

INFN School of statistics 2013

Vietri sul Mare, 3-7 June 2013

Hotel LLOYD's Baia

Timetable	3-6-2013 Monday	4-6-2013 Tuesday	5-6-2013 Wednesday	6-6-2013 Thursday	7-6-2013 Friday
9:00-9:30		Lecture 2.1	Lecture 3.1	Lecture 4.1	Lecture 5.1
9:30-10:00					
10:00-10:30		Coffee break	Coffee break	Coffee break	Coffee break
10:30-11:00					
11:00-11:30	Registration	Lecture 2.2	Lecture 3.2	Lecture 4.2	Lecture 5.2
11:30-12:00					
12:00-12:30					
12:30-13:00	Lunch	Lunch	Lunch	Lunch	Lunch
13:00-13:30					
13:30-14:00					Departure
14:00-14:30					
14:30-15:00	Lecture 1.1		Excursion		
15:00-15:30					
15:30-16:00	Coffee break	Exercise session: 1+2		Exercise session: 3+4	
16:00-16:30					
16:30-17:00	Lecture 1.2	Break (15')		Break (15')	
17:00-17:30		Exercise session: 1+2	Exercise session: 3+4		
17:30-18:00					
18:00-18:30					
18:30-19:00					
19:00-19:30					
19:30-20:00					
20:00-20:30	Dinner	Dinner	Dinner	Dinner	
20:30-21:00					

Lecture programme

Lectures 1.1, 1.2

Probability theory

Luc Demortier (Rockefeller University, New York)

Introduction to probability theory
 Random variables: discrete and continuous distribution, cumulative function
 Multiple random variables: covariance and correlation coefficient
 Distribution moments: expected value and variance
 Conditional probability and Bayes theorem
 Bayesian approach to probability
 Bayesian inference

Lectures 2.1, 2.2

Statistical methods

Glen Cowan (Royal Holloway, London)

Most popular discrete and continuous statistical distributions
 Parameter estimates, properties of estimators
 Maximum likelihood method
 Error propagations
 The error ellipse and its properties
 Neyman belt and confidence intervals
 Pearson and Neyman chi-squares
 Combination of more measurements

Lectures 3.1, 3.2

Confidence intervals and upper limits

Jochen Ott (KIT, Karlsruhe)

Hypothesis testing
 Definition of p-value and significance and use in goodness of fit
 Feldman-Cousins method
 Frequentist vs Bayesian upper limits
 CLs, the modified frequentist approach
 Treatment of nuisance parameters
 Look-elsewhere effect

Lectures 4.1, 4.2

Multivariate discriminants

Harrison Prosper (Florida State University, Tallahassee)

Signal/background discrimination
 Overview of multivariate discrimination methods
 Fisher discriminant
 Likelihood ratio discriminant
 Artificial neural networks, including Bayesian neural networks
 Boosted decision trees

Lectures 5.1, 5.2

Statistical software tools

Lorenzo Moneta (CERN, Geneva)

Overview of the main statistical tools
 Strong/weak point of the main tools
 RooFit
 RooStats
 Usage examples code demonstrations