Physics 499
Computational Nuclear-Particle Physics
Spring 2013

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Lecture Hours: Mon 4-5:50 in room 4-3-567 and online

Office Hours for this Course: Wed 4-5 in room 4-3-567 and online

Textbook: There is no specific textbook for the course. I will post my lecture notes online as well as the archived video sessions. There are a number of good texts on computational physics. A nice one I have used in the past is *Computer Simulation Methods: Applications to Physics Systems*, by Gould and Tobochnik

Grading:

Programming Projects   100%

Programming Projects:

There will be 5 programming projects assigned thoroughout the quarter. For each project you will be writting a computer program in "C" and/or in the ROOT environment from CERN. I will try and design the assignment so that there is a basic part which I hope everyone will be able to complete, and a more challenging part.

Course Material

Computers are used in many ways in solving physics problems. The goal of this course is to teach you some numerical methods and give you experience of writing computer programs to solve problems in nuclear and particle physics. For those students who will be working at CERN this summer, the goal of the course is to give you a good introduction to the ROOT software used at CERN. Below is an initial outline of the numerical methods and physics topics that I plan to cover this quarter. These can vary depending upon the interest of the students.

Rough Course Outline Spring 2013 (Siegel)

Day	Date	Programming Topic	Physics Topic
Mon	April 1	Introduction	
Mon	April 8	Solving for the roots of a function	Λ-Hypernuclei
Mon	April 15	Differential Equations	Bound States in nuclei
Mon	April 22	Differential Equations	$q\bar{q}$ Resonances
Mon	April 29	Numerical Integration	Born Approximation
Mon	May 6	Graphing	Relativistic Kinematics
Mon	May 13	Random Numbers	scattering amplitude
Mon	May 20	Gaussian Probability	partial-wave analysis
Wed	May 29	χ^2 analysis	resonances
Mon	June 3	Grid-Search	resonances