Physics 503 – Syllabus
Introduction to Scientific Computing
Spring 2008

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)

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

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.

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