

COURSE OUTLINE

1. Study programme information

1.1 Higher education institution	Universitatea de Vest din Timișoara
1.2 Faculty / Department	Chimie, Biologie, Geografie / Departamentul de Geografie
1.3 Sub-department	Geografie
1.4 Field of study	Geography
1.5 Level of study	Master's degree
1.6 Study programme / Qualification	Geographic Information Systems

2. Course information

2.1 Course title			Introduction to databases				
2.2 Course convend	or/ Lec	turer	Drd. Ing. Ion- Alexandru Meca				
2.3 Teaching assista	ant		Drd. Ing. Ion- Alexandru Meca				
2.4 Year of study	Ι	2.5 Semester	1 2.6 Type of assessment E 2.7 Course type DS/I				DS/DO

3. Total estimated time (hours of didactic activities per semester)

6

3.1 Number of hours per week	3	of which: 3.2 lecture	1	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	42	of which: 3.5 lecture	14	3.6 seminar/laboratory	28
Time distribution:					
Studying textbooks, course materials, b	ibliogr	aphy and notes			35
Further research in libraries, on electronic platforms and in the field 35					
Preparing seminars/ laboratories, homework, research papers, portfolios and essays 2					20
Tutoring 9					
Examinations 9					
Other activities					
3.7 Total hours of individual study	108				
3.8 Total hours per semester	150				

3.9 Number of credits

4. Prerequisites (if applicable)				
4.1 based on curriculum	Programming Languages			
4.2 based on competencies	Proficiency in English, Analytical mindset, Ability to decompose			
	complex problems into sub-problems			

5. Conditions (if applicable)

5.1 for the course	• Room equipped with beamer and whiteboard				
5.2 for the seminar/laboratory	• Room equipped with computers running PostgreSQL Developer tool and available connectivity to an PostgreSQL Database server including PostGIS				

6. Objectives of the discipline - expected learning outcomes to the formation of which contribute to the completion and promotion of the discipline



	• Good understanding of relational database approach;
Knowledges	• Good knowledge of techniques and methodologies specific to relational database design
	 Basic understanding of Spatial database systems
	• Basic understanding of Spatial datastores.
	 Knowledge in relational database design and efficient implementation
	• Argue about advantages and shortcomings of different model used in modern database
	management systems
	• Ability to approach a problem using a relational database approach
	• Ability to manage relational data (query, insert, update, delete) using SQL language
01.11	• Ability to handle security issues for relational database management systems (users, roles, permissions)
SKIIIS	• Ability to analyse, design and implement simple and moderate complexity use cases using computer-based models (database approach)
	• Ability to express high-level, human specific questions into machine-specific languages
	• Use SQL language to represent end-users queries against relational databases
	• Development of a critical and analytical spirit among students; appreciating the advantages
	of using algorithmic thinking
	• The ability to solve specific tasks autonomously
Responsibility and autonomy	• The application of effective and responsible work strategies, based on the principles, norms and values of the code of professional ethics
	• Application of effective work techniques in a multidisciplinary team, ethical attitude, respect for diversity and multiculturalism, acceptance of diversity of opinion
	• Self-assessment of the need for continuous professional training for the purpose of insertion and adaptability to the requirements of the labor market

7. Content

7.1 Lecture	Teaching methods	Observations
C1. Basic concepts of database approach.	Lecture, Interactive	Lecture notes:
Roles. Components of database system	presentations,	Thomas Connolly and Carolyn Begg,
(1h)	heuristic	Database Systems - A Practical Approach to
	conversation,	Design, Implementation, and Management
	problematization	(4th edition)
		– Chapter 1
C2. The database environment (1h)		Lecture notes :
		Thomas Connolly and Carolyn Begg,
		Database Systems - A Practical Approach to
		Design, Implementation, and Management
		(4th edition)
		– Chapter 2
C3. Conceptual, logical and		Lecture notes:
physical design of databases (1h)		Thomas Connolly and Carolyn Begg,
		Database Systems – A Practical Approach to
		Design, Implementation, and Management
		(4th edition)
		– Chapter 11/12
C4. The relational model. Basic		Lecture notes:
concepts. Relational integrity (1h)		Thomas Connolly and Carolyn Begg,
		Database Systems - A Practical Approach to
		Design, Implementation, and Management
		(4th edition)

Adresă poștală: Bd. Vasile Pârvan nr. 4, cod poștal 300223, Timișoara, jud. Timiș, România Număr de telefon: +40-(0)256-592.300 (310) Adresă de e-mail: <u>secretariat@e-uvt.ro</u> Website: <u>www.uvt.ro</u>



