SYLLABUS

1. Information on the study programme

1.1. Higher Education Institution	West University of Timisoara
1.2. Faculty	Chemistry, Biology and Geography
1.3. Department	Geography
1.4. Study program field	Geography
1.5. Study cycle	Graduate
1.6. Study programme	

2. Information on the course

2.1. Title of the course			Databases				
2.2. Lecture instructor			Lect. Dr. Daniel Pop				
2.3. Seminar / laboratory instructor			Lect. Dr. Daniel Pop				
2.4. Study year	1	2.5. Semester	1	2.6. Examination type	E	2.7. Course type	DI

3. Estimated study time (number of hours per semester)

3.1. Attendance hours per week	4	out of which 3.2 lecture	2	3.3. seminar/laboratory	2
3.4. Attendance hours per semester	56	out of which: 3.5 lecture	28	3.6. seminar/laboratory	28

Distribution of the allocated amount of time *	**hours**
Study of literature, course handbook and personal notes	20
Supplementary documentation at library or using electronic repositories	15
Preparing for laboratories, homework, reports etc.	25
Exams	6
Tutoring	8

3.7. Total number of hours of individual study	74
3.8. Total number of hours per semester	130
3.9. Number of credits (ECTS)	6

4. Prerequisites (if it is the case)

4.1. curriculum	Programming Languages
4.2. competences	Proficiency in English, Analytical mindset, Ability to decompose complex problems into sub-problems

5. Requirements (if it is the case)

5.1. for the lecture	Room equipped with beamer and whiteboard
	Room equipped with computers running Oracle SQL Developer tool and available connectivity to an Oracle Database server (Academic licence provided) , including Oracle Spatial

6. Specific acquired competences

Professional competences	• Ability to approach a problem using a relational database approach • Good knowledge of techniques and methodologies specific to relational database design • Basic understanding of Spatial database systems • Ability to manage relational data (query, insert, update, delete) using SQL language • Ability to handle security issues for relational database management systems (users, roles, permissions)
Transversal competences	• 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

7. Objectives of the course

7.1. General objective	Understand and apply the relational database approach to design and implement systems and use cases from real-life
7.2. Specific objectives	*Knowledge wise objectives (KO)*: (1) Good understanding of relational database approach; (2) Relational database design and efficient implementation (3) Basic understanding of Spatial datastores. *Ability wise objectives (AO)*: (1) Design of simple systems using relational database approach; (2) Use SQL language to represent end-users queries against relational databases. *Skills wise objectives (SO)*: (1) Argue about advantages and shortcomings of different model used in modern database management systems

8. Content *

8.1. Lecture	Teaching methods	Remarks, details
C1. Basic concepts of database approach. Roles. Components of database system (2h)	Lecture, discussion, active student participation	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 1
C2. The database environment (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 2
C3. Conceptual, logical and	Idem	Lecture notes http://web.info.uvt.ro/~danielpop

physical design of databases (2h)		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 concepts. Relational integrity (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 3
C5. The relational model. Relational algebra. Codd rules. SQL as an implementaiton of relational model (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 4
C6. Normalization process. Functional dependencies. Normal forms 1NF, 2NF, 3NF (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 13
C7. Normalization process. Normal forms BCNF, 4NF and 5NF. Multi-valued dependencies (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 14
C8. Indexes. Role. Utilization. Implementation (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 17, Annex C5
C9. Concurrency in relational database systems. Annomalies. Transactions. Isolation levels. (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database

		Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 6.5 and 20
C10. Triggers and views (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapter 8.2.7, 6.4, 3.4
C11. A practical use-case to illustrate the database modelling process (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition) – Chapters 15, 16, 17
C12. Introduction to Spatial Database. Spatial Data Types. Spatial Reference System. (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Oracle Spatial and Graph Developer's Guide. Chapter 1
C13. Geometry and geography functions (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Oracle Spatial and Graph Developer's Guide. Chapter 1
C14. Spatial Data Types and Metadata (2h)	Idem	Lecture notes http://web.info.uvt.ro/~danielpop Oracle Spatial and Graph Developer's Guide. Chapter 2

Recommended bibliography / Bibliografie

[1] Thomas Connolly and Carolyn Begg, Database Systems - A Practical Approach to Design, Implementation, and Management (4th edition), Addison-Wesley, 2004
[2] Jeffrey Ullman,Jennifer Widom, A First Course in Database Systems (3rd edition), Prentice Hall, 2007
[3] Oracle Spatial and Graph Developer's Guide https://docs.oracle.com/database/121/SPATL/toc.htm (2017)

8.2. Seminar, laboratory	Teaching methods	Remarks, details
L1-L5 (10h) Query relational database using SQL SELECT	Active participation, Discussion, Self-conducted practical work	Running SQL queries using Oracle SQL Developer tool against a pre-built database
L6-L7. (4h) Data definition using SQL CREATE, DROP	Idem	Changes applied to an existing relational database

L8 (2h) Knowledge evaluation	Asses practical abilities in using SQL SELECT, CREATE and DROP commands	Practical / written test to assess the intermediary level
L9-L10 (4h) Update relational database records using SQL INSERT, UPDATE, DELETE	Idem	Running SQL commands using Oracle SQL Developer tool against a pre-built database
L11-L12 (4h) Enabling spatial database extensions with Oracle Spatial	Active participation, Discussion, Self-conducted practical work	
L13-L14. (4h) Managing spatial data in Oracle Spatial	Active participation, Discussion, Self-conducted practical work	
Recommended bibliography		

9. Correlations between the content of the course and the requirements of the professional field and relevant employers

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.

10. Evaluation *

Activity	10.1. Assessment criteria**	10.2. Assessment methods***	10.3. Weight in the final mark
10.4. Lecture / Curs	• Good understanding of relational database approach; (KO1) • Relational database design and efficient implementation (KO2) • Basic understanding of Spatial databases • Design of simple systems using relational database approach; (AO1) • Argue about advantages and shortcomings of different spatial database approaches (SO1)	Written test at exam	50%
10.5. Seminar/ lab	• Design of simple systems using relational database approach; (AO1) • Use SQL language to represent end-user queries against relational databases (AO2)	Practical / written test during semester	25%
	• Design of simple systems using relational database approach;	Practical / written test at the end / exam	25%

	(AO1) • Use SQL language to represent end-user queries against relational databases (AO2)		

10.6. Minimal knowledge for passing

Minimal knowledge for passing this subject:

- Good knowledge of basic concepts of relational databases
- Design a simple problem using a relational database
- Identify functional dependencies and use them to normalize the database design to 3NF
- Given a simple relational database design, implement it in a RDBMS using SQL commands
- Ability to write simple SQL 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 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.

Date	Signature (lecture instructor)	Signature (seminar instructor)
11/12/2017	Lect. Dr. Daniel Pop	Lect. Dr. Daniel Pop

Signature (director of the department)