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INTERNATIONAL EUROPEAN UNIVERSITY

SYLLABUS

INTERNATIONAL EUROPEAN UNIVERSITY

EUROPEAN SCHOOL OF BUSINESS

Data and knowledge base organization

2023

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Course Name	Data and knowledge base organization
Lecturer (s)	Olena Kharkianen, associate professor at the Department of Information Technology, PhD in Technology, associate professor
Lecturer's profile	https://business.ieu.edu.ua/kafedry/kafedra-informatsiinykh-tekhnolohii#zzz-009
Consultations	
online consulting	–
offline consulting	Wednesday 4:10 p.m. – 5:30 p.m. https://meet.google.com/cwi-xwbn-cgo
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Discipline page	https://dist.ieu.edu.ua/course/index.php?categoryid=615

Form of final control	test	def. test	exam
	☐	☒	☒

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1 Brief discipline annotation

The Data and knowledge base organization academic discipline is aimed at training Bachelors of knowledge area: 12 Information technology, specialty: 121 Software engineering. It is one of the professional disciplines for future software developers.

2 Background for studying discipline

The discipline program is based on the knowledge obtained while studying the Methods and tools of computer information technology discipline.

3 Goal and objectives of the discipline

Subject matter of the Data and knowledge base organization academic discipline is to provide future Bachelors in Software Engineering with computer culture, theoretical knowledge and practical skills in basics of creation and functioning of relational databases, data storages, as well as intelligent systems based on knowledge base methodologies.

Objectives of the discipline:

- to explore technologies and methodologies of database operations, database modifications: creating, deleting, editing;
- to learn areas, methods and tools for designing, developing, integrating and applying software products, databases and data storages created using object-oriented programming languages, industrial client-server database management systems, as well as intelligent systems;
- to acquire skills in data manipulation and explore principles of creating SQL queries: sorting and grouping of results; maintenance of security measures.
- to develop the ability to actualize and control queries, use queries for data analysis;
- to be able to make managerial decisions based on the information analysis in databases and data storages, predict the situation, keep data security and integrity.

4 Learning outcomes

After learning the discipline, students should

know:

- the structure of major databases;
- database management systems.

be able to:

- apply acquired skills in presenting internal and external information of complex economic-organizational and production systems;
- use methods and tools for designing different types of databases, knowledge-based software and intelligent systems to solve specialized tasks.

5 ECTS credits

8 ECTS credits / 240 academic hours

6 Course Content

Topics	Type of classes/hours		
	Lectures	Laboratory work	Independent work
Content section 1. Basic concepts of database systems	10	20	45
Topic 1.1. Concept of data and knowledge bases.			
Topic 1.2. Data model concept.			
Topic 1.3. Relational algebra and relational calculus.			
Topic 1.4. Semantic modeling.			
Topic 1.5. SQL.			
Content section 2. Intelligent systems	6	12	27
Topic 2.1. Cutting-edge DBMS.			
Topic 2.2. The concept of building data stores and data mining.			
Topic 2.3. Knowledge bases and knowledge engineering.			
Content section 3. Integrated database management system environment	8	16	54
Topic 3.1. MS SQL Server components. Administration. Physical and logical database architecture and its objects.			
Topic 3.2. Transact SQL - programming language in MS SQL Server environment.			
Topic 3.3. SQL queries for data definition and processing.			
Topic 3.4. Creation of a database and development of a user application.			
Topic 3.5. Course design.			
Content section 4. Additional issues of database management systems	6	12	18
Topic 4.1. Special database objects (triggers, views and storage procedures).			
Topic 4.2. Supporting data integrity in DBMS.			
Topic 4.3. Non-relational (non-SQL) DBMS.			

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7 List of obligatory tasks

1. Development of data tables of the selected subject area
2. Relationship normalization
3. PowerDesigner, BPWin and ERWin CASE technologies, their purpose and functions. Construction of ER diagrams in the selected software tool
4. Building queries in SQL structured query language. Modification of SQL queries in the Access environment.
5. Introduction to the Ms. SQL Server DBMS. Converting the database into the SQL Server format.
6. Introduction to the MySQL DBMS. Exporting tables
7. Data Mining intelligent data analysis
8. Creating a knowledge base in the interactive environment of the CLIPS expert shell.
9. DBMS technology: design and development of a relational database of the selected subject area.
10. Development of relational database protection methods: password setting, system and object authorization, access rights setting, database backup.
11. Writing single-line, multi-line, multi-column subqueries and embedded views.
12. Transactions
13. Creating views, triggers, indexes, and storage procedures
14. Loading and unloading a database. Replication
15. Technologies of database access Web-applications development
16. Creating and using a non-SQL database (in Redis environment)

8 List of selective tasks

1. Data flows. Big data. Information economy as a field of application of database technologies.
2. Characteristics of algorithms, problems arising in data modeling.
3. Secrecy, data integrity protection, synchronization, failure protection and recovery. Comparative characteristics of local and distributed databases, as well as file-server and client-server data management technologies
4. Define and characterize the following concepts: entity, attribute, relationships, entity types, hierarchy, succession mimic, keys, tables and views. Describe the technology (sequence of steps and tools) of linking process and data model.
5. Data management in databases. Security management in DBMS
6. SQL wildcards and regular expressions (LIKE)
7. Possibilities of the Select operator where the value of its parameters are defined in dialog and automatic modes.
8. Requirements for selection requests in a common combination request
9. DBMS background (DBWO, LGWR, SCRT, SMON, PMON) and server (dedicated and shared) processes.
10. Storage virtualization. Differences between data storages and accounting systems.
11. Objectives of data mining
12. Blockchain technology: design and application.