	– Chapter 3
C5. The relational model. Relational	Lecture notes:
algebra. Codd rules. SQL as an	Thomas Connolly and Carolyn Begg,
implementation of relational model (1h)	Database Systems - A Practical Approach
	to Design. Implementation. and
	Management (Ath edition)
	Charter 4
	– Chapter 4
C6. Normalization process. Functional	Lecture notes:
dependencies. Normal forms INF, 2NF,	Thomas Connolly and Carolyn Begg,
3NF (1n)	Database Systems - A Practical Approach to
	Design, implementation, and Management
	(4th edition)
	- Chapter 13
C7. Normalization process. Normal forms	Lecture notes:
BCNF, 4NF and 5NF. Multi-valued	Thomas Connolly and Carolyn Begg,
dependencies (In)	Database Systems - A Practical Approach to
	Design, Implementation, and Management
	(4th edition) Chapter 14
CO Indense Data Utilization	
US. Indexes. Role. Utilization.	Themes Connelly and Corelyn Baga
	Thomas Colliony and Carolyn Begg,
	Database Systems - A Practical Approach
	to Design, Implementation, and
	Management (4th edition)
	– Chapter 17, Annex C5
C9. Concurrency in relational database	Lecture notes:
systems. Anomalies. Transactions.	Thomas Connolly and Carolyn Begg,
Isolation levels. (1h)	Database
	Systems - A Practical Approach to Design,
	Implementation, and Management (4th
	edition
	- Chapter 6.5 and 20
C10. Triggers and views (1h)	Lecture notes:
	Thomas Connolly and Carolyn Begg,
	Database Systems - A Practical Approach to
	Design, Implementation, and Management
	(4th edition)
	- Chapter 8.2.7, 0.4, 3.4
C11. A practical use-case to illustrate the	Lecture notes:
database modelling process (1h)	Thomas Connolly and Carolyn Begg,
	Database Systems - A Practical Approach to
	Design, implementation, and Management
	(4111 Cuttion)
C12 Introduction to Spatial Database	- Chapters 15, 10, 17
Spatial Data Types Spatial Database.	DestCIS tytemial 1
System (1h)	
C13 Geometry functions (1h)	Lecture notes:
	PostGIS tutorial 2
C14 Spatial Data Types and	
1014. Spanal Data Types and	Lecture:



Metadata (1h)		PostGIS tutorial 3				
Bibliography						
• Thomas Connolly and Carolyn Begg, Da	• Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation,					
and Management (4th edition), Addison	and Management (4th edition), Addison-Wesley, 2004					
Jeffrey Ullman, Jennifer Widom, A First	Course in Database Sy	vstems (3rd edition), Prentice Hall, 2007				
7.2 Seminar / laboratory	Teaching methods	Observations				
L1-L5 (10h) Query relational database	Hands-on	Running SQL queries using PostgreSQL &				
using SQL SELECT	exercises, case	PG Admin against a pre-built database				
L6-L7. (4h) Data definition using SQL	studies, explanation	Changes applied on existing relational				
CREATE, DROP	and demonstration.	database				
L8 (2h) Knowledge evaluation		Practical / written test to assess the				
		intermediary level				
L9-L10 (4h) Update relational database		Running SQL commands using PG Admin				
records using SQL INSERT, UPDATE,		tool against a pre-built database				
DELETE						
L11-L12 (4h) Enabling spatial database						
extensions with PostGIS						
L13-L14. (4h) Managing spatial data in						
PostgreSQL and PostGIS						
Bibliography						
•						

8. Corroborating course content with the expectations held by the representatives of the epistemic community, professional associations and typical employers in the field of the study programme

The content of the discipline was developed in accordance with the curriculum and meets the didactic and scientific requirements corresponding to similar specializations in other universities. The relational database approach is the prevalent, de-facto approach used to implement complex systems across multiple businesses, such as financial, commercial, industrial, or online commerce. The local, national and international workforce market is continuously looking for highly skilled personnel to develop, administer or configure relational, and spatial, database management systems.

7. Assessi						
Type of	9.1 Assessment criteria	9.2 Assessment methods	9.3 Weight in			
activity			the final mark			
9.4 Lecture	 Good understanding of relational database approach; Relational database design and efficient implementation Basic understanding of Spatial databases Design of simple systems using relational database approach; Argue about advantages and shortcomings of different spatial database approaches 	Written test at exam	50%			
9.5 Seminar / laboratory	 Design of simple systems using relational database approach; Use SQL language to represent end-user queries against relational databases 	Practical / written test during semester	25%			

9. Assessment

Adresă poștală: Bd. Vasile Pârvan nr. 4, cod poștal 300223, Timișoara, jud. Timiș, România Număr de telefon: +40-(0)256-592.300 (310) Adresă de e-mail: <u>secretariat@e-uvt.ro</u> Website: www.uvt.ro



			2.5.4			
	• Design of simple systems using	Practical / written test at the	25%			
	relational database approach;	end / exam				
	•Use SQL language to represent end-					
	user queries against relational					
	databases;					
9.6 Minimum pe	rformance standard	·				
Minimal know	wledge for passing this subject:					
 Good knowled 	ge of basic concepts of relational databases					
• Design a simpl	le problem using a relational database					
• Identify function	onal dependencies and use them to normalize	the database design to 3NF				
• Given a simple	e relational database design, implement it in a	RDBMS using SQL commands				
• Ability to write simple SOL queries to retrieve data from 2 joined tables						
· · · · · · · · · · · · · · · · · · ·						
The final grade is computed as a weighted average of grades obtained for components described in 10.4 and						
10.5. The exam	10.5. The exam is passed if each individual grade obtained at components 10.4 and 10.5 (i.e. both lecture and lab					
evaluations) are greater or equal to 5. This rule is enforcing for all exam periods. The student need to re-take						
only the failed component (course or lab grade, respectively), unless the student wishes to re-take both						
evaluations.						
Final remark:						
• All students all welcome to tutoring meetings as scheduled by the department.						

• All lectures and seminars are going to be kept in modular approach in last weekend of each month

Date

Course convenor's signature

11.09.2023

Drd. Ing. Ion- Alexandru Meca

Date of approval in the department

Head of department's signature