Cornell University

Department of Physics

Physics 480/680, Astro 690 January 23, 2006

Computational Physics, Spring 2006

Course Information

Home page:
http://people.ccmr.cornell.edu/∼muchomas/P480

Lecturer:
Tomás Arias, Clark 522, x5-0450 (muchomas@ccmr.cornell.edu)
Lecture: Tue, Thu 8:40-9:55am (104 Rockefeller Hall)
Computer Lab: During lecture hours (B3 Rockefeller Hall)
Office hours: Tue 10:15-11:15am (522 Clark Hall)

Grader:
Daniel Freedman, 604 Clark Hall, x5-6311 (freedman@physics.cornell.edu)
Office hours: Tue 2-4pm (604 Clark Hall)

Course Administrator:
Rosemary French, 121 Clark Hall, x5-7563 (rjf2@cornell.edu)

Textbook:
Numerical Recipes in C: The Art of Scientific Computing, 2^{nd} Edition (Cambridge University Press, 1992).

Lectures and Computer Sessions:
The only way to learn scientific computing is to "Just do it." Accordingly, this course is designed to be a hands-on learning experience. Part of the course will be traditional lectures to introduce new material. Part will take place in the computer laboratory, where we will run our codes interactively to learn, hands-on, how to debug, extract physics, and improve computational performance.

Getting the most from the lectures:
Students generally get more out of a lecture if they have a sense of the material to be covered and some questions already formed in their minds. Selected short readings will be assigned at the top of each new homework assignment. It is highly recommended that this reading be done, even if cursorily, *before* attending the corresponding lecture.

Homework:
Beyond the short readings and the lectures, the third element of the learning process is working the weekly homework. Because the purpose of this course is to develop the skill of writing effective software to solve scientific problems, the homework will consist of completing computer programs which perform an assigned task. We will grade this homework primarily by sitting down with you and testing your code in real time. There will be very little, if any, written homework.

Homework will be assigned each week and will be due the afternoon before the interactive computer session. As we will learn important lessons by running our programs together in these sessions, it is *extremely*

important that you complete these assignments on time. Toward this end, we have scheduled computer office hours with the course grader for all students who wish to attend.

Students should feel free and are highly encouraged to discuss and ask conceptual and practical advice on the homework from each other and from the teaching staff. The assignments are modular and will come together to form codes which predict the behavior of matter from basic physics. As most of the fun is in doing this yourself and as this course is graded on these programs, we expect the students, after such discussions, to write their own software and not to copy complete programs directly from each other. Because the assignments do build upon each other, if your assignment doesn't work, you may use someone else's module in future homework.

Exams:
This course has no exams.

Grades:
This course is S/U only. To achieve a grade of S, you must either complete or demonstrate that you completed all *but three* of the assignments *on time* if you are registered for Phys 480 and all *but two* of the assignments *on time* if you are registered for Phys 680/Astro 690.

Good luck!!!
This semester you will learn how to apply one of the keystones of modern science, quantum theory, to predict the behavior of matter *ab initio*, from first principles. It is a pleasure for us to teach this course. We wish you all a productive, enjoyable and stimulating semester.