LUNDS UNIVERSITET

Naturvetenskapliga fakulteten

Syllabus for the course Modelling and computer simulation of particles passage through matter, with GEANT4 as example, NAFY002

Swedish title: Modellering och datasimulering av partiklars passage genom materia, med GEANT4 som exempel

The course syllabus was confirmed by the Faculty board for graduate studies on 2013-12-12. Third cycle course, 3 credits.
This is a translation of the course syllabus approved in Swedish.

Learning outcomes
The outcome is that the student shall obtained state of the art competence, corresponding to 3 ECTS, in modelling and simulation of elementary particles and nuclides passage through matter.

Course contents
Introduction to simulation of elementary particles and nuclides passage through matter, and interactions and decays on their paths; the structure of an object-oriented program for simulation; the definition of a realistic geometry in the simulation, including magnetic field; primary particles and interfaces to generators of different physics processes; simulation of strong and electromagnetic interactions though the passage; user interfaces; visualization; event bias; simulation examples from subatomic physics, space science, and medical applications.

Teaching
The course is given during one week followed by another week of individual problem solving. The daily layout of the first week is four hours of lectures, two hours of supervised problem solving and tutorials, and finally individual problem solving to be presented the following day. The teachers are continually accessible for discussions and supervision. At the end of the first week, problems corresponding to one week of work, are distributed. The solutions of these should be electronically communicated to the teachers.

Assessment
Approved solutions to all problems and distributed exercises

Grading
Possible grades are Passed or Failed.

Language
The course if given in English

Entrance qualifications
Master in physics or Engineer in Engineering Physics. Knowledge of programming in C++.