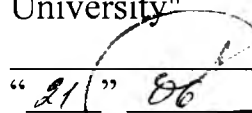


Educational Institution
"Belarusian State Economic University"

APPROVED

Rector of the educational institution
"Belarusian State Economic
University"


A.V. Egorov
"21" 06 2023
Registration № UD 18712/ed.

INFORMATION TECHNOLOGY

The study programme of the higher education institution
for the academic discipline for the following specializations:

1-25 01 03 "Global Economy";
1-25 01 08 "Accounting, Analysis, and Audit (by major)"
(in English)

The study programme is based on ESHE 1-25 01 08-2021; ESHE 1-25 01 03-2021 and curricula for the following specialties: 1-25 01 03 "World Economy" (in English); 1-25 01 08 "Accounting, Analysis and Audit (by area)" (in English).

COMPILED BY:

M.N. Sadovskaya, Head of the Department of Information Technology of the Belarusian State University of Economics, Candidate of Technical Sciences, Associate Professor.

RECOMMENDED FOR APPROVAL:

Department of Information Technology of the Belarusian State University of Economics

(Protocol No. 7 of 02/23/2023);

Scientific and Methodological Council of the educational institution "Belarusian State Economic University".

(Protocol No. 6 of 22.06.2023).

EXPLANATORY NOTE

The objective of the "Information Technology" course is to:

- prepare students to use modern information technology (IT), based on computer and network technologies, as a tool for solving professional problems;
- acquire theoretical knowledge of modern data storage and processing technologies and practical skills in using them to solve applied problems;
- explore the potential of information systems in the digital economy;
- master information security technologies.

The tasks of this course are:

- to form in students theoretical and methodological foundations of knowledge on modern methods of working with information;
- to develop an understanding of informatization in the era of economic digitalization and the prospects for the development of IT hardware and software, database and knowledge base technologies, data mining technologies, and information systems in economics;
- to prepare students for the use of modern IT and information system tools to solve problems in their subject area.

The academic discipline "Information Technology" is one of the fundamental disciplines that form in students a system of knowledge determining their competence as specialists in the digital economy:

- teaches information processing and analysis technologies, which are further used in the study of specialized academic disciplines;
- teaches how to correctly format printed works;
- teaches decision-making technologies and tools, which are the most important competencies of future specialists;
- teaches information security methods and tools.

As a result of studying the academic discipline "Information Technology", the following **competencies** are formed:

- *universal competencies*: solving standard professional tasks using information and communication technologies;
- *basic professional competencies*: applying information technology to manage a computer system and using office software in professional activities.

As a result of studying the academic discipline "Information Technology" students **must**:

know:

- basic IT concepts; Functional elements of computers and computer networks; Purpose and composition of system and application software; Fundamentals of programming in an office environment using the VBA language;
- computer system management technologies;
- the concept of a database (DB) and approaches to database design; functional capabilities of database management systems (DBMS) and the SQL language; systems for processing multi-user databases;

- principles of information system (IS) organization in the subject area; IS standards;

- technologies of business process modeling;

- fundamentals of information security and countering cybercrime;

be able to:

- use office software tools at a professional level;

- use global information resources;

- search for information on assigned tasks, collect and analyze data necessary for specific economic calculations;

- process economic data sets in accordance with the assigned task;

- determine personal computer configuration;

- develop web pages;

- expand the functionality of office software products using macro technology and VBA programming;

- design databases;

- work with artificial intelligence systems;

- solve economic problems using information systems;

possess skills:

- in the use of modern telecommunication tools;

- in methods of ensuring data security under conditions of computer-based information processing;

- in professional processing of text and spreadsheet documents;

- in technologies of database creation and their applications.

The teaching methodology of the academic discipline is based on a combination of lectures and laboratory classes (lab sessions) and includes the following **teaching technologies** that contribute to the activation of students cognitive activity:

- problem-based learning;

- research work;

- communication technologies (discussions, press conferences, brainstorming sessions, academic debates, and other active forms and methods);

- project-based learning, etc.

The study of each topic, in addition to the literary sources provided in the study programme, requires the use of materials from topic-specific publications and online information resources.

Assessment of the course's learning is conducted through computer-based tests on lecture course topics and three two-hour assessments—one in each section: one in the first semester and two in the second.

310 hours are allocated for the course's study.

Distribution of classroom time and the form of ongoing assessment for the academic discipline:

- 132 hours total (44 lecture hours and 88 lab sessions), of which:

- in the 1-st semester – 52 hours (18 lecture hours and 34 lab sessions), credit,

- in the 2-nd semester – 80 hours (26 lecture hours and 54 lab sessions), exam.

