lphys2236 2025	Advance data analyses method in particle physics experiments

The version you're consulting is not final. This course description may change. The final version will be published on 1st June.

5.00 credits	27.5 h + 2.5 h	Q2

Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Triggering, data acquisition and computing systems - Data treatment algorithms - Advanced statistics - Software tools for data treatment and simulation in fundamental physics.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 **Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M and PHYS2M1)** 1.3, 1.4, 1.5, 1.6, 2.3, 2.4, 2.5, 5.1, 5.3, 6.1, 6.2, 6.3, 6.4, 7.1, 7.3, 8.1, 8.2 2 **Specific learning outcomes of the teaching unit** At the end of this teaching unit, the student will be able to : 1. explain and discuss in detail the advanced experimental techniques of complex systems used in fundamental physics : detectors ; trigger, data acquisition and computing systems ; data treatment ; statistical data analysis ; 2. analyse data issued from an experiment in order to measure physical quantities through statistical inference ; 3. write a report that documents the developments and results of a personal software project.
Evaluation methods	Evaluation of a report written by the student on a project concerning the statistical analysis of data. Evaluation of an oral interrogation on the project and the subjects treated in the teaching unit. Each of the two parts must be passed with more than 50%.
Teaching methods	- Lectures in auditorium. - Resolution of problems in auditorium. - Personal software project and report writing.
Content	1. Trigger and data acquisition systems. 2. Offline data processing systems. 3. Event reconstruction algorithms. a. Tracking, b. Vertexing. c. Clustering. d. Jets 4. Calibration and alignment techniques. 5. Statistical methods of data analysis. 6. Simulation of particle propagation in matter. 7. Projects concerning a statistical analysis of data from a physics experiment.
Bibliography	G. Cowan, "Statistical Data Analysis", Oxford Science Publications
Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [60] in Physics	PHYS2M1	5		🔍
Master [120] in Physics	PHYS2M	5		🔍