МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
ІМЕНІ СЕМЕНА КУЗНЕЦЯ

ЗАТВЕРДЖЕНО
на засіданні кафедри
інформаційних систем
Протокол № 1 від 22.08.2023 р.

ПОГОДЖЕНО
Проректор з навчально-методичної роботи
_____ Каріна НЕМАШКАЛО

ТЕХНОЛОГІЇ БАЗ ДАНИХ

робоча програма навчальної дисципліни (РПНД)

Галузь знань	**12 "Інформаційні технології"**
Спеціальність	**121 "Інженерія програмного забезпечення"**
Освітній рівень	**перший (бакалаврський)**
Освітня програма	**"Інженерія програмного забезпечення"**

Статус дисципліни	**вибіркова**
Мова викладання, навчання та оцінювання	**англійська**

Розробник:
к.е.н., доцент підписано КЕП Володимир БРЕДІХІН

Завідувач кафедри
інформаційних систем _____ Дмитро БОНДАРЕНКО

Гарант програми _____ Олег ФРОЛОВ

Харків
2024

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

APPROVED
at the meeting of the Information Systems Department
Protocol № 1 of 22.08.2023

AGREED
Vice-rector for educational and methodical work
_____Karina NEMASHKALO

DATABASE TECHNOLOGIES

Program of the course

Field of knowledge	**12 "Information technologies"**
Specialty	**121 "Software engineering"**
Study cycle	**first (bachelor)**
Study programme	**"Software engineering"**
Course status	**elective**
Language	**English**

Developers: PhD, Associate Professor	digital signature	Volodymyr BREDIKHIN
Head of Information Systems Department	_____	Dmytro BONDARENKO
Head of study programme	_____	Oleg FROLOV

Kharkiv
2024

INTRODUCTION

Modern economic conditions of business require from specialists, regardless of their specialization, the comprehensive use of the latest information technologies, computerized means of collecting, processing and providing the necessary information. The purpose of these technologies is to significantly increase the quality and efficiency of economic calculations, to try to make the process of justifying economic decisions much more efficient, etc. The course "Database Technologies" refers to elective disciplines and constitutes the foundation on which the design and direct creation of software products in business is based.

A characteristic feature of the vast majority of software products is the use of information stored in databases. Therefore, data access technologies have become an important part of application development and are an integral direction of training of modern specialists in the field of information technologies.

In order to acquire practical competencies in the course, students must work with Visual Studio.

The course "Database Technologies" is studied by students of the "Computer Science" specialty of all forms of education.

The purpose of the course "Database technologies" is the formation of students of a system of theoretical knowledge, applied skills and practical skills regarding the application of database technologies and the mastery of SQL and NoSQL technologies, the practical application of existing database management systems.

The objectives of the course are:

mastering the principles of construction, purpose, elements of various methodologies for database technology, etc.

The object of the course is learning the fundamental principles and practical skills of working with databases, including data modeling, SQL, administration and data security.

The subject of the course is the main approaches and methods of developing and implementing database technologies that provide solutions to problems indesign and implementation of business applications.

The learning outcomes and competencies formed by the course are defined in table 1.

Table 1

Learning outcomes and competencies formed by the course

Learning outcomes	Competences that must be mastered by a student of higher education
LO 10	GC05, SC01, SC07
LO 18	GC01, GC02, GC06

where, GC01. Ability to abstract thinking, analysis and synthesis
GC02.Ability to apply knowledge in practical situations.

GC05. Ability to learn and master modern knowledge.

GC06. Ability to search, process and analyze information from various sources.

SC01. Ability to identify, categorize and formulate software requirements.

SC07. Knowledge of data information models, ability to create software for data storage, extraction and processing.

LO10. Conduct a pre-design survey of the subject area, system analysis of the design object.

LO18. Know and be able to apply information technologies for data processing, storage and transmission.

COURSE CONTENT

Content module I. Classic data access tools

Topic 1. ADO.NET architecture. Basic concepts of database technologies.

1.1 Definition of ADO.NET

1.2 Local databases, distributed enterprise databases and XML repositories.

1.3 Organization of work in a connected environment.

Topic 2. Architectures of database systems.