CONTENTS OF THE STUDY MATERIAL

Section 1. Basic Information Technologies

Topic 1.1. Basic concepts of information technology

Subject and content of the academic discipline.

Computerization. State policy and legislation of the Republic of Belarus in the field of computerization and improving digital literacy of the population. Information security policy of the Republic of Belarus. Digital economy. E-government.

Information technology (IT) and its classification.

Basic IT concepts: information, data, knowledge. Types of information.

Economic information: properties, characteristics, and structural units, classification and coding.

Topic 1.2. Technical support of information technology

Components of IT hardware

Computer classification.

Personal computers (PCs). The "open architecture" principle.

Main computer components: processors – purpose, components, characteristics, families; memory – units of measurement for information capacity, types of internal and external memory.

PC performance: parameters affecting PC performance.

Prospects for the development of IT hardware. Virtual and augmented reality.

Topic 1.3. Network information technologies

Concept and classification of computer networks. Switching methods in computer networks.

Computer network components. Workstations and servers. Types of servers. Telecommunications: network data transmission media, connecting and switching equipment.

The Internet. The concept of a protocol. The TCP/IP protocol stack. IP and domain addresses of a computer.

Corporate networks. Intranet. Extranet.

Internet services: types, purposes, application data transfer protocols. URL addressing of information resources.

The World Wide Web. HTTP and HTTPS protocols. The Semantic World Wide Web.

Prospects for the development of computer networks. Mobile networks. Multi-service networks. Grid networks.

Topic 1.4. System software

Software classification.

Operating systems (OS): functions and classification.

OS file system: purpose and types.

Windows OS: general characteristics and functionality.

OS security capabilities.

Utility software: purpose and types.

Windows OS utilities.

File managers: purpose, types, and characteristics.

Antivirus software: classification and functionality. Malware.

Topic 1.5. Application software

Classification of application software. Concepts and composition of electronic, virtual, and cloud offices.

1.5.1. Text document processing systems

Classification and functionality of text processing systems.

Microsoft Word: general characteristics, functionality, and operating technology (studied in lab classes).

Composite electronic document. Data exchange technologies between applications.

1.5.2. Spreadsheets

General characteristics of spreadsheet programs.

Microsoft Excel spreadsheet program: functionality and operating technology (covered in labs).

Key concepts: workbook, sheet, spreadsheet, page, cell, cell addressing, reference types, cell names.

Spreadsheet data types: number, text, date, time, formula. Data formats. Custom data formats.

Excel add-ins: Analysis ToolPak, Solver, Power Pivot, Power Query.

Topic 1.6. Instrumentation software

Programming languages.

Programming systems. Development environments.

Visual Basic for Application (VBA) programming language.

Programming in the MS Office application environment: macro programming; programming in the VBA environment.

Software development trends.

Section 2. Database Technologies

Topic 2.1. Fundamentals of Database Theory

Concept and types of databases (DB).

Data organization models in databases.

Relational model: basic concepts, conditions of relational integrity.

Hierarchical, network, post-relational, object-oriented, object-relational, and multidimensional models.

Development of data models.

Topic 2.2. Database Management Systems

The concept and functionality of a database management system (DBMS). Database systems.

DBMS architecture.

DBMS language and software tools.

DBMS classification. Relational DBMS.

DBMS development trends.

Database administration.

Topic 2.3. Database Design

Database requirements.

Database life cycle. Stages of relational database design.

Conceptual database models: concept, entity-relationship model (ER model).

Transforming an ER model into a relational data model. Table normalization.

General information about CASE tools. Automated database design using CASE tools.

Topic 2.4. SQL Language Basics

The purpose and general characteristics of the SQL language. SQL standards and dialects.

Data types. Expressions. SQL command structure.

Basic SQL commands.

Topic 2.5. Multi-user database processing systems

Evolution of data processing concepts.

File-server architecture.

Client-server architecture. Mechanisms for accessing external databases.

Distributed database architecture.

Evolution of data processing concepts.

File-server architecture.

Client-server architecture. Mechanisms for accessing external databases.

Distributed database architecture.

Section 3. Information Systems

Topic 3.1. Information systems in economics

Concept and classification of information systems. Corporate information systems. IS standards.

Information system (IS) structure. Types of information system support.

Information system support (IS).

IS software. Criteria for selecting software for a given subject area.

IS design principles: approaches, development stages, and IS life cycle models.

Topic 3.2. Enterprise IT infrastructure

The concept of enterprise IT infrastructure.

IT infrastructure organization methods. Data centers.

Cloud services in the economy. Cloud service delivery models.

