

PHYS 329

Topics in Advanced Physics: Computational Physics

Mount Holyoke College - Fall 2008

Meeting Times:

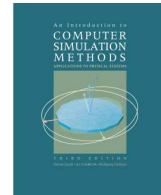
Kendade G06 – TTh 8:35a – 9:50a, (optional fourth hour to be arranged)

| | | |
|---|---|--|
| Instructor: Rob Salgado Visiting Assistant Professor of Physics Office: Kendade 215 Voice: (413)-538-2816 | Email (the best way to contact me): rsalgado@mtholyoke.edu Instant-Messengers: AOL, MSN, Yahoo: mhcpyrob (do not email here) | Office hours: -to be announced |
|---|---|--|

Catalog Description:

PHYS 329 - Topics in Advanced Physics: Computational Physics (4 credits) - [65718]

This course is intended for Physics majors who are interested in scientific modeling, computation, simulation, and visualization. We will draw on a variety of examples from introductory and intermediate physics. More advanced examples may be considered, depending on student interest. Some previous computer programming experience will be helpful, but not required as a prerequisite. We will work in the Python programming language, together with the VPython visualization module.
[Prerequisite: PHYS 216 or permission of instructor.]



Required Textbook:

“Introduction to Computer Simulation Methods: Applications to Physical Systems (3rd Ed)”,
 Harvey Gould, Jan Tobochnik, and Wolfgang Christian [Addison-Wesley (2006), ISBN: 0-8053-7758-1]

Electronic Materials:

I will maintain a website (for now: <http://www.mtholyoke.edu/~rsalgado/329/>) that links to computer programs, electronic-whiteboard notes, and handouts.

Course Goals:

- A. To introduce techniques in scientific computing.
- B. To reinforce important concepts in physics and mathematics.
- C. To further develop physical intuition, mathematical reasoning, and problem solving skills.
- D. To have fun using the computer to learn physics.

Course Requirements:

Come to class **ON TIME and AWAKE**. Attendance on Tuesdays and Thursday is **REQUIRED**. The fourth hour is an optional period set aside for you to work on your computer assignments, during which I will be available to answer any questions and offer help.

Homework (assigned periodically):

Homework will be assigned and graded. (Late homework loses 10% per day.)
Most of the learning you do in this course is done by your doing homework problems outside of class! (I am merely a guide for you.)
 You are strongly encouraged to discuss the homework with other students. However, be sure that you can do the homework *by yourself* and that you present your own work. You can always ask me for help after you have made an effort.

Grades are roughly weighted as follows:

- 40% HOMEWORK
- 20% PROJECT #1
- 20% PROJECT #2
- 20% FINAL PRESENTATION OF ONE OF THE PROJECTS

Sequence of PHYS 329 topics (loosely following the topics in the textbook):

- (aspects of Ch 1 and 2) Introduction to Python programming and the VPython module
- (Ch 3) Simulating Particle Motion
- (Ch 4) Oscillatory Systems
- (Ch 5) Few-Body Problems: The Motion of the Planets
- (Ch 6) The Chaotic Motion of Dynamical Systems
- (Ch 7) Random Processes
- (Ch 8) The Dynamics of Many-Particle Systems
- (Ch 10) Electrodynamics
- (Ch 11) Numerical and Monte Carlo Methods

| 2008 September | | | | | October | | | | | November | | | | | December | | | | |
|----------------|----|----|----|-----|---------|----|----|----|-----|----------|----|--------------|----|----|---------------|----|----|----|-------|
| Su | Mo | Tu | We | Th | Su | Mo | Tu | We | Th | Su | Mo | Tu | We | Th | Su | Mo | Tu | We | Th |
| | | | | 4 5 | | | | | 2 3 | | | | | | | | | | 2 4 5 |
| | | 9 | 11 | 12 | 7 | | 9 | 10 | = | 4 | | 6 | 7 | | 9 | | 11 | 12 | |
| | | 16 | 18 | 19 | BREAK = | | 16 | 17 | | 11 | | 13 | 14 | | ====EXAMS==== | | | | |
| | | 23 | 25 | 26 | | | 21 | 23 | | 18 | | 20 | 21 | | | | | | |
| | | 30 | | | 28 | | 30 | 31 | | 25 | | THANKSGIVING | | | | | | | |

Away giving a seminar:
(a Tuesday yet to be determined)

At a Conference:
Oct 24-26

Final Presentations