Syllabus Version 0
Physics 1331 Mechanics Spring 2016 (25043)

Instructor: Professor Joseph Boudreau
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Lectures : Thaw Hall 104, Monday, Wednesday, Friday, 1:00-1:50 PM
Office Hours: Wednesday 2:30-4:30 or by appointment

Physics 1331 is an advanced course to Newtonian classical physics. The class develops the Lagrangian and Hamiltonian approaches to classical mechanics, which permit an efficient treatment of otherwise complex classical problems, while giving insight into the theoretical structure of classical mechanics and its relation to the dynamics of fields on one hand and quantum mechanics on the other.

Topics in classical mechanics include: analytic and numerical solutions to equations of motion, oscillations, gravitation, symmetries and conservation laws, the calculus of variations, Lagrangian and Hamiltonian dynamics, the two-body central force problem, physics in non inertial reference frame, rigid body motion, and coupled oscillations.

The textbook for the course is *Classical Dynamics of Particles and Systems*, (5th edition) by Stephen T. Thornton and Jerry B. Marion, which is available at the bookstore. Reading assignments will be assigned each day of class, which should be completed prior to the next class meeting. In addition written **homework** is to be turned in each week. Due dates will be announced in class but and on Courseweb but will generally be due in class on Fridays. Homework may include computer exercises which can be undertaken using a programming method or computer algebra system of your choice.

Some of the assigned work is designed to be carried out with the aid of a computer algebra system such as **Mathematica**, which is freely available from Pitt's Software Download Service. If you do not have access to Mathematica, please either locate a copy in one of the computing laboratories or download it to you personal computer. If you have trouble with that, come and see me in my office hours for help with the installation. If you are handy with another computer algebra (or programming language for that matter) you are free to use it instead of Mathematica but then you may find that your instructor cannot help you much if you get stuck with some technical problem.

Homework should be neat and legible, and the graders should be able to follow the logic and clearly understand the conclusion. Do not submit a long sequence of dead-ends, false starts, or abandoned calculations—make sure you know how a problem is solved before you begin writing up your final copy, and keep the all scratch paper for yourself, please.
Unless otherwise indicated, please use the plotting capabilities of Mathematica (or some other program) to produce plots rather than submitting "sketches" to display quantitative information. Plots should be properly labelled. Making a high-quality plot of quantitative information is an

essential skill in all of the sciences. (In many textbook examples a sketch is requested, but the world has changed a lot since 2004). **Homework which is unreadable is ungradeable and will be returned for resubmission.**

Courseweb is used for announcements, homework solutions, and dissemination of any additional materials.

The grade is based on course participation and homework (10%), three in-class examinations examinations given in class (20% each) and the final examination (30%). **Three hour exams** shall be held in class on Friday, Feb 5, Wednesday March 2, and Friday, April 1. The final examination shall be held on Wednesday April 27 3:00-3:50 PM, in a location to be announced.

Reserve Books: The following books on classical mechanics are placed on reserve in the Engineering Library (Benedum Hall):

Classical dynamics of particles and systems, Steven T. Thornton and Jerry B. Marion, Brooks/Cole, 2004. (Textbook for the course.)

Analytical Mechanics, Grant R. Fowles and George L. Cassidy; Saunders College Pub. 1993. A good undergraduate text in classical mechanics.

Introduction to classical mechanics with problems and solutions, David Morin; Cambridge University Press, 2008. Another good undergraduate text.

Classical Mechanics, Herbert Goldstein, Charles Poole, and John Safko; Addison-Wesley, 2002. A standard graduate text.

Students with disabilities: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, (412) 648-7890/(412) 383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

A comprehensive description of the services of that office can be obtained at www.drs.pitt.edu

Academic Integrity: Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, from the February 1974 Senate Committee on Tenure and Academic Freedom reported to the Senate Council, will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz or exam will be imposed.