

Syllabus - Classical Mechanics

PHYS 321 - Spring 2014

Instructor: Kevin J. McCann

Physics Room 315

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Office Hours: MW 12-1 or by appointment

Text: Taylor, John R., *Classical Mechanics*, University Science Books, 2005,
http://www.amazon.com/Classical-Mechanics-John-R-Taylor/dp/189138922X/ref=la_B001IODK2C_1_1?ie=UTF8&qid=1357762290&sr=1-1,

\$71.10 (1/9/13)

\$71.59 (1/8/14)

Class Time: MWF 2:00-2:50

Room: Sondheim 109

■ Some Important Dates This Semester

January 27 First Day of Class

March 15-23 Spring Break

April 17 Daffy Duck's Birthday

May 13 Last Day of Spring Semester

The final exam schedule has not yet been posted,
but I will let you know when I find out.

If any classes are cancelled, I will attempt to make them up, probably at the free hour on Wednesday.

A Brief Course Outline

In this class we will study the principles of classical mechanics as first set forth in the works of Galileo and Newton. We will pay particular attention to the conservation of energy, momentum, and angular momentum, and the derivation of the equations of motion. After an initial review of basic classical mechanics, we will have a brief mathematical interlude during which we will develop the calculus of variations, and from it an entirely different approach to find both the equations of motion and conserved quanti-

ties, namely the Lagrangian approach. The Lagrangian approach will be applied to the classic problem of two-body central force problems with special focus on the orbital results of Kepler and Newton. We will then consider the equations of motion for a non-inertial frame with a primary application to rigid body rotation. We will finish the semester with coupled oscillations and normal modes.

The guide throughout this course will be the excellent text by Taylor, cited above. We will cover most of the first eleven chapters in the text, which means that our pace will be one and one-half weeks per chapter on average. The pace will be fast and I expect to assign approximately 10 homework problems per week, roughly two assignments per chapter.

Preparation for the Course

As preparation for the course, you should be able to understand and use the simple vector concepts outlined in the first few sections of Chapter 1 in our text. You will also be expected to be able to solve the usual second order differential equations. You should review the meaning of and how to find the eigenvalues and eigenvectors of a matrix. In addition, you will be expected to be able to plot functions with a computer by using *Mathematica*, *Matlab*, *Maple*, or some other software. On occasion there will be homework problems that require the use of a computer to solve differential equations numerically and plot the results.

Email for this course

If you have questions or homework that you wish to email, be sure to put PHYS 321 in the subject line. If you are sending me a file as part of a homework assignment, please use the following file naming convention

last_name – Phys 321 – short description.ext

where “ext” is the extension for whatever the format is, e.g. .nb, .mat, .doc, etc. For the short descriptions try to do something other than HW6 or assignment 12 or whatever; rather, do something like “harmonic oscillator” or “HO” or some other descriptor that lets me know which assignment it is. I will try to remember to suggest something with each assignment.

Grading

20% Exam #1 will be on Chapters 1-5 and will be given in late March

20% Exam #2 will be primarily on Chapters 6-9, but you should remember Chapters 1-5. This will be given around the end of April or early May.

25% Homework

35% Final Exam will include all topics covered but with slightly more emphasis on Chapters 10 & 11

Homework Policy

You may work together on homework, but each student must turn in her/his own work. If you use results found on the internet or in texts, **you must cite them**. A cautionary note: the exam problems will often be similar to or even identical to homework questions; so, if you just copy someone else's work without understanding, you will not do well on the exams.

Late homework will not be accepted (no exceptions). Homework will be due at the beginning of class on the date it is due.

Your two lowest homework grades including ones not turned in will be dropped. This should allow for any problems due to illness, job interviews, weddings, vacations, or unexpected romances.