



Programme of Module "Statistics Lab"

<ul style="list-style-type: none"> • Code: DT0366 • Type of course unit: Compulsory (Master Degree in Applied Data Science curriculum Data for Smart City), Compulsory (Master Degree in Applied Data Science curriculum Data for Life Science) • Level of course unit: Postgraduate Degrees • Semester: 1 		
Number of ects credits: (Master Degree in Applied Data Science) 6 (workload 150 hours)		
Teachers: Fabio Antonelli (fabio.antonelli@univaq.it)		
1	Course objectives	The students, by attending this course, should acquire a basic knowledge in statistics, to be able to understand the basic theoretical tools in data management. Moreover, they should be able to solve simple theoretical statistical problems, involving the use of probability and statistics. They should also be able to tackle real simple statistical problems and employ the correct theoretical and software tools to solve them. Finally, the students should acquire sufficient skills to proceed towards a more advanced course in statistics, econometrics or in statistical learning.
2	Course content and learning outcomes (dublin descriptors)	<p>Topics of the module include:</p> <ul style="list-style-type: none"> • Using Statistics to summarize data sets: representation of datasets, sample mean, variance, median, covariance and correlation. • Review of fundamentals of probability: combinatorics, uniform probability spaces, independence and conditioning, main discrete and continuous random variables, marginal and joint distributions, Mean, variance, moments, covariance and correlation index. The Gaussian densities, the Law of Large Numbers, the Central Limit Theorem. • Distribution of sampling statistics, estimators, confidence intervals. • Linear regression: univariate and multivariate. • Principal component analysis • RE software to calculate statistics figures <p>On successful completion of this module, the student should :</p> <ul style="list-style-type: none"> • Have acquired a basic knowledge of the main tools in statistical analysis. • Have a theoretical familiarity with multivariate analysis. • Be able to understand and employ the basic techniques to manage data sets. • Have acquired a basic knowledge of a statistical software such as R. • Be able to proceed towards a more advanced course in statistics, econometrics and statistical learning.
3	Course prerequisites	It is required a basic knowledge in • Basic Mathematics • Linear Algebra • Calculus Also, a basic knowledge of Probability is strongly advised.
4	Teaching methods and language	<p>Lectures and recitation classes with the use of statistical software.</p> <p>Language: English</p> <p>Reference textbooks</p> <ul style="list-style-type: none"> • R. A. Johnson, D.W: Wichern , <i>Applied Multivariate Statistical Analysis (6th Edition)</i>. Pearson. • S. M. Ross, <i>Introductory Statistics</i>. Academic Press.
5	Assessment methods	Written exam, with possible development of a small project with the aid of a statistical software.