COURSE DESCRIPTION – ACADEMIC YEAR 2018/2019

Course title	**Temporal and Spatial Databases**
Course code	72099
Scientific sector	INF/01
Degree	Master in Computer Science (LM-18)
Semester	1
Year	2
Credits	8
Modular	No

Total lecturing hours	48
Total lab hours	24
Total exercise hours	--
Attendance	Not compulsory
Prerequisites	Students should be familiar with basic concepts in databases (including relational databases, SQL, and relational algebra) and algorithms. This material is taught in the following courses: Database Systems, and Data Structures and Algorithms.
Course page	https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "caratterizzanti – discipline informatiche". Understanding of the basics of temporal and spatial database systems.

Lecturer	Vincenzo Del Fatto and Anton Dignös
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Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	Arrange beforehand by email.
Lecturing Assistant (if any)	--
Contact TA	--
Office hours TA	--
Syllabus	• Spatial Reference Systems and Geographic Data Format: Raster Data, Vector Data • Modelling Spatial Concepts in Spatial Databases • Spatial indexes • Spatial Analysis • Requirements and motivation for temporal databases • Time domain, granularity, calendars • Abstract and concrete temporal data models • Temporal operators and extensions of SQL
Teaching format	Frontal lectures and labs (exercises). The labs will allow students to get practical experience and apply the concepts learned during the lectures.

Learning outcomes	Knowledge and understanding: • Know in detail the principles of temporal and spatial database systems and methods for designing and developing temporal and spatial databases. Applying knowledge and understanding: • Be able to identify new application requirements and business opportunities in the field of systems based on data and knowledge. Making judgments • Be able to identify reasonable work goals and estimate the resources required to achieve the objectives. Communication skills • Be able to structure and prepare scientific and technical documentation describing project activities. Learning skills • Be able, in the context of a problem-solving activity, to extend even incomplete knowledge taking into account the objective of the project.

Assessment	The assessment of the course consists of two parts: • a single written exam at the end that covers the entire course (50% of the mark); • lab assignments which are done during the semester and requires students to solve concrete problems by using methods and technologies taught in the course (50% of the mark). The written exam consists of a set of open questions and multiple-choice questions, and verifies knowledge and understanding of the methods and techniques learned during the course. The lab assignments verify whether the student is able to apply the techniques taught in the course to solve concrete problems.
Assessment language	English
Assessment typology	Monocratic
Evaluation criteria and criteria for awarding marks	A positive overall mark for the assignments is a pre-requisite to be admitted to the written exam; there are no other pre-requisites. Both parts (the written exam and the assignments) must be positive to pass the exam. The final grade is the average of the assignment mark (50%) and the mark of the written exam (50%). Criteria for the evaluation of the assignments and written exam: correctness of the solution and presentation of the solution.

Required readings	Online lecture notes
Supplementary readings	• C. Bettini, S. Jajodia, X. S. Wang. Time Granularities in Databases. Data Mining, and Temporal Reasoning, chap. 2, Springer-Verlag, July 2000. • C. S. Jensen, M. D. Soo, and R. T. Snodgrass. Unification of Temporal Data Models. ICDE 2003, pp. 262-271, 1993.

	• M. H. Böhlen, C. S. Jensen. Temporal Data Model and Query Language Concepts. Encyclopedia of Information Systems, Volume 4, Elsevier Science, 2003. • D. Gao, C. S. Jensen, R. T. Snodgrass, and M. D. Soo. Join operations in temporal databases. VLDB Journal, 14:2–29, 2005. • B. Moon, I. F. Vega Lopez, and V. Immanuel. Efficient algorithms for large-scale temporal aggregation. IEEE Transactions on Knowledge and Data Engineering, vol. 15, no. 3, 2004. • Philippe Rigaux, Michel Scholl, Agnès Voisard: Spatial databases - with applications to GIS. Elsevier 2002.
Software used	PostgreSQL with PostGIS, QGIS, PostgreSQL client (psql or pgAdmin) and/or C compiler.