DATABASES 1

ACADEMIC YEAR 2024-2025

Degree	Bachelor of Science in Computer Science			
Qualification	Computer Science			
Professor	PhD Kristina Sargsyan PhD Artur Lalayan			
Distribution of hours	CM 18 h.	TD 12 h.	TPS 60 h.	ECTS 3

EXPECTED LEARNING OUTCOMES OF THE COURSE		
B-Skills	A1 - General	A 1.1 Have in-depth knowledge of analytical and numerical methods and be able to apply it to solving problems arising in computational sciences.
	A2 - Professional	A 2.1 Formulate and critically assess problems and sub-tasks including conduct of appropriate research, identification of sources and investigative techniques.
B-Skills	B1 - Implement knowledge	B 1.1 Think critically and creatively, conceptualizing real-world problems from different perspectives. B 1.2 Work productively in diverse teams and solve problems collaboratively.
	B2 - Communicate, use ICT tools & resources	B 2.1. Properly document and synthesize existing data, keep current with developments, conduct independent research, and discover and learn new material intrepidly.
	B3 – General (transversal)	B 3.1. Produce and deliver written and oral presentations, and communicate with specialists and non-specialists using appropriate media and technology.

KNOWLEDGE / SKILLS ASSESSMENT & EVALUATION		
Ongoing evaluation tasks (max 1/3 of grade for the total course)	Midterm exam (max 1/3 of grade for the total course)	Final exam
Assessment : Oral ☐ Written ☒	Assessment : Oral ☐ Written ☐	Assessment : Oral ☐ Written ☒
Duration : XXX h. Criteria :	Group base: Yes ☐ No ☐	Group base: Yes ☐ No ☒
Course project : Yes ☐ No ☒ Presentation : Yes ☐ No ☒	Duration : XXX h.	Duration : 2 h.
Tasks type & Weight : 25% of the total mark. Practical Work and Individual Assignments.	Exam type : XXXXXX	Exam type : 75% of the total mark. Semestral Exam (written) / Assignment /Assignment concerning Theoretical and Practical Parts

TEACHING METHODS & TOOLS

Lectures - designed to teach theoretical basics, writing, synthesizing and presenting work publicly and pedagogically (mathematics, computer science).
Tutorials – designed to use mathematical, computer and communication tools to teach and illustrate computer and mathematical concepts.
Case studies – designed as practical examples where theoretical concepts are applied.
Individual work - designed in the format of home assignment.

KNOWLEDGE & SKILLS PREREQUISITS

No prior coding skills are needed. The willingness to learn about Databases, Data Modeling & Database Design will suffice.

COURSE DESCRIPTION /SYLLABUS / RESOURCES

The course covers standard database design and management techniques applicable to any type of database featuring clear examples using both Microsoft Access and Oracle database management systems. It helps to understand various database models and discover the ways of implementing logical design using normalization, transform the logical design into a physical database, and handle data and process modeling. This course familiarizes the student with techniques necessary to properly create and normalize a relational database, as well as use Structured Query Language (SQL) to create and access database objects.

TOPIC	HOURS	CORE RESOURCES [1]	ADDITIONAL RESOURCES
1. Database Fundamentals 1.1. Properties of a Database 1.2. Prevalent Database Models 1.3. History of Databases	3	A.J. Oppel, pages 3-24	
2. Relational Database Components 2.1. Conceptual Database Design Components 2.2. Logical/Physical 2.3. Database Design Components	3	A.J. Oppel, pages 3-24	
3. Database Life Cycles 3.1. Traditional Life Cycle 3.2. Nontraditional Life Cycles	1.5	A.J. Oppel, pages 171-184	

[1] *For each topic max 20 -25 page of reading*

4. Database Design Using Normalization 4.1. The Need for Normalization 4.2. Applying the Normalization Process 4.3. Denormalization	3	A.J. Oppel, pages 189-219	
5. Data and Process Modeling 5.1. Entity Relationship Modeling 5.2. Process Models 5.3. Relating Entities and Processes	1.5	A.J. Oppel, pages 221-246	
6. Database Implementation 6.1. Physical Database Design 6.2. Introduction to SQL 6.3. Deployment Models	12hTP	A.J. Oppel, pages 117-165, 253-274, 282-285	
7. Introduction to Knowledge Bases 7.1. Overview of KB Technologies 7.2. Case Studies	6	IBM Watson, Google Knowledge Graph, Expert Systems	

STRUCTURE OF THE COURSE & ADDITIONAL INFORMATION REGARDING THE COURSE PREPARATION

CORE REFERENCES

1. A.J. Oppel. Databases: A Beginner's Guide. US: McGraw-Hill Osborne Media, 2009.

ADDITIONAL REFERENCES

1. R. Elmasri, S. Navathe. Fundamentals of Database Systems. Pearson, 7th edition, 2015.

WEB RESOURCES

1. http://infolab.stanford.edu/~ullman/dscb.html
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall-2010/