Topic 3.3. Artificial Intelligence Systems

The concept and applications of artificial intelligence (AI). Classification of AI systems.

Knowledge bases. Knowledge representation models. Production model. Semantic network model. Frame model.

Decision support systems.

Expert systems.

Topic 3.4. Analytical data processing systems

Data warehouse (DW). DW classification.

Online and analytical data processing systems: OLTP, OLAP.

Data and knowledge mining: Data Mining and Knowledge Mining.

Big data: concept and processing features.

Business intelligence (BI) systems. Power BI analytical platform in Excel.

Topic 3.5. Information security of IS

Basic concepts of information security.

Information security threats and attack types. Countering threats and preventing cybercrime.

Methods and means of information security. Cryptography. Steganography. Electronic digital signature.

Enterprise information security policy.

EDUCATIONAL AND METHODOLOGICAL MAP OF THE ACADEMIC DISCIPLINE "INFORMATION TECHNOLOGIES"

FOR FULL-TIME HIGHER EDUCATION

Section number, topic	Section title, topic	Number of classroom hours		Other	Knowledge assessment form
		Lectures	Laboratory classes		
1	Basic Information Technologies				
1.1	Basic concepts of information technology	3		[1-5], [1.1-1.6]	Test
1.2	Technical support of information technology	3		[1.1-1.6]	Test
1.3	Network information technologies	4		[1.1-1.6]	Test
1.4	System software	2	1	[1.1-1.6]	
1.5	Application software	2	11	[1.1-1.6]	Individual assignment, test
	1. Text document processing systems				
	2. Spreadsheets	2	16	[1.1-1.6]	Test
1.6	Instrumentation software	2	6	[1.1-1.6]	
Total for 1 semester		18	34		Credit
2	Database Technologies				
2.1	Fundamentals of database theory	3		[2.1-2.5]	Test
2.2	Database management Systems	2	18	[2.1-2.5]	Individual assignment, test
2.3	Database Design	3	2	[2.1-2.5]	Test
2.4	SQL language basics	2	6	[2.1-2.5]	Test
2.5	Multi-user database processing systems	2	2	[2.1-2.5]	
3	Information Systems				
3.1	Information systems in economics	4	12	[3.1-3.5]	Test
3.2	Enterprise IT infrastructure	2		[3.1-3.5]	
3.3	Artificial Intelligence Systems	2	8	[3.1-3.5]	Test
3.4	Analytical data processing systems	2	2	[3.1-3.5]	
3.5	Information security of IS	4	4	[1-5], [3.1-3.5]	Test
Total for 2 semester		26	54		Exam

INFORMATION AND METHODOLOGICAL PART

Methodological recommendations for organizing independent work of students in an academic discipline

To support active learning in this academic discipline, independent work (IW) is provided.

The main areas of student independent work are:

- familiarization with the course study programme, recommended reading list, and questions for preparing for the test and exam;
- study of the theoretical portion of the course;
- preparation for the practical portion of the course according to the laboratory topics;
- preparation for the test and exam.

LITERATURE

Legislative and regulatory acts

1. On information, informatization and information protection: Law of the Republic of Belarus, 10.11.2008, No. 455-3 // National Register of Legal Acts of the Republic of Belarus. – 2008. – No. 279. – 2/1552.
2. On the Electronic Document and the Electronic Digital Signature: Law of the Republic of Belarus, 21.01.2011, No. 113-Z // National Register of Legal Acts of the Republic of Belarus. – 2011. – No. 15. – 2/1665.
3. On the Development of the Digital Economy: Decree of the President of the Republic of Belarus, 21 December 2017, No. 8 // [Electronic resource] – Minsk, 2003-2021. Access mode: <https://president.gov.by/ru/documents/dekret-8-ot-21-dekabrja-2017-g-17716>. – Access date: 25.01.2023.
4. State Program "Digital Development of Belarus" for 2021-2025: Resolution of the Council of Ministers of the Republic of Belarus. Belarus, February 2, 2021, No. 66 // [Electronic resource] – Access mode: https://pravo.by/upload/docs/op/C22100066_1612472400.pdf. – Access date: January 25, 2023.
5. Concept of Information Security of the Republic of Belarus: Resolution of the Security Council of the Republic of Belarus, March 18, 2019, No. 1 // [Electronic resource] – Access mode: https://pravo.by/upload/docs/op/P219s0001_1553029200.pdf. – Access date: January 25, 2023.