2.1 Data abstraction levels.

2.2 Types of database architecture.

2.3 The main stages of the data processing process in a disconnected environment.

Topic 3. Relational data model.

3.1 Structure of relational data.

3.2 External keys.

3.3 Stored Procedures.

Content module II. Modern data access tools

Topic 4. Relational algebra.

4.1 Operations on sets.

4.2 Concepts of sampling and projection.

4.3 Operations of relational algebra.

Topic 5. LINQ to DataSet technology.

5.1 Types of LINQ technologies.

5.2 LINQ to Dataset technology and queries.

5.3 Use of lambda expressions in method syntax.

Topic 6. Implementation of access to data using transactions.

6.1 Properties of Transactions

6.2 Interaction of application programs with databases

6.3 Development of applications using distributed transactions.

Topic 7. Optimization of queries and reports.

7.1 Query parsing.

7.2 Report designer.

Topic 8. Prospects for the development of databases and technologies for accessing them.

8.1 Cloud technologies.

8.2 NoSQL databases.

The list of laboratory studies in the course is given in table 2.

Table 2

The list of laboratory studies

Name of the topic and/or task	Content
Topic 1. Task 1.	Development of programs for performing operations in a connected environment
Topic 2. Task 2.	Development of programs for performing operations in a disconnected environment
Topic 3. Task 3.	Development of applications based on the JDBC interface
Topic 4. Task 4.	Development of programs using typed data sets
Topic 5. Task 5.	Development of programs using LINQ to DataSet technology
Topic 6. Task 6.	Implementation of data access based on Code First technology
Topic 7. Task 7.	Development of data access programs using transactions and reports

The list of self-studies in the course is given in table 3.

Table 3

List of self-studies

Name of the topic and/or task	Content
Topic 1-8	Study of lecture material
Topic 1-7	Preparation for laboratory classes
Topic 1-8	Preparation for the exam

The number of hours of lectures, laboratory studies and hours of self-study is given in the technological card of the course.

TEACHING METHODS

In the process of teaching the course, in order to acquire certain learning outcomes, to activate the educational process, it is envisaged to use such teaching methods as:

Verbal (lecture (Topic 1, 2, 3, 5, 6, 7), discussion lecture (Topic 8), provocative lecture (Topic 4)).

In person (demonstration (Topic 1-8)).

Practical (laboratory work (Topic 1 - 7)).

FORMS AND METHODS OF ASSESSMENT

The University uses a 100-point cumulative system for assessing the learning outcomes of students.

Current control is carried out during lectures, laboratory classes and is aimed at checking the level of readiness of the student to perform a specific job and is evaluated by the amount of points scored:

– for courses with a form of semester control as an exam: maximum amount is 60 points; minimum amount required is 35 points.

The final control includes current control and an exam.

Semester control is carried out in the form of a semester exam.

The final grade in the course is determined:

– for disciplines with a form of exam, the final grade is the amount of all points received during the current control and the exam grade.

During the teaching of the course, the following control measures are used:

Current control: defense of laboratory work (maximum score – 28 points); group competency-based task (maximum score – 8 points); theoretical tests (maximum score – 10 points); practical control works (maximum score – 14 points).

Semester control: Exam.

More detailed information on the assessment system is provided in technological card of the course.

An example of an exam card and assessment criteria.

Example of an exam ticket

Simon Kuznets Kharkiv National University of Economics
First (bachelor's) study cycle
Specialty "Software engineering"
Study program "Software Engineering"
Semester V
Course " Database Technologies"

EXAM CARD

Task 1 (15 points).

1. Create entity classes of data models and access them on the basis
Code First technology.
Present class and context texts in Word.
2. Create and fill the database in the mdf file of the MS SQL Server DBMS
by means of Code First technology.
Present the following data in Word:
2.1. Screenshot of the database in the Server Explorer window.
2.2. Screenshots of the schemes of each table.
2.3. The text of the method for filling the database.

Task 2 (25 points).

