

## COURSE DESCRIPTION – ACADEMIC YEAR 2024/2025

<b>Course title</b>	<b>Statistics</b>
<b>Course code</b>	43078
<b>Scientific sector</b>	SECS-S/02
<b>Degree</b>	Bachelor in Industrial and Mechanical Engineering
<b>Semester</b>	1
<b>Year</b>	(optional)
<b>Credits</b>	3
<b>Modular</b>	No
<b>Total lecturing hours</b>	18
<b>Total lab hours</b>	12
<b>Attendance</b>	Not required, but strongly suggested
<b>Prerequisites</b>	Basic Math at a Bachelor course level
<b>Course page</b>	Microsoft Teams and <a href="https://ole.unibz.it/">https://ole.unibz.it/</a>
<b>Specific educational objectives</b>	<p>The course is designed for acquiring practical skills and knowledge. The students will be able to:</p> <ul style="list-style-type: none"> <li>• analyze their own data statistically and to present them graphically</li> <li>• judge critically scientific results and conclusions</li> <li>• use specific functions of the statistical software package R</li> </ul> <p>apply methods of inferential statistics</p>
<b>Lecturer</b>	Fabiola Del Greco M.
<b>Contact</b>	fabiola.delgreco@unibz.it
<b>Scientific sector of lecturer</b>	
<b>Teaching language</b>	English
<b>Office hours</b>	<i>Arrange beforehand by email.</i>
<b>Lecturing Assistant (if any)</b>	
<b>Contact LA</b>	
<b>Office hours LA</b>	
<b>List of topics</b>	<ol style="list-style-type: none"> <li>1.Introduction to descriptive statistics and probability</li> <li>2.Random variables discrete and continuous</li> <li>3.Confidence intervals</li> <li>4.Hypothesis testing</li> <li>5.Correlation and linear</li> </ol>
<b>Teaching format</b>	Frontal lectures, exercises on the PC with R
<b>Learning outcomes</b>	<p><b>Knowledge and understanding</b></p> <p>Knowledge of the most important statistical tests, understanding their rationale, conditions of usage and their results.</p>

	<p><b>Applying knowledge and understanding</b>          Identification of appropriate statistical method for data analysis; independent application of tests using software package R.</p> <p><b>Making judgements</b>          Critical reviewing of own scientific work and of original publications; interpretation of statistical analyses in the context of environmental sciences.</p> <p><b>Communication skills</b>          Ability to present results of statistical analyses correctly and intelligibly at the level of scientific publications.</p> <p><b>Learning skills</b>          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.</p>
<p><b>Assessment</b></p>	<p>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 an individual work (exceptions for 2 students will be evaluated) with an applied work to be presented with 4 slides (1. Data and scientific hypothesis to be analyzed; 2. Method used; 3. Results; 4. Conclusions).</p>
<p><b>Assessment language</b></p>	<p>English</p>
<p><b>Assessment Typology</b></p>	<p>Monocratic</p>
<p><b>Evaluation criteria and criteria for awarding marks</b></p>	<p>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. Maximum 3 points more will be added to the mark of the written exam.</p>
<p><b>Required readings</b></p>	<p>Teacher's slides in OLE.</p>

	Heumann, Christian/ Schomaker, Michael/ Srivastava, Shalabh. Introduction to Statistics and Data Analysis: With Exercises, Solutions and Applications in R, Part I (2016). Web. ISBN 3-319-46162-1, Springer International
<b>Supplementary readings</b>	James, Witten, Hastie, Tibshirani. An Introduction to Statistical Learning with Applications in R, Springer 2013, freely available at <a href="http://www-bcf.usc.edu/~gareth/ISL/index.html">http://www-bcf.usc.edu/~gareth/ISL/index.html</a>
<b>Software used</b>	<i>R or Rstudio</i>