Physics 503 – Syllabus
Introduction to Scientific Computing
Spring 2018

General Information
Professor: Dr. Josh Gladden
email: jgladden@olemiss.edu  Phone: 915-7428
Office: Lyceum 313
Office Hours: Make an appointment by email.
Website: www.phy.olemiss.edu/~jgladden/sci_comp/
(Lecture: M T 11:00 – 12:15 in Lewis 104
Required Text: A Primer on Scientific Programming with Python
by Hans Petter Langtangen (5th edition, Springer
Press, 2016)

Course Description
This is a course targeted toward undergraduate and graduate
students in the physical sciences (Physics, Chemistry, Biology,
Geology, ...) as well as Mathematics. 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
or engineering. 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, scientifically
related object oriented programming, 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, adaptive
Runge-Kutta methods and solutions to coupled ordinary
differential equations. As time allows, more advanced topics such
as parallel computing, time series analysis graphical, or user
interface programming will be covered. The partial differential
equation components will be optional for 500 level students. The
level of complexity in projects will be higher for 700 level students.

Evaluation
Homework:
~ Weekly homework sets will be assigned. Some problems will be
solved “by hand” with pencil and paper, however most will be
Weights
Homework ...... 30%
Project 1 .......... 35%
Project 2 .......... 35%

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 of their choosing with my approval. I encourage students to choose topics useful to their particular field of study.
There will be no tests or a final exam in this course.