<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>Empirical Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE CODE</td>
<td>75012</td>
</tr>
<tr>
<td>SCIENTIFIC SECTOR</td>
<td>SECS-S/01</td>
</tr>
<tr>
<td>DEGREE</td>
<td>Bachelor in Computer Science and Engineering</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>2nd Semester</td>
</tr>
<tr>
<td>YEAR</td>
<td>2nd year</td>
</tr>
<tr>
<td>CREDITS</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL LECTURING HOURS</td>
<td>36</td>
</tr>
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<td>TOTAL LAB HOURS</td>
<td>18</td>
</tr>
<tr>
<td>PREREQUISITES</td>
<td>Discrete Mathematics and Logics, Analysis</td>
</tr>
<tr>
<td>COURSE PAGE</td>
<td><a href="https://ole.unibz.it/">https://ole.unibz.it/</a></td>
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</tbody>
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**Specific Educational Objectives**
- Type of course: “affini o integrativi” for L-31 and L-08
- Scientific area: “formazione affine” for L-31 and for L-8

The course offers an overview of the theory of probability in connection to its use in computer science and the use of statistics in assessing empirical data.

**LECTURER**
Omar Lakkis

**SCIENTIFIC SECTOR OF THE LECTURER**
MAT-05

**TEACHING LANGUAGE**
English

**OFFICE HOURS**
office: POS 3.09, email: omar.lakkis@unibz.it, phone: +39 0471 016186

**TEACHING ASSISTANT**
Alisa Kovtunova: Alisa.Kovtunova@unibz.it

**OFFICE HOURS**
Tuesdays, 14:30-16:00; office POS 2.02, Faculty of Computer Science, Piazza Domenicani 3
# List of Topics Covered

- Introduction to probability
- Descriptive statistics – exploratory data analysis
- Parametric Inference – testing for normality
- Nonparametric Inference – bootstrap, nonparametric test
- Hypothesis Testing
- Linear regression

## Teaching Format
Direct lecture room contact, with use of visual aids such as chalk board and computer projected slides.

## Learning Outcomes

### Knowledge and understanding
- Language of probability and probabilistic modelling
- Theoretical and practical, including computational, methods of parametric, linear and non-parametric statistics

### Applying knowledge and understanding
- Understanding and ability to use Monte Carlo methods for computer simulation (using “R”) and quantification of uncertainty
- Understanding and ability to use standard statistical methods, regression, linear models, other parametric models and non-parametric models in practical situations (based on the computing language “R”)

### Making judgments
- Ability to discern between various probability models and capability to find appropriate model for a given application
- Interpretation of statistics and ability to analyse statistical data

### Communication skills
- Written communication of arguments involving randomness and uncertainty to experts and non-experts
- Ability to transfer knowledge from mathematical probability and statistics to the computer science and wider audiences

### Learning skills
- Ability to read and interpret current literature using probabilistic and statistical language
- Ability to acquire further theoretical knowledge and develop new computational techniques involving probability or statistics

## Assessment

- Final Exam

## Assessment Language

- English

## Evaluation Criteria and Criteria for Awarding Marks

- Relevant for assessment 1: clarity of answers, mastery of language (also with respect to teaching language), ability to summarize, evaluate, and establish relationships between topics; critical interpretation of results and connection to applications

## Required Readings

3. W. N. Venables, D. M. Smith, and the R Core Team. An Introduction to...
<table>
<thead>
<tr>
<th>SOFTWARE USED</th>
<th><code>R cs-tech@inf.unibz.it</code></th>
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<tbody>
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<td>SUPPLEMENTARY READINGS</td>
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