# Syllabus

## Course description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Advanced Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code</td>
<td>27084</td>
</tr>
<tr>
<td>Scientific sector</td>
<td>ING-INF/05</td>
</tr>
<tr>
<td>Degree</td>
<td>Master in Entrepreneurship and Innovation</td>
</tr>
<tr>
<td>Semester and academic year</td>
<td>1st semester 2018-2019</td>
</tr>
<tr>
<td>Year</td>
<td>1</td>
</tr>
<tr>
<td>Credits</td>
<td>6</td>
</tr>
<tr>
<td>Modular</td>
<td>No</td>
</tr>
</tbody>
</table>

| Total lecturing hours | 36                              |
| Total lab hours       | 0                               |
| Total exercise hours  | 0                               |

### Attendance

- strongly suggested, but not required; for non-attending students additional study material which covers the entire course is available

### Prerequisites

- English understanding and reading at level B2.
- A basic course in computer science covering basic Microsoft Windows, file handling, basic Internet usage, Excel or a similar data organization program at good level.

### Course page

- [www.paolocoletti.it/advanceddataanalysis](http://www.paolocoletti.it/advanceddataanalysis)

### Specific educational objectives

The course is designed to acquire further computer skills, providing knowledge and experience with automatic tools and techniques to organize and analyse data.

### Lecturer

- Paolo Coletti
- Office E 203
- Paolo.Coletti@unibz.it
- tel. 0471 013497
- [www.paolocoletti.it](http://www.paolocoletti.it)

### Scientific sector of the lecturer

- ING-INF/05

### Teaching language

- English

### Office hours

#### Lecturing assistant

- none

#### Teaching assistant

- none

#### Office hours

- 18

### List of topics covered

- Relational databases.
- Microsoft Access: relations, queries, summary queries, modification queries, left and right joins.
- Bitcoin, blockchain technology and ICO.
- R statistical package basic data organization, descriptive statistics, data analysis with R, graphs.

### Teaching format

Frontal lectures in standard classroom with examples and exercises. Students use their own notebook and/or repeat
the lesson at home through provided videos. Optional home exercises, to be repeated in class in front of the colleagues. Optional group homework.

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Entrepreneurship:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge and understanding</td>
</tr>
<tr>
<td></td>
<td>• knowledge of automatic tools to collect, organise and analyse quantitative data</td>
</tr>
<tr>
<td></td>
<td>• relational database structures</td>
</tr>
<tr>
<td></td>
<td>• a database management system</td>
</tr>
<tr>
<td></td>
<td>• data organization</td>
</tr>
<tr>
<td></td>
<td>• statistical data analysis</td>
</tr>
</tbody>
</table>

Applying knowledge and understanding
• experience with tools and techniques to collect, organise and analyse quantitative data in different formats
• queries and modification to data in a database
• efficient interaction with databases
• efficient and clean graphical representation of data
• modifying data through a statistical program
• representing and summarizing data through a statistical program.

Making judgments
• deciding which tool or technique to choose when dealing with a data organization problem
• observing and evaluating graphical and statistical representation without being misled

Communication skills
• building efficient and straightforward graphical representations
• building statistics to support communications with objective data

Learning skills
• using online help system to further expand programs usage

Innovation:

Knowledge and understanding
• knowledge of tools to collect and organize new data
• structure of relational databases
• most common errors and omissions in advanced graphical representations
• import and handling of data in a statistical package
• blockchain technology.

Applying knowledge and understanding
experience with automatic tools and techniques to extract data from sources
• summary queries to an online database with the creation of virtual fields
• organising data in a relational database
• representing data using advanced online graphical tools
• handle and modify quantitative data
• finding statistical relations in data

Making judgments
• deciding the difficulty level in retrieving data for analysis

Learning skills
• finding suitable statistical tests to analyse data.

Assessment
1. Written assessment to test abilities to understand a data organizational problem and build and describe an appropriate relational database.
2. Practical assessment to test data extraction and handling ability on an Access database.
   As alternative to points 1 and 2, group homework to test database design and data extraction capabilities using either Access or MySQL.
3. Practical assessment to test knowledge of R and statistical tools. As alternative, if the number of students allows it, regular attendance, homework and class presentations.
4. Written test on blockchain technology.

Assessment language
English

Evaluation criteria and criteria for awarding marks
Grade is the weighted average of assessment 1 (23%), assessment 2 (23%), assessment 3 (48%) and assessment 4 (6%). File handling and severe basic computer errors count negatively on the final grade.
Particular emphasis is given to solutions which are optimal, efficient and extensible.
Active participation in class counts positively towards the final grade.

Required readings
• Databases course book, book available on www.paolo.coletti.it/advanceddataanalysis
• Videos on databases, Access, bitcoin and blockchain, and on statistics with R, available on www.paolo.coletti.it/advanceddataanalysis
• Data analysis course book, book available on www.paolo.coletti.it/advanceddataanalysis

Supplementary readings
• Infographics course book, book available on www.paolo.coletti.it/advanceddataanalysis
• Allen G. Taylor, Database Development For Dummies,
For Dummies, 2000, ISBN 978 0764507526
- Sams Teach Yourself Microsoft Office Access 2003 in 24 Hours, Alison Balter, ISBN 0-6723-2545-4