

PHYS 821: Advanced Dynamics

Lecture: MW 11:30, CW 146

Spring 2011

Instructor:

Brett Esry

CW 329

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Textbook:

Classical Mechanics, Third Edition, Goldstein, Poole, and Safko

Supplements:

In order of increasing difficulty level:

- *Analytical Mechanics*, Fowles and Cassiday

- *Mechanics*, Symon

- *Classical Dynamics of Particles and Systems, Fifth Edition*, Thornton and Marion

Grading:

Exam 1	10%
Exam 2	10%
Final	30%
Homework	50%

Course philosophy:

This course will challenge you. I expect that you will learn the most from the homework, so there will be quite a bit of it: assignments will be given roughly once per week and will take an average of about 10 hours each. I encourage you to discuss the problems with your classmates, but you should write up the assignment *on your own*. Some assignments may require computer work.

Guidelines for homework:

- Discuss your homework with classmates as much as you like, but *write your homework solutions on your own!* There will be a severe grade penalty for copying.
- As a scientist in training, you need to learn to communicate scientific information in an effective, efficient manner. You should consider homework assignments as practice in this art. It is your responsibility to present your homework solutions in a readable, logical manner — not mine to decipher and interpret them. There will be a grade penalty.
- In an incorrect solution, I will reward statements on homework and on exams that show you know it is incorrect and why. I will also reward any (correct!) effort above and beyond what is explicitly asked for in a problem. Conversely, if you give a grossly incorrect solution, but make no indication that you know it is grossly incorrect, there will be a grade penalty beyond just getting the problem wrong.

Students with disabilities:

If you have any condition such as a physical or learning disability that will make it difficult to carry out the work as I have outlined it or that will require academic accommodations, please notify me and contact the Disabled Students Office (Holton 202) in the first two weeks of the course.

Plagiarism:

Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper, or project; failure in the course; and/or expulsion from the University. For more information refer to the “Academic Dishonesty” policy in the *K-State Undergraduate Catalog* and the *Undergraduate Honor System Policy* on the Provost’s web page at <http://www.ksu.edu/honor/>.

Tentative Course Outline:

The following is a tentative list of topics that will be covered in lecture (in no particular order):

- Lagrangian and Hamiltonian mechanics
- Small oscillations and normal modes
- Principle of least action and the calculus of variations
- Motion under a central force and scattering theory
- Canonical transformations, Hamilton-Jacobi theory
- Special relativity
- Continuous systems
- Perturbation theory