PHYSICS 130 COURSE SYLLABUS

FALL 2009

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Text: *Physics for Scientists and Engineers with Modern Physics* (seventh edition) by Serway and Jewett and *Physlet Physics* by Christian and Belloni.
Lecture: MWF 10:30-11:20
Lab: W (2:30-5:30) or T (1:30-4:30) Lab manual online.
Office Hours: MW 2:00-3:00, F 11:30-12:30, and Th 11:15-12:15 and other times by appointment. You can usually find me in the Dana building from 9:00 to 5:00. I teach each Quantum Mechanics TTh at 10:00 and I reserve the hour before both Introductory Physics and Quantum Mechanics lecture for my own class preparation.
Help sessions: Students sometimes request that I have informal (and optional) evening help sessions. No new material is covered. I rely on students to guide the discussion of topics. These sessions are most popular before a major review but they can be scheduled whenever there is sufficient interest.

COURSE OBJECTIVES:
The successful student will obtain an understanding of and an appreciation for mechanics, oscillations, kinetic theory, and thermodynamics. The textbook is encyclopedic and we will cover topics in chapters 1 through 19 in order to prepare students for the second semester and for the MCATS. We will, however, pick and choose key sections from the various chapters for more extensive analysis and leave some of the more straightforward applications for reading assignments. Our aim during regularly scheduled class time is not to "cover a lot" but rather to "uncover a little."

Topics "uncovered" will include:

- one dimensional motion,
- kinematics,
- vectors,
- forces,
- circular motion,
- work and energy,
- gravitation,
- momentum,
- rotation,
- oscillations,
- ideal gases,
- and, heat engines.

Even though much of the material we will be studying was developed in the 17th and 18th centuries, it is not without current interest. Much of our technological society is build upon its foundations. Furthermore, the computer has revitalized classical physics through the study of such topics as chaos and multiple particle systems. In fact, the computer has now made it possible to begin the study of systems that were heretofore treated in junior/senior level courses or are impossible to solve! Computers will be used to simulate these systems in class and as part of the weekly laboratory.

STRUCTURE OF THE COURSE:

Class periods will be a mixture of theory, analysis, demonstration, computer simulation, and discussion. We believe in the active-learner approach. You are required to read. Your English professor will not recite every stanza of a Shakespeare sonnet and it is a waste of our time and your parents' money for me to recite sections of Serway's book.

Homework: You will be assigned homework problems together with due dates. I encourage you to use as many resources as possible to complete these exercises including: the library, other classmates, and me. There is, of course, a distinction between collaboration and copying (plagiarism). A student must be able to work each problem that is turned in independently. Conversations among students for the purpose of understanding concepts is encouraged; however, the final analysis and write-up must be your own work. Copying another student's lab data or analysis from this class or any previous class is a violation of the honor code. Since homework is graded, I require that you specify where you received help and how much. Indicate if a tutor or classmate helped you with a homework problem by writing "Jane Doe showed me how to set up the free body diagram" or something similar next to the problem. Annotating your homework will keep you honest and will let me know if there are topics I need to review in class. I will not collect every homework assignment; I will however give an occasional writ similar to the problems that are assigned.

Laboratory: Laboratory will be taught by myself, Mr. Holcomb, and Mr. Drake and is designed to complement the theory presented in class. As such, laboratory exercises are often a compromise between the abstract world of point masses, frictionless tables and massless strings usually assumed and the real world. Hopefully, the labs you will perform will "work" and give results in good agreement with the ideal. We are trying to reinforce the abstract concepts of force, velocity, vectors, etc. with some real everyday phenomena in order to make the physics meaningful. That is the "cookbook" part of any laboratory--we know what the answer should be and we expect you to get reasonably close to it. Often you will discover enough disagreement that you can make some intelligent observations as to the cause of the discrepancy; this is where you can and should add your ideas as to what caused the discrepancy, how you would improve the experiment, or how you would modify the theory to give better agreement. These extras, together with how well the notebook is laid out, how carefully you have made equipment sketches, and how clearly you have explained the procedure are not "cookbook," will vary from individual to individual, and will distinguish the good experimentalist.

