

Faculty: FACULTY OF TELECOMMUNICATIONS AND MANAGEMENT
Department: INFORMATION TECHNOLOGIES
Professional Field: 5.3. COMMUNICATION AND COMPUTER TECHNOLOGY
Specialty: CYBER SECURITY OF COMMUNICATION TECHNOLOGIES
Educational-qualification degree: BACHELOR

LEARNING COURSE DESCRIPTION

- 1. Course title:** Database Management Systems
- 2. Course code:** B.43.021.1
- 3. Type of the course:** compulsory
- 4. Level:** Bachelor
- 5. Year of study:** second
- 6. Semester:** third (equalizing)
- 7. Number of credits:** 6
- 8. Name of the lecturer:** Assistant Prof. PhD Vladimir Denchev
- 9. Course learning outcomes:**

The aim of the course "Database Management Systems" is to give students a systematic knowledge of the study and practical mastery of methods for creating databases (DB) and the general principles of their operation, theoretical and applied issues of modern database management systems (DBMS). The course is practically oriented and introduces students to modern databases, logical and physical organization of data, different models of data presentation, methods of access and information retrieval in databases, the correspondence between the logical structure and the physical organization of the database and SQL data management language.

10. Teaching methods:

The way of teaching is in a lecture and practical exercises, using multimedia.

11. Prerequisites:

Students should have an in-depth knowledge of database systems and operational systems.

12. Course contents:

Introduction to database management systems. Objectives of database systems; Data View; Database Languages; Relational databases; Database design; Object-based and semi-structured databases; Data and request storage; Transaction management; Database architecture; Users and administrators; General structure; Historical overview of database systems.

Data models: Hierarchical, Network, Relational, Entity relationship, Object oriented. Basic building blocks in data modeling; Business rules and how they affect database design; Development of basic data models; Classification of data models by level of abstraction

Types of database management systems DBMS: Based on the used data model: Traditional: relational, network, hierarchical; emerging: object-oriented, object-relational. Other classifications: Single-user and multi-user. Centralized and distributed

Database system architectures: Centralized and client-server systems; Server system architectures; Parallel systems; Distributed systems; Network types.

Transactions. Transaction concept; Transaction status; Simultaneous execution; execution of parts; ability to recover; execution of isolation; definition of the transaction in SQL

Simple SQL Expressions Basic SELECT statement, Select all or specific columns, Operator priority, Null concept, Alias, Concatenation. Duplicate rows, Restrict rows, Where clause, Comparison operators, Operators Between, IN, Like, AND, OR, NOT, ORDER BY, Operator priority

SQL functions: Single line functions, text functions, numeric functions (Round, Trunc, MOD), Date processing functions, SYSDATE, Date arithmetic. Convert functions, Use the TO_CHAR function with dates and numbers, Use the TO_NUMBER and TO_DATE functions, General functions - NVL, NVL2, NULLIF, CASE conditional expressions, DECODE

Aggregation functions Grouping and aggregation in SQL, Aggregation operators, GROUP BY function, HAVING clause

JOIN - Display data from multiple tables, JOIN types, normal JOIN, USING, ON clauses, Apply additional conditions to JOIN, SELFJOIN, NONEQUIJOINS, internal and external JOIN. LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN, Cartesian Product.

DML - data processing language: Operations Insert, Update, Delete, Truncate.

Database transactions: Concept of Start and End, Commit, Rollback

Database Objects: Table, Table Creation Expressions, Naming Rules, Data Types, Constraint Concept - NOT NULL, Primary Key, Foreign Key, Unique Key, ALTER TABLE Expression, Delete Table, VIEW, Index, SYNONYM, SEQUENCE

13. Bibliography

Basic literature:

1. Carlos Coronel, Steven Morris, Database Systems: Design, Implementation, & Management, ISBN 978-1-305-86679-9, Cengage Learning, 2017
2. Chopra Rajiv, Database Management System (DBMS): A Practical Approach, 5th Edition, ISBN: 978-8121932455, S.Chand, 2016
3. Радослава Христова, Димитър Димитров, Ръководство по бази от данни, ISBN 9789540738840, УИ "Св. Климент Охридски", 2015
4. Джоан Ламбърт, Джойс Кокс, Microsoft Access 2013. Step by Step, ISBN: 9789546563019, AlexSoft, 2015

Юлиана Пенева, Принципи на базите от данни, ISBN: 9789545359996, Нов български университет, 2017

Additional literature:

1. Радева, С. Информационни технологии и бази от данни. ВУ КТП, София, 2011.
 2. Радева, С. Бази от данни. ВУ КТП, София, 2011.
 3. Ramez Elmasri, Shamkant Navathe, Fundamentals of Database Systems (4th Edition), ISBN 10: 0321122267 ISBN 13: 9780321122261, Addison Wesley, 2003
 4. Lynn Beighley, Head First SQL: Your Brain on SQL -- A Learner's Guide, ISBN-10: 0596526849, ISBN-13: 978-0596526849, O'Reilly Media; 1 edition (September 1, 2007)
 5. Ернандес, М. Проектиране на бази от данни, ISBN 954-685-301-1, Софтпрес, 2004
 6. Database Management System (DBMS), <https://www.geeksforgeeks.org/dbms/>
 7. Цветанка Георгиева-Трифенова, Практикум по бази от данни - I част, ISBN: 978-954-524-834-4, Университетско издателство "Св. св. Кирил и Методий", 2012
 8. Денис Колисниченко, PHP 7 & MySQL - практическо програмиране, ISBN: 9786197356328, Асеновци, 2018
 9. Гордън Ръсел, Андрю Къминг, SQL Хакове: Съвети и инструменти за изследване на вашите данни, ISBN: 9789549341225, ЗеСТ Прес, 2008
 10. Michael McLaughlin, DBMS Tutorial, https://w_Oracle Database 12c PL/SQL Programming 1st Edition, ISBN-10: 0071812431, ISBN-13: 978-007181243, McGraw-Hill Education; 1 edition (February 14, 2014)
 11. www.w3schools.in/dbms/
 12. MySQL Administration, <http://www.mysqltutorial.org/mysql-administration.aspx>
- MySQL Tutorial, <https://www.tutorialspoint.com/mysql/index.htm>

14. Assessment methods and criteria:

The SQL course ends with an exam. The individual work and teamwork of students during lectures and exercises are taken into account. The exam takes the form of a test.

The grade in the course is formed on the basis of a point system and the maximum number of points that students can receive is 100. They are formed by the following activities:

- First test during the semester - 20 points;
- Second test during the semester - 20 points;
- Participation in practical exercises - 20 points;
- Final test on the exam date - 40 points.

Tests can include open and closed questions.

4.5.2. Formation of the final assessment

The formation of an assessment in the training course at each of the indicated stages, according to the received points and their arrangement according to the six-point system is given in Table 1.

Table 1.

Number of points	Assessment According to the 6-point Scale System
0 – 20	Fail 2 (F)
20 – 39	Fail 2 (FX)
40 – 49	Satisfactory 3.00 (E)
50 – 59	Satisfactory 3.00 (D)
60 – 69	Good 4.00 (C)
70 – 84	Very good 5.00 (B)
85 – 100	Excellent 6.00 (A)

15. Language of instruction: *Bulgarian/English*