9 Discipline features

Period of teaching	Semester	International disciplinary integration	Year of study	Courses: general training/ professional training/elective
2 semesters	3,4	available	2	Professional training

10 Hardware and software

Personal computer, Windows and Linux OS, office software packages, GlobalLogic platform for developing embedded systems.

11 Assessment system and requirements

As part of discipline teaching, one carries out the current and final control of students' knowledge. The final grade is given according to the total rating of students.
The results of the current control of students' knowledge is assessed in general between 0 and 60 scores.
Students are admitted to the final control if they fulfil the requirements of the training program and obtain at least 36 scores for the current learning activity.
Final assessment of students' knowledge is conducted in the form of exam.
The maximum amount of scores that can be obtained during the exam is 40 scores.
The overall score of the discipline is 100. The total grade for the discipline is given according to the national and European scale.

12 Discipline policy

Teaching of the discipline is based on cutting-edge educational technologies aimed at increasing the level of students' interest in the course, providing theoretical and practical knowledge of the discipline.
To activate the learning and cognitive activity of students, the discipline includes the consolidation of knowledge obtained at the lecture and acquisition of practical skills in lecture topics during laboratory classes.

13 Absence policy

Scores are not given for missed lectures. If students miss a laboratory work, they should perform all tasks of the missed laboratory work before the next laboratory work and present the results to the lecturer.
Students who have missed classes without valid reasons and have not participated in current control activities are not admitted to the final semester control. In this case, a mark 'non-admission' is put in the exam record on the day of the exam.
Repeated taking of the exam of the discipline is appointed in case of accomplishing all types of educational, individual work stipulated by the working program of the academic discipline and is carried out according to the approved schedule of academic failure liquidation.

14 Policy of late task performance

Tasks and laboratory works submitted later are assessed with a lower grade. The grade is reduced by one point for each week of lateness.

15 Academic integrity policy

Participants in the educational process rely on the academic integrity principles. One should provide references to sources of information when using someone else's ideas, statements, data, as well as verified information.

16 Recommended sources of information

Primary:

Primary:

1. Gunderloy M., Automating Microsoft Access with VBA = Mike Gunderloy, Susan Sales Harkins; Automating Microsoft Access with VBA / Translated from English by S.A. Khramov. M, SpB, K: Williams, 2006. 416 p.
2. Date C. Introduction to Database Systems. Translated from English. 6th edition. Kyiv: Williams, 1999. 848 p.
3. Ensor Dave. Ian Stevenson. Oracle Design: Translated from English. K.: BHV Publishing Group, 2000. – 560 p.
4. Makarova M.V., Karnaukhova H.V., Zapara S.V. Informatics and computer technology: study guide / edited by M.V. Makarova. 3rd edition, revised and supplemented. Sumy: University book, 2008. 665 p.
5. Pasichnyk V.V., Shakhovska N.B. Data storages: study guide / edited by V.V. Pasichnyk. Lviv: Magnolia 2006, 2008. 492 p.
6. Rudenko V.D. Databases in information systems: study guide / edited by V.Y. Bykov. K.: Phoenix, 2010. 240 p.
7. Hernandez M.D., J.L. Viescas. SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL: Translated from English. – M.: Lori, 2003. – 458 p.
8. Huzhva V.M. Information systems and technologies at enterprises: study guide. K. : KNEU, 2001. 400 p.
9. Kauchmen Jason S., Mariseti Sudhir N. OSA Oracl 9x Associate DBA. Database administrator training: Translated from English. M.: Lori, 2006.
680 p.
10. Luger George F. Artificial Intelligence: Strategies and Methods for Solving Complex Problems: Translated from English. M.: Williams, 2003. 864 p.
13. Falovskyi O. O., Nesterenko O. V. Basics of database design and using: Tutorial. Section I. Kyiv: Tropea. 2023. 83 p.

Internet resources

1. Additional materials and software tools for developing intelligent systems. - Available at: http://www.pearsoneduc/ com/computing
2. Software system design methods. - Available at: http://www.sdm.viptop.ru/articles/booch/'
3. MySQL DBMS. - Available at: www.mysql.com
4. PostgreSQL DBMS. - Available at: www.postgresql.org

17 Tips on successful study during the course

Note: examine lecture materials and perform tasks and laboratory works synchronously with the curriculum. Thus, your abilities and insistence will be the key to success!