Section 1. Basic Information Technologies

Main

- 1.1. Гвоздева, В.А. Информатика, автоматизированные информационные технологии и системы: учебник / В. А. Гвоздева. – Москва: ФОРУМ: ИНФРА-М, 2021. – 542 с.
- 1.2. Кудинов, Ю. И. Основы современной информатики: учебное пособие / Ю. И. Кудинов, Ф. Ф. Пашенко. – 5-е изд., стер. – Санкт-Петербург: Лань, 2021. – 256 с.
- 1.3. Техническое и программное обеспечение информационных технологий: учеб. пособие / М.Н. Садовская [и др.] под общей ред. М.Н. Садовской. – Минск: БГЭУ, 2017. – 271 с.

Additional

- 1.4. Компьютерные информационные технологии: практикум для студентов заочной формы обучения / М.Н. Садовская [и др.]. – Минск: БГЭУ, 2015. – 183 с.
- 1.5. Компьютерные информационные технологии: учебное пособие для студентов учреждений образования по экономическим специальностям. В 3 ч. Ч. 1: Программное обеспечение / [М. Н. Садовская и др.]. – Минск: БГЭУ, 2014. – 287 с. : ил.
- 1.6. Компьютерные информационные технологии: учебно-метод. пособие для иностр. студентов / М.Н. Садовская и [др.]. – Минск: БГЭУ, 2015. – 287 с.

Section 2. Database Technologies

Main

- 2.1. Голицына, О.Л. Базы данных: учебное пособие / О.Л. Голицына, Н.В. Максимов, И.И. Попов. – 4-е изд., перераб. и доп. – Москва: ФОРУМ: ИНФРА-М, 2020. – 400 с.
- 2.2. Оскерко, В.С. Базы данных и знаний: учебное пособие для студентов учреждений высшего образования по экономическим специальностям / В.С. Оскерко, Н.Н. Говядинова, З.В. Пунчик. – Минск: БГЭУ, 2020. – 250 с.
- 2.3. Шустова, Л.И. Базы данных: учебник / Л.И. Шустова, О.В. Тараканов. – Москва: ИНФРА-М, 2021. – 304 с.

Additional

- 2.4. Голицына, О.Л. Базы данных: учебное пособие / О.Л. Голицына, Н.В. Максимов, И.И. Попов. – 4-е изд., перераб. и доп. – Москва: ФОРУМ: ИНФРА-М, 2020. – 400 с. – (Среднее профессиональное образование). – ISBN 978-5-00091-601-8. – Текст: электронный. – URL: <https://znanium.com/catalog/product/1091314> (дата обращения: 13.01.2023). – Режим доступа: по подписке.
- 2.5. Оскерко, В. С. Технологии баз данных и знаний: учебное пособие для студентов высших учебных заведений по экономическим и гуманитарным специальностям / В.С. Оскерко, З.В. Пунчик. – Мн.: БГЭУ, 2015. – 215 с.

Section 3. Information Systems

Main

- 3.1. Акперов, И. Г. Информационные технологии в менеджменте: учебник / И. Г. Акперов, А. В. Сметанин, И. А. Коноплева. – Москва: ИНФРА-М, 2019. – 400 с.
- 3.2. Информационные системы в экономике: учебное пособие / М.Н. Садовская [и др.]; под общ. ред. М.Н. Садовской. – Минск: БГЭУ, 2018. – 316 с.
- 3.3. Федотова, Е.Л. Информационные технологии и системы: учебное пособие / Е. Л. Федотова. – Москва: ФОРУМ: ИНФРА-М, 2020. – 352 с.

Additional

- 3.4. Информационные системы и цифровые технологии. Часть 1: учебное пособие / В.В. Трофимов, М.И. Барабанова, В.И. Кияев, Е.В. Трофимова; под общ. ред. проф. В.В. Трофимова и В.И. Кияева. – Москва: ИНФРА-М, 2021. – 253 с. – (Высшее образование: Бакалавриат). – ISBN 978-5-16-109479-2. – Текст: электронный. – URL: <https://clck.ru/V5Epa> (дата обращения: 12.01.2023). – Режим доступа: по подписке.
- 3.5. Федотова, Е.Л. Информационные технологии и системы: учебное пособие / Е. Л. Федотова. – Москва: ФОРУМ: ИНФРА-М, 2020. – 352 с. – (Высшее образование). – ISBN 978-5-8199-0376-6. – Текст: электронный. – URL: <https://clck.ru/V5EXu> (дата обращения: 12.01.2023). – Режим доступа: по подписке.

Protocol for approval of the study programme

Name of the academic discipline requiring approval	Name of the department	Proposals for changes in the content of the study programme of a higher education institution in an academic discipline	The decision taken by the department that developed the study programme (indicating the date and protocol number)
Statistics	Department of Statistics	No comments or suggestions	