## Syllabus

### Course description

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course code</strong></td>
<td>43078</td>
</tr>
<tr>
<td><strong>Scientific sector</strong></td>
<td>SECS-S/02</td>
</tr>
<tr>
<td><strong>Degree</strong></td>
<td>Bachelor in Industrial and Mechanical Engineering</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>I</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>(optional)</td>
</tr>
<tr>
<td><strong>Academic year</strong></td>
<td>2021/2022</td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Modular</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Total lecturing hours</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Total lab hours</strong></td>
<td>12</td>
</tr>
<tr>
<td><strong>Total exercise hours</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Attendance</strong></td>
<td>Not required, but strongly suggested</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Basic Math at a Bachelor course level</td>
</tr>
<tr>
<td><strong>Course page</strong></td>
<td>See ole.unibz.it</td>
</tr>
</tbody>
</table>

### Specific educational objectives

Applied Statistics: The course is designed for acquiring professional skills and knowledge. The students will be able to:
- analyze their own data statistically and to present them graphically
- judge critically scientific results and conclusions
- use specific functions of the statistical software package R
- apply methods of inferential statistics

### Lecturers

Fabiola Del Greco M.

### Scientific sector of the lecturer

SECS-S/02

### Teaching language

English

### Office hours

See Timetable on unibz web page

### Teaching assistant (if any)

See Timetable on unibz web page

### List of topics covered (Applied Statistics)

1. Introduction to descriptive statistics and probability
2. Random variables discrete and continuous
3. Confidence intervals
4. Hypothesis testing
5. Correlation and linear regression

### Teaching format (Applied Statistics)

Frontal lectures, exercises on the PC with R

### Learning outcomes

**Knowledge and understanding**

Knowledge of the most important statistical tests, understanding their rationale, conditions of usage and
their results.

**Applying knowledge and understanding**
Identification of appropriate statistical method for data analysis; independent application of tests using software package R.

**Making judgements**
Critical reviewing of own scientific work and of original publications; interpretation of statistical analyses in the context of environmental sciences.

**Communication skills**
Ability to present results of statistical analyses correctly and intelligibly at the level of scientific publications.

**Learning skills**
Ability to recognize situations in which statistical analysis is necessary. Ability to judge the appropriateness of statistical methods, even if not explicitly treated in this course.

**Assessment**
Written exam and Project work. The length of the written exam will be 90 minutes. This will include 8/10 questions (that is exercises and theory questions) which will allow to reach a maximum of 30 points. The student will be allowed to consult only a sheet of formulas and use a calculator to perform simple calculations. The ability to accurately trace the solution will be more important than the final calculation result. The programming language R will not be concretely examined. However, the student may be asked to correctly interpret numerical and graphical outputs generated using R. The Project work will consist of a small individual applied project with real data to describe and analysis, that should be presented with 4 slides (1. Data and scientific hypothesis to be analyzed; 2. Method used; 3. Results; 4. Conclusions).

**Assessment language**
English

**Evaluation criteria and criteria for awarding marks**
The written exam will be the 80% of the final grade; the Project work will be the 20% of it. The written exam will be pass if the student reach at least 18 points over 30. In the Project work, the ability to identify a scientific hypothesis and the appropriate statistical method, and the ability to synthesize and present data and results, will be evaluated.

**Required readings**
Teacher’s slides in the electronic reserve collection.

Heumann, Christian/ Schomaker, Michael/ Srivastava,
Supplementary readings

James, Witten, Hastie, Tibshirani. An Introduction to Statistical Learning with Applications in R, Springer 2013, freely available at http://www-bcf.usc.edu/~gareth/ISL/index.html