PHY 277: Computation for Physics and Astronomy Majors

Time and Location: Math SINC Site Room SL-235 (in the Sub-level of the MATH Tower), MWF 10:00-10:53 am

Instructor: Prof. Cyrus Dreyer (cyrus.dreyer@stonybrook.edu)
Office: Physics B-141; office hours: TBD

TA: Theodore Sauyet (theodore.sauyet@stonybrook.edu)
Office Hours: TBD

Scope of the Course
This course is designed to prepare sophomore Physics and Astronomy majors for the realities of modern scientific computing. The desktop computer running linux (or some form of Un*x operating system) has become ubiquitous in the fields of physics and astronomy for a variety of purposes: numerically solving problems that cannot be easily solved analytically, analyzing or acquiring data from experiments and observations, writing papers or reports, or presenting results on the WWW. This course will help you to attain a minimal level of scientific computing literacy that you need to function on a daily basis in this field. The course will focus on developing the skills needed carry out core tasks on modern computers running linux (or Un*x) operating systems. The course will cover the following core topics:

- Carrying out core tasks on Linux or Unix-based operating systems
- Writing and compiling programs in the FORTRAN 95 language
- Essentials of the Matlab programming language and software suite
- Elementary numerical methods
- An introduction to the LaTeX typesetting system
- An introduction to gnuplot and xmgrace plotting software

What to Expect
This course will require you to carry out numerous programming or other computing tasks on the MATHLAB linux machines located in S235 of the math tower. It is likely you will have to spend a substantial amount of time writing and debugging programs in this laboratory setting. It may be possible in some cases for you to carry out some assignments on other computers however the Instructor and Teaching Assistants for this course will not offer any formal support for such efforts. The bottom line is that you should plan to carry out your work on the MATHLAB machines or other machines specified by the instructor. The instructor may require you to turn in your assignments electronically, via web pages that you develop, or in the form of hardcopy. The course T.A. will hold office hours in the MATHLAB in order to assist you with problems that you may encounter in carrying out your assignments. Lecture outlines will be provided via

the course web site.

Recommended text:
Note: This text is **recommended but not required.** If you can purchase an earlier edition for a lower price please do so. **Latest edition is not needed!**
Fortran 95/2003 for Scientists and Engineers, (or the Fortran 90/95 edition), Stephan J. Chapman

Course Grading
This course requires important continuous work and dedication. The majority of the grade weight in this course will be put on the homework assignments rather than on the exams. If you work on these assignments and finish them on time every week you will certainly pass the course without problems. There will be two midterms and a final exam. The grading policy will be:

- Assignments: 30 %
- Midterm 1: Mar 4 20%
- Midterm 2: Apr 14 20 %
- Final: Last week of class 30 %

The course grades are curved. The homework problems will consist mainly of computer programming assignments which are designed to emphasize the subject matter discussed in the preceding lectures. The programming assignments will be demanding, and it will typically require several hours of your time per week to complete the assignment. If you fail to keep up with the weekly assignments, you will have difficulty passing this course!

Teaching Assistant
The course T.A. will hold office hours in the MATHLAB in order to assist you with problems that you may encounter in carrying out your assignments. Lecture outlines will be provided via the course web site.

Attendance
As per the University policy outlined in the Undergraduate Student Bulletin, students are expected to regularly attend all classes. If an absence occurs causing you to miss an exam or homework assignment due to a legitimate reason (illness, medical issue, death of a family member, jury duty, military service) please provide full documentation of the reason to the Office of the Dean of Students (222 Students Activities Center, 631-632-7320) and ask them to contact your instructors.
Important University Policies:

- **Student Accessibility Support Center (SASC) Statement:** If you have a physical, psychological, medical or learning disability that may impact your

course work, please contact the Student Accessibility Support Center (SASC), ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the staff at the Student Accessibility Support Center (SASC). For procedures and information go to the following website: http://www.stonybrook.edu/ehs/fire/disabilities

- **Critical Incident Management Statement:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.
- **Academic Integrity Statement:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

SPECIAL NOTE REGARDING PLAGIARISM AND DISHONESTY: All instances of suspected plagiarism or academic dishonesty will be brought before the Academic Judiciary Committee. All parties suspected (both the copier and the person who produced the original work) will be held accountable for any instance of plagiarism or dishonesty. You are responsible for protecting the security of your programming assignments by making sure that your directories are not world readable. If you are unsure how to secure your home directory see the instructor immediately.

Important Course Policies:

- **Student Responsibilities.** You will be expected to abide by all University regulations, procedures, requirements, and deadlines as described in the *Undergraduate Student Bulletin.*
- **Attendance.** As per the University policy outlined in the *Undergraduate Student Bulletin*, students are expected to regularly attend all classes and to participate in the classroom experience.

- **Assignments.** All work on class assignments is to be carried out **completely** independently. **DO NOT ASK OTHER STUDENTS FOR HELP OR ASK THEM TO DEBUG YOUR CODE.** Ask the instructor or the TA for help if you need assistance. There will be no collaborative work on assignments at any time. Computer programs developed for this course should be developed exclusively by you alone. Late assignments will not be accepted.
- **Copying of Code.** Never, **EVER,** copy code from any source for use in your homework assignments unless an assignment explicitly states that you can do so. This includes sources such as web sites, books, and others. Any instances of suspected copying of code for assignments will be referred to the Academic Judiciary Committee in accordance with University Policies.
- **Computer Use.** All use of University owned computers and networks must be in accordance with the University Information Technology Policy.
- **Classroom Behavior and Conduct**
  You are expected to conduct yourself in accordance with the minimal undergraduate student responsibilities described in the Undergraduate Student Bulletin including:
    - You are expected to arrive for class promptly.
    - Avoid behavior that is disruptive to the classroom especially the use of cell phones.
    - Avoid web surfing during class.
    - Be familiar with material presented in previous lectures.