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COURSE: PROBABILITY AND STATISTICS

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ACADEMIC YEAR: 2018-2019

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TYPE OF EDUCATIONAL ACTIVITY: CHARACTERIZING

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TEACHER: VITO ANTONIO CIMMELLI

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e-mail: [vito.cimmelli@unibas.it](mailto:vito.cimmelli@unibas.it)

website:

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phone: 0971 205885

mobile (optional):

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Language: Italian

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ECTS: 6

n. of hours: 48

Campus: Potenza  
Dept: Di.M.I.E.

Semester: II

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#### EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

**Knowledge:** Basic knowledge of the fundamental concepts of Probability and Statistics.

**Skills:** Basic knowledge of the applications of Probability and Statistics in twentieth-century physics.

**Judging autonomy:** The student must have clear the connections between Probability and Statistics and the differences between the different approaches to Probability Theory.

**Communicative skills:** The student must be able to explain in a concise manner the main applications of Probability and Statistics to Quantum Physics and to Statistical Mechanics.

**Learning skills:** The student must be able to read and understand basic texts on Probability and Statistics.

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#### PRE-REQUIREMENTS

Knowledge of the basic notions of Mathematical Analysis and vector calculus.

Ability to read simple texts of Mathematics written in English.

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SYLLABUS

Definition of probability and its fundamental properties. On the different interpretations of the concept of probability. Discrete and continuous random variables. Probability distributions and their properties. Moments of a random variable. Moment generating function. Special probability distributions. Central limit theorem. Sampling and statistical inference. Sample of a population. The punctual estimate. Estimators and their properties. Method of maximum likelihood. Method of moments.

Wave function, Schroedinger equation and probabilistic interpretation of Quantum Mechanics. Function of distribution of the velocities of the molecules of a rarefied gas. Boltzmann equation. Moments of the distribution function and Grad hierarchical system. Entropy and probability of the states of a thermodynamic system. Boltzmann's H theorem.

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TEACHING METHODS

Lectures and exercises, with collective periodic discussions.

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EVALUATION METHODS

Oral examination.

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TEXTBOOKS

Notes of the lessons elaborated by the teacher and distributed during the course.

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INTERACTION WITH STUDENTS

Direct meetings, by appointment fixed by e-mail. Short communications, just to information, by telephone.

Office hours: Wednesday – 15:00-17:00

Potenza, University Campus of Macchia Romana, Building 3D, Department of Mathematics, Computer Science and Economics, room 3D254.

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EXAMINATION SESSIONS

It can take exams every month, except August, after agreement with the teacher.

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SEMINARS BY EXTERNAL EXPERTS      YES     NO

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**Università degli Studi della Basilicata**

**DIPARTIMENTO DI MATEMATICA, INFORMATICA ED ECONOMIA**