1. Create a form to perform CRUD operations with any table
databases based on Code First technology.
Present the following data in Word:
1.1. The text of the form's load event handler method.
1.2. Screenshot of the form at the application execution stage.
Notes. 1. Tasks are performed in the Visual Studio environment.
Database: The information system for accounting for doctor's appointments contains the following tables:
Type of analysis (Code, Name, Lower value, Upper value).
Patient (Patient_code, Surname, Passport, Telephone).
Analysis (Code, Patient_code, Analysis_type_code, Date, Result).
Save the developed project (script) in a separate folder on your disk in
set format.

Protocol No. ____ dated "___"_____20___ was approved at the meeting of the Department of Information Systems

Examiner PhD, Associate Professor Bredikhin V.

Chief department PhD, Associate Professor Bondarenko D.

Assessment criteria

The exam ticket consists of a practical task to test knowledge of the basics of database technology related to the use of CRUD operations with any database table based on Code First technology.

The result is the solution of a stereotypical task using the specified technology in the Visual Studio environment.

The duration of the exam is 90 minutes.

The solution to the problem must contain program code; a screenshot with the code and test results of the program; database model; analysis of results; conclusions

The evaluation of the exam result is formed according to the following rule.

40 points - both tasks completed in full. Correct answers are received, there is an explanation for completing the task, conclusions are drawn. Formulated database model.

30 points - the task is completed in full. Correct answers were received, but explanations for the task and conclusions were not provided. Formulated database model.

20 points - one task completed in full. Correct answers are received, there is an explanation for completing the task, conclusions are drawn. Formulated database model.

10 points - the task is not fully completed, no results were obtained, no explanations were given for the completion of the task and no conclusions. The database model is not formulated.

0 points - task not completed. The database model is not formulated.

As a result of such calculation, the applicant may receive from 0 to 40 points for two tasks on the exam.

RECOMMENDED LITERATURE

Main

1. Лосєв М. Ю. Бази даних [Електронний ресурс] : навч.-практ. посіб. для самостійної роботи студ. / М. Ю. Лосєв, В. В. Федько ; Харківський національний економічний університет ім. С. Кузнеця. – Х. : ХНЕУ ім. С. Кузнеця, 2018. – 232 с. http://repository.hneu.edu.ua/handle/123456789/21468

2. Технології баз даних [Електронний ресурс] : лабораторний практикум / В. В. Федько. – Харків : ХНЕУ ім. С. Кузнеця, 2020. – 344 с. http://repository.hneu.edu.ua/handle/123456789/24099

Additional

3. Доценко С. І. Організація та системи керування базами даних: Навч. посібник. – Харків: УкрДУЗТ, 2023. – 117 с. http://repository.hneu.edu.ua/handle/123456789/21468

4. Берко А.Ю., Верес О.М., Пасічник В.В. Системи баз даних та знань, книга 2: системи управління базами даних та знань. Навчальний посібник (рек. МОН України), – К. : Вид. Магнолія, 2021, – с.584

5. Введення в сучасні бази даних: навч. посіб. / М.А. Демиденко; НТУ «Дніпровська політехніка». – Д. : 2020. – 38 с.

https://ir.nmu.org.ua/bitstream/handle/123456789/154887/MA%20Demidenko%20INTRODUCTION%20TO%20MODERN%20DATABASES.pdf?sequence=1&isAllowed=y

Information resources

6. Visual Studio Community 2022 https://apps.microsoft.com/detail/xpdcfjdklzjlp8?hl=uk-UA&gl=IN
7. NetBeans IDE 8.2 Download : https://netbeans.org/downloads/8.2.
8. PL/SQL developer https://www.allroundautomations.com/products /pl-sql-developer/?gad_source=1&gclid=CjwKCAjwte-vBhBFEiwAQSv_xcAtW7GVbqqD0rqPhCMIIdMJNy96i9yE8zslY_elK9xb8NDueU9XBxoC5_UQAvD_BwE
9. Entity Framework Documentation Інформаційні ресурси в Інтернеті. Available at: https://docs.microsoft.com/en-us/ef/index.
10. Entity Framework 6. https://learn.microsoft.com/uk-ua/ef/ef6/.