Computers: During the first few weeks of Py 130 you will be given instruction in the use of the computer for the analysis and acquisition of data. Computers have been added to the physics laboratory curriculum because they allow the rapid analysis of more data than was possible previously. Computers can help reduce the time and tedium of such routine tasks as tabulating and graphing. More importantly, computers have become a part of professional practice in the sciences and you need to be exposed to their use. There are pitfalls however that will need to be overcome; lost data due to scratched disks, bugs in programs or programmers, and a general computer-phobia among the uninitiated. With proper and careful operating procedures, a little work and understanding, and some occasional humor, these problems should go away. A general understanding of computers is helpful in many courses on campus; so you may wish to enroll in a ITS introductory short course if you don't know what a disk drive is, how to copy and edit a file, or do other basic operations.

Just-in-Time Teaching (JiTT): For most classes and laboratories the theory will have already been covered in class. But not always. You may be assigned a short JiTT exercise to prepare for what will be covered in the next class or laboratory. JiTT exercises are usually not graded on the basis of correctness but rather on the quality of the work and the clarity and depth of your response.

JiTT exercises may reinforce old material or they may require you to study new material. They must be completed before you come to class or to the laboratory. They are due at 8:00 AM the day of the class. (All pre-laboratory exercises are JiTT exercises.) Strict adherence to this rule is necessary for me to have time to review your work before class starts.

COURSE REQUIREMENTS:

Attendance: You are required to attend all lectures and laboratory sessions. Please see me if you have an extended illness or family emergency. You must initial the attendance sheet on the side blackboard every day so that I have a quick check of who is missing.

World Wide Web: You are required to access the Internet in order to retrieve information and complete interactive exercises.

Grade: The final grade will be based on the traditional 100 point scale. It will be comprised of the following contributions:

- Tests- 30%
- Exam- 20%
- Homework and Classwork- 25%
- Labs-25%

There will be three on-class tests and one take home final exam. The final exam will be handed out December 4 and is due December 9.

PHYSICS 130/120 Lab

TEXT: Physics Department laboratory manual.

LABORATORY: The weekly laboratory sessions will help bring to life the fundamental physics discussed in class and in the text. The labs will develop your familiarity with physical apparatus and methods of scientific inquiry, and enhance your understanding of the basic principles of physics. For this part of the course, you should purchase a laboratory notebook with an inside pocket (for handouts). The lab manual is available on the web and each laboratory station will have a paper version. Further details regarding this part of the course will be discussed during the first lab session (see schedule below).

Notebook: You are required to keep a laboratory notebook in which you record your day to day work. The lab notebook shall consist of entries made during each lab period. It should document the particular lab and contain analysis, diagrams, plots, and notes. The better the purposeful explanation, the better the grade.

Week	Topic
Aug. 24	Lab #0: Introduction and Assessment (Physics 130 only)
Aug. 31	No 130 lab. (Physics 120 will meet)
Sept. 7	Lab #1: Statistics
Sept. 14	Lab #2: Measure g
Sept. 21	Lab #3: Newton's Laws
Sept. 28	Lab #4: Centripetal Force
Oct. 5	Lab #5: Trajectories

Oct. 12	No lab.
Oct. 19	Lab #6: Conservation of momentum and energy
Oct. 26	Lab #7: Angular momentum and moment of inertia
Nov 2	Lab #8: Simple Harmonic Motion
Nov. 9	Lab #8: Simple Harmonic Motion, cont'd
Nov. 16	Lab #9: Waves & Sound
Nov. 23	No lab.
Nov. 30	Lab #10: Latent Heat
Dec. 4-8	No lab.

The above outline is the intended schedule. I will give ample notice if adjustments are necessary.