



STATISTICAL METHODS IN PHYSICS

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	FIS/01 (EXPERIMENTAL PHYSICS)
Department	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
Course	MATHEMATICS
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (01/10/2020 - 20/01/2021)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	PEDRONI PAOLO (titolare) - 6 ECTS
Prerequisites	Basic notions of statistics and probability theory that are usually provided in the undergraduate Physics and Mathematics courses
Learning outcomes	Learning of the main statistical methods used in all the different physics disciplines for the interpretation, the simulation and the prediction of experimental data.
Course contents	Topics covered include: Multidimensional random variables and functions of random variables; Basic statistics (confidence intervals; estimates of probabilities; population mean and variance, correlation coefficients); Detailed treatment of the Monte Carlo methods with a discussion of its basic principles and first applications; Maximum likelihood method applied parameter estimation and hypothesis testing; Least squares method and its application to minimization (best-fit) algorithms.

Lectures with the discussion and the guided resolution of specific practical problems

**Reccomended or required
readings**

L.Lyons, Statistics for Nuclear and Particle Physics (Cambridge University Press, 1986)
A. Papoulis, Probability and Statistics, (Prentice Hal 1990)
G.Cowan, Statistical Data analysis, (Oxford University Press 2002)

Oral examination. For this examination the recommendation is to mainly focus on the conceptual and logical aspects of the covered topics and on their applications to the main statistics problems in Physics and not on a detailed study of the pure mathematical derivations.

Slides of the lessons are available for students.
indications are given, mainly for students not attending the lectures, of
the topics and themes to be tested in the final exam.

