# COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

<table>
<thead>
<tr>
<th>Course title</th>
<th>Data Management Technologies</th>
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<tbody>
<tr>
<td>Course code</td>
<td>73057</td>
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<tr>
<td>Scientific sector</td>
<td>INF/01</td>
</tr>
<tr>
<td>Degree</td>
<td>Master in Computing for Data Science (LM-18)</td>
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<tr>
<td>Semester</td>
<td>1</td>
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<tr>
<td>Year</td>
<td>1</td>
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<tr>
<td>Credits</td>
<td>6</td>
</tr>
<tr>
<td>Modular</td>
<td>No</td>
</tr>
<tr>
<td>Total lecturing hours</td>
<td>40</td>
</tr>
<tr>
<td>Total lab hours</td>
<td>20</td>
</tr>
<tr>
<td>Attendance</td>
<td>Generally, attendance is not compulsory, but non-attending students have to contact the lecturer at the start of the course to agree on the modalities of the independent study.</td>
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<tr>
<td>Prerequisites</td>
<td></td>
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<tr>
<td>Course page</td>
<td><a href="https://ole.unibz.it/">https://ole.unibz.it/</a></td>
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### Specific educational objectives

The course belongs to the type "caratterizzanti – discipline informatiche". 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: Anton Dignös  
Contact: Piazza Domenicani 3, Room 2.19, anton.dignoes@unibz.it  
Scientific sector of lecturer: INF/01  
Teaching language: English  
Office hours: During the lecture time span: will be arranged with the teacher the first week of lecture.  
Lecturing Assistant (if any): --  
Contact LA: --  
Office hours LA: --

### List of topics

- Business intelligence, from data to information
- Data integration, multidimensional model, OLAP
- Data Warehouse technology and ETL (Extract, Transform, Load)
- NoSQL database systems
- Main memory database systems
- MapReduce and Apache Spark

### 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:
- D1.1 - Knowledge of the key concepts and technologies of
data science disciplines
- D1.4 - Sound basic knowledge of storing, querying and
managing large amounts of data and the associated
languages, tools and systems

#### Applying knowledge and understanding:
- D2.1 - Practical application and evaluation of tools and
techniques in the field of data science

#### Making judgments
- D3.2 - Ability to autonomously select the documentation (in
the form of books, web, magazines, etc.) needed to keep up
to date in a given sector.

#### Communication skills
- D4.1 - Ability to use English at an advanced level with
particular reference to disciplinary terminology.
- D4.3 - Ability to structure and draft scientific and technical
documentation

#### Learning skills
- D5.1 - Ability to autonomously extend the knowledge
acquired during the study course.

### 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.

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 exam modalities are the same for attending and non-attending
students.

### Assessment language

English
### Assessment Typology
- Monocratic

### Evaluation criteria and criteria for awarding marks
- 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
- Lecture notes

### Supplementary 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 (available as print and/or online versions through the unibz library):

Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it

Additional sources will be announced during the course.

### Software used
- PgAdmin4, PostgreSQL, Hadoop MapReduce framework, Spark.