# COURSE DESCRIPTION – ACADEMIC YEAR 2016/2017

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Advanced Database Management Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course code</strong></td>
<td>72108</td>
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<tr>
<td><strong>Scientific sector</strong></td>
<td>INF/01</td>
</tr>
<tr>
<td><strong>Degree</strong></td>
<td>Master in Computer Science (LM-18)</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Modular</strong></td>
<td>No</td>
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| **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/](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  
**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:
- theory (60%): assessed with a single written exam at the end;
- project (40%): assessed through a presentation, demo and final report about the project.

The written part verifies knowledge and understanding of the advanced data management techniques learned during the course.

The project verifies whether the student is able to apply advanced data management techniques to solve concrete problems.

### Assessment language

English

### Evaluation criteria and criteria for awarding marks

Both parts (theory and project) must be positive to pass the exam.

A positive project is a pre-requisite to do the written exam.

The final grade is the weighted average of the project grade (40%) and the written exam (60%). Both parts must be positive.

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

<table>
<thead>
<tr>
<th>Supplementary readings</th>
<th>Additional sources will be announced during the course.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software used</td>
<td>Oracle database, Postgres database, Hadoop MapReduce framework</td>
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