COURSE DESCRIPTION – ACADEMIC YEAR 2017/2018

Course title	**Advanced Database Management Technologies**
Course code	72108
Scientific sector	INF/01
Degree	Master in Computer Science (LM-18)
Semester	1
Year	1
Credits	8
Modular	No

Total lecturing hours	48
Total lab hours	--
Total exercise hours	24
Attendance	Not compulsory
Prerequisites	Students should be familiar with basic concepts in databases (including relational databases, SQL, and relational algebra) and algorithms, as well as having good programming skills.
Course page	https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "caratterizzanti – discipline informatiche" in the curriculum "Data and Knowledge Engineering". The course aims at teaching both scientific foundations and practical aspects of advanced data management technologies that go beyond traditional (relational) database management systems. The students will learn the basic concepts of such systems and how to use them to solve concrete problems. Moreover, students will be trained to evaluate the advantages and disadvantages of such technologies in different application contexts.

Lecturer	Johann Gamper, https://www.unibz.it/en/faculties/computer-science/academic-staff/person/748-johann-gamper
Contact	Piazza Domenicani 3, Room 2.15, gamper@inf.unibz.it, 0471-016140
Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	During the lecture time span: Monday, 13:00-15:00, or email arrangement.
Lecturing Assistant (if any)	Anton Dignös
Contact LA	Piazza Domenicani 3, Room 2.20, dignoes@inf.unibz.it, 0471-016142
Office hours LA	Email arrangement
List of topics	• Data Warehousing and Business Intelligence • OLAP • Extract, Transform, Load • NoSQL • Main-memory Databases • Column-oriented Databases • Distributed Databases • Distributed Data Structures

Teaching format	Frontal lectures and project work during the exercise hours. In the frontal lectures, the basic concepts are introduced and explained together with some examples. In the labs, the students will do a semester project, where selected techniques have to be applied to solve concrete problems.

Learning outcomes	Knowledge and understanding: • Know the most advanced management and optimization techniques of large quantities of structured data. Applying knowledge and understanding: • Be able to design and create databases for critical applications. • Be able to design and execute experimental analyses on information systems or their components. Making judgments • Be able to plan a technical project activity and to meet defined deadlines and objectives. • Be able to independently select the documentation required to keep abreast of the frequent technological innovations. Communication skills • Be able to structure and prepare scientific and technical documentation describing project activities. Learning skills • Be able to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation.

Assessment	The assessment of the course consists of two parts: • a single written exam at the end that covers the entire course material (60% of the mark); • a project which is done during the semester and requires students to solve a concrete problem by using methods and technologies taught in the course (40% of the mark). The written exam is a multiple-choice test and verifies knowledge and understanding of the advanced data management methods and techniques learned during the course. The project verifies whether the student is able to apply advanced data management techniques to solve concrete problems. The project is assessed through a final presentation, demo and project report.
Assessment language	English
Evaluation criteria and criteria for awarding marks	A positive project mark is a pre-requisite to be admitted to the written exam; there are no other pre-requisites. Both parts (the written exam and the project) must be positive to pass the exam. The final exam grade is the weighted average of the project mark (40%) and the mark of the written exam (60%).

	Criteria for the evaluation of the project: correctness of the solution, complexity of the project, technologies used in the solution, quality of the report and the presentation. Criteria for the evaluation of the written exam: correctness.

Required readings	There is no single textbook that covers the entire course. The course material is collected from various textbooks and research papers, including the following ones: • M. Golfarelli, S. Rizzi. Data Warehouse Design: Modern Principles and Methodologies. McGraw-Hill, 2009. • R. Kimball, M. Ross. The Data Warehouse Toolkit, 2nd edition, John Wiley & Sons. • Tom White. Hadoop: The Definitive Guide, 3rd edition, O'Really.
Supplementary readings	Additional sources will be announced during the course.
Software used	Oracle database, Postgres database, Hadoop MapReduce framework