Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Applied Statistics
Course code	47053 A
Scientific sector	SECS-S/02
Degree	Environmental Management of Mountain Areas
Semester	I
Year	I
Academic year	2023/2024
Credits	3
Modular	yes

Total lecturing hours	20
Total lab hours	
Total exercise hours	10
Attendance	Not required, but strongly suggested
Prerequisites	Basic statistics at a Bachelor course level
Course page	https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/master-environmental-management-mountain-areas/course-offering/

Specific educational objectives	The module aims to develop specific skills in applied statistics research through a mix of lectures, computer classes and team assignments where each topic is addressed in methodology and application. The intention is to provide a description of a number of different methods, tools and examples of how they may be applied to ecological, engineering and socio-economic mountain landscape management issues for the collection and analysis of data. More specific education objectives include: - Ability to manage, analyze and interpret data and to present them graphically; - Learn specialised statistical software and functions to perform data analysis; - Ability to apply theoretical and empirical models to a real-world context; - Ability to interpret the results of environmental analysis and draw appropriate conclusions.

Lecturer	Dr. Andrea Menapace, UNIBZ-C 5.01, andrea.menapace@unibz.it
Scientific sector of the lecturer	ICAR/01
Teaching language	English

Office hours	See Timetable on unibz web page
Teaching assistant (if any)	-
Office hours	Appointment by email
List of topics covered	Introduction to descriptive statistics; Distributions; Correlation; Probability and random variables discrete and continuous; Return period; Statistical interference; Confidence intervals; Hypothesis testing; Simple and multiple linear regressions
Teaching format	Lectures, practical labs, group projects, face-to-face coaching and mentoring.

Learning outcomes	**Knowledge and understanding** Knowledge of linear regression analysis, the most important statistical tests and confidence intervals understanding their rationale, conditions of usage and their results. Understanding of the concept of return time for natural events, e.g. precipitation, landslides or river discharge flows. **Applying knowledge and understanding** Use of descriptive statistics for data investigation; identification of appropriate statistical method for data analysis; independent application of tests; perform statistical study with software Python/R. **Making judgements** Critical reviewing of own scientific work, interpretation of statistical analyses in the context of environmental sciences. **Communication skills** Ability to present the results of statistical analyses in a correct and comprehensible manner, together with the ability to discuss and argue their theses. **Learning skills** Ability to recognise situations where statistical analysis is required. Ability to judge the appropriateness of statistical methods, even if not explicitly covered in this course.

Assessment	Written exam and assignment Assignment carried out in groups (2-3 persons) and presented in the form of an oral presentation (20 minutes). Written exam includes questions and exercises to test the knowledge of theory and application skills (1 hour exam).
Assessment language	English
Evaluation criteria and	Final mark is a sum of marks from the group assignment

criteria for awarding marks	and a written exam. Specifically, the written exam and the assignment will both be worth 50% of the final grade. Student will analyse environmental in mountain context problems in both academic and practical contexts, displaying effective quantitative problem-solving skills. With a clarity of answers and mastery of research method, ability to collect and process the data, make critical comparisons and judgements, summarize, establish and measure the relationships within the project. An assignment also test student's ability to work in a team, creativity, IT and communication skills, critical thinking, cooperation and demonstrate individual's reflection and judgement. The final grade for the entire course "Applied statistics and computer programming for environmental modelling" will be calculated as the average of the final grades obtained in this module and the one of Computer Programming.

Required readings	Teacher's slides and Python/R scripts in the electronic reserve collection. David S. Moore, George P. McCabe and Bruce A. Craig - Introduction to the practice of Statistics. ISBN 978-1-319-38366-4, Macmillan Learning.
Supplementary readings	Christian Heumann and Michael Schomaker Shalabh - Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R. ISBN 978-3-319-46160-1, Springer.