7)
The aim of study of a discipline	Develop technical skills to automate, secure, monitor, manage, and troubleshoot AWS operations.
Brief course description (main sections)	Below are the main topics / modules that will be covered in the course: 1) Familiarize yourself with the AWS Well-Architected Framework to learn how to make informed architecture decisions. 2) An overview of AWS security technology and related use cases, benefits, and services. 3) How certain network components can help you use networks effectively in your application, using a simple three-tier architecture as an example. 4) How AWS CloudTrail works and familiarize yourself with its features and potential use cases. 5) How to create automated and repeatable deployments of networks and systems on AWS. 7) Learn about AWS Systems Manager and explore real-world use cases in detail. After completing this course, you will be encouraged to take the AWS Certified SysOps Administrator - Associate exam and obtain an AWS Official Certification. Since IITU is an Amazon AWS Academy partner, you will receive 50% off your first exam attempt and free access to the paid practice exam.

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Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Develop technical skills to automate, secure, monitor, manage, and troubleshoot operations on AWS - Know an overview of AWS security technology and related use cases, benefits, and services. - effectively use networks in the application, using a simple three-tier architecture as an example. - be able to create automated and reproducible deployments of networks and systems on AWS. Additional bonus / result: You will receive a 50% discount for taking the AWS Certified SysOps Administrator - Associate official exam.

Description of discipline	
Code of discipline	SFT6151
Name of discipline	AWS SysOps Administration (AWS-7)
Number of credits (ESTS)	5
Course, semester	4, 7
Department	IS
Course author(s)	Senior Lecturer Maulenov E.S., PhD, Assoc. prof. Kassymova A.B.
Prerequisites	ICT, AWS Cloud Foundations (AWS-1), AWS Solution Architecture (AWS-2-3)
Postrequisites	Diploma Project
The aim of study of a discipline	Develop technical skills to automate, secure, monitor, manage, and troubleshoot AWS operations.
Brief course description (main sections)	Below are the main topics / modules that will be covered in the course: 1) Familiarize yourself with the AWS Well-Architected Framework to learn how to make informed architecture decisions. 2) An overview of AWS security technology and related use cases, benefits, and services. 3) How certain network components can help you use networks effectively in your application, using a simple three-tier architecture as an example. 4) How AWS CloudTrail works and familiarize yourself with its features and potential use cases. 5) How to create automated and repeatable deployments of networks and systems on AWS. 7) Learn about AWS Systems Manager and explore real-world use cases in detail. After completing this course, you will be encouraged to take the AWS Certified SysOps Administrator - Associate exam and obtain an AWS Official Certification. Since IITU is an Amazon AWS Academy partner, you will receive 50% off your first exam attempt and free access to the paid practice exam.
Expected Learning Outcomes (knowledge, abilities, skills and competencies acquired by students)	Upon completion of this course, students will be able to: - Develop technical skills to automate, secure, monitor, manage, and troubleshoot operations on AWS - Know an overview of AWS security technology and related use cases, benefits, and services. - effectively use networks in the application, using a simple three-tier architecture as an example. - be able to create automated and reproducible deployments of networks and systems on AWS. Additional bonus / result: You will receive a 50% discount for taking the AWS Certified SysOps Administrator - Associate official exam.