Physics 503 – Syllabus
Introduction to Scientific Computing
Spring 2008

General Information

Professor: Dr. Josh Gladden
email: jgladden@olemiss.edu; Phone: 915-7428
Office: Kenon Observatory #1 and NCPA 1062
Office Hours in Kenon Obs.:
Mon. (10:00 – 11:00) Thurs. (11:00 – 12:00), or by appointment
Website: www.phy.olemiss.edu/~jgladden/comp_phys/ (check regularly!)
Lecture: W 3:00 – 5:00 PM in Lewis 1 (Astro Lab)
Required Text: *Numerical Methods in Engineering with Python*
by Jaan Kiusalaas (Cambridge Press, 2005)

Course Description

This is a course targeted toward Junior and Senior level undergraduate majors as well as Graduate Students in the Physical Sciences (Physics, Chemistry, Biology, Geology, ...). The purpose of the course is to provide these students with a coherent picture of the role of computers in the sciences as well as the practical skills they will need in their graduate studies or professional positions in science. The role of computers in science is, of course, an enormous topic with many highly specialized niches. This course will focus on what one might call a "base level of knowledge" which most scientists will be expected to have. It also will provide a good starting point from which a more advanced course or self-study may follow. After completing the course, students should have developed a set of tools and skills they will immediately find useful in their study and research. Specific topics covered will be: the basics of the Python programming language, numerical differentiation and integration methods, linear and non-linear fitting of models to data, graphical representation of data and models, roots of functions, and numerical precision and error issues. Graduate students will learn more in depth topics such as adaptive Runge-Kutta methods and solutions to ordinary differential equations.

Evaluation

Weights
Homework 20%
Project 1 ..... 40%
Project 2 ..... 40%

Homework:
Weekly homework sets will be assigned. Some problems will be solved "by hand" with pencil and paper, however most will be programming assignments. Group work is allowed, but each member of the group should understand each component of the problem.

Projects:
There will be two larger scale projects assigned, one near the mid term and one near the end of the term. These will be more involved projects which bring together many of the topics we have studied. Each student will have an individual topic. Graduate students will be expected to incorporate their additional skills into their projects.
There will be no tests or a final exam in this course.