SYLLABUS
COURSE DESCRIPTION

COURSE TITLE	**Probability Theory and Statistics**
COURSE CODE	76210
SCIENTIFIC SECTOR	MAT/06
DEGREE	Bachelor in Computer Science
SEMESTER	1st
YEAR	2nd
CREDITS	6

TOTAL LECTURING HOURS	40
TOTAL LAB HOURS	20
PREREQUISITES	Basic notions of algebra and mathematical analysis
COURSE PAGE	ole.unibz.it

SPECIFIC EDUCATIONAL OBJECTIVES	• Type of course: “affini o intergativi” • Scientific area: „formazione affine“ The course offers an overview of the theory of probability in connection to its use in computer science and the use of statistics in analysing and understanding empirical data.

LECTURER	Rafael Penaloza
SCIENTIFIC SECTOR OF THE LECTURER	INF/01
TEACHING LANGUAGE	English
OFFICE HOURS	POS 3.05, Wednesday 11.00-13.00, Rafael.Penaloza@unibz.it
TEACHING ASSISTANT	Alisa Kovtunova
OFFICE HOURS	TBA

LIST OF TOPICS COVERED	• Discrete probability: finite probability spaces, infinite discrete probability spaces, probability, conditional probability, Bayes's theorem, random variables, discrete distributions • Continuum probability: probability spaces, conditional probability, random variables, distributions, expectations and integration • Independence: independence of random variables, variance and covariance, joint distributions, convolution, conditional expectation • Sums of random variables: random variable manipulations, law of large numbers, central limit theorem, the Monte Carlo method • Descriptive statistics and inference: data analysis, parametric inference, normality, non-parametric inference, bootstrap • Statistical models: hypothesis testing, linear statistical models, regression, least square methods
TEACHING FORMAT	Lectures: chalk and talk; supplemental e-learning activities, Lab: interactive and group work

LEARNING OUTCOMES	**Knowledge and understanding** • Have a solid knowledge of statistics and probability theory; **Applying knowledge and understanding** • Be able to apply the tools of statistics and probability theory to solve information technology issues; **Making judgments** • Ability to discern between various probability models and capability to find appropriate models for a given application; **Learning skills** • Have developed learning capabilities to pursue further studies in statistics and probability theory.

ASSESSMENT	Written final exam with unseen questions about the material covered in the course. The aim of the written exam is to check to which degree students have mastered the following learning outcomes: 1) Knowledge and understanding, 2) applying knowledge and understanding, 3) making judgment.
ASSESSMENT LANGUAGE	English
EVALUATION CRITERIA AND CRITERIA FOR AWARDING MARKS	Correctness and clarity of the answers.

REQUIRED READINGS	C. M. Grinstead and J. L. Snell. Introduction to Probability. American Mathematical Society, 1997. S. M. Ross. Introduction to probability and statistics for engineers and scientists. Elsevier/Academic Press, Amsterdam; Boston, 2004. OCLC: 123752914.
SUPPLEMENTARY READINGS	J. Haigh. Probability models. Springer, London, 2013. OCLC: 909978104.

	W. N. Venables, D. M. Smith, and the R Core Team. An Introduction to R, version 3.3.2 edition, 10 2016. Notes on R: A Programming Environment for Data Analysis and Graphics.
SOFTWARE USED	R as a recommended software, but not required for exam.