

Ph.D. Physics course at University of Bari (XXXII Cycle)

Title	Interpolation Methods & Techniques for Experimental Data Analysis
Proponent	Alexis Pompili (UNIBA)
# CFU (1CFU = 8 hours)	2 CFU (16 hours)
Time Schedule	SEPTEMBER-OCTOBER 2017
Brief Summary of the course	Fundamental statistics's concepts applied to data analysis are reviewed with specific emphasis devoted to the comparison of experimental data with theoretical models. The course is half theoretical with the other half dedicated to hands-on sessions concerning interpolation applications carried out in the ROOT/RooFit framework.
Programme	<p>1) Probability density function (pdf) and properties (expectation value, variance). Bayes theorem, joint and conditional pdf. Uncorrelation & independency (2 hours).</p> <p>2) Binomial distribution and efficiency. Poisson distribution and histogram. Gaussian distribution and Central limit theorem. Breit-Wigner distribution and resolution function. Exponential distribution (3 hours).</p> <p>3) Statistical hypothesis testing, efficiency and purity. Point estimation and method of (Unbinned) Maximum Likelihood [(U)ML]. Extended ML. ML with binned data. Goodness-of-fit testing (3 hours).</p> <p>*) Hands-on sessions include generating and fitting distributions, advanced 1D fitting and simultaneous 2D fitting (proper-time and invariant mass distributions).</p>
Recommended texts	<p>1) G.Cowan, Statistical Data Analysis (1998),</p> <p>2) RooFit Manual,</p> <p>3) Additional material provided by the teacher.</p>
Assessment methods	Selected topics of statistical data analysis are reviewed and enriched with extended hands-on exercises.