Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Course catalogue

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Programme of Course "Calcolo Delle Probabilità"

- Code: I0643
- Type of course unit: Compulsory (Laurea in Ingegneria dell'Informazione curriculum Automatica)
- Level of course unit: Undergraduate Degrees
- Semester: 2

Number of ects credits: (Laurea in Ingegneria dell'Informazione) 6 (workload 150 hours)

Teachers: Fabio Antonelli (fabio.antonelli@univaq.it)

1	**Course objectives**	Students should develop a certain familiarity with the basic probabilistic tools and should become able to - model simple real problems and to propose a solution - solve theoretical problems in secrete and continuous basic probability, using the appropriate mathematical tools. - understand the main probabilistic structures to be able to employ them even in more complex situations; - read a basic probability textbook; - gain access to a more advanced probability course
2	**Course content and learning outcomes (dublin descriptors)**	Topics of the module include: • Probability spaces: combinatorics, axiomatic approach, uniform probability spaces, conditional probability and independence • Discrete random variables Distributions: Bernoulli, binomial, Poisson, Hypergeometric, geometric, Joint distributions and independence Transforms of random variables, distributions of max, min, sums of random variables. Expectation, expectation of a function of a r.v., moments, variance and covariance, correlation, lineare regression Examples and applications • Continuous r.v.'s Distribution functions: definitions and properties. Main distributions : uniform, exponential, Gaussian, Gamma, Beta. Distributions of transform, of max and min . Expectation, moments, variance and covariance. Joint distributions, sums of independent r.v.'s, conditional distributions. Conditional expectation and conditional variance Moment generating functions or characteristic functions Multivariate Gaussian laws. • Convergence of r.v.'s and approximation. The law of large numbers, the central limit theorem, normal approximation. • If enough time An introduction to Markov chains: recurrence and transience, invariant probabilities, ergodic theorem. On successful completion of this module, the student should : • Students should develop a certain familiarity with the basic probabilistic tools • model simple real problems and to propose a solution • solve theoretical problems in secrete and continuous basic probability, using the appropriate mathematical tools. • understand the main probabilistic structures to be able to employ them even in more complex situations; • being able to report the main points of the theory of probability and its theorems • read a basic probability textbook; gain access to a more advanced probability course
3	**Course prerequisites**	Fundamentals of Calculus are strongly recommended
4	**Teaching methodsand language**	Lectures and recitation classes **Language**: Italian **Reference textbooks** • P. Baldi, ***Calcolo delle probabilità***. McGraw-Hill. • D. Ross, ***Calcolo delle probabilità***. Apogeo. • ***Schaum's outline series : Probabilità***.
5	**Assessment methods**	Written and possibly oral exams.