Physics 303: Physical Theory—Syllabus

Instructor: Dr. Itai Seggev (dŏk′ • tər ē • tī′ sĕ′ • gĕv)

August 22, 2006

1 Contact Information

Office: Lewis 121A **Phone**: 662-915-3887 **Email**: iseggev@phy.olemiss.edu
Office Hours: Tuesday/Thursday 11:00–12:00. "Office Hours" means that I promise I will be there and will give you priority over students from my other courses. You are welcome to drop by my office anytime, with the understanding that I may be busy.

2 Course Goals

This one-semester course covers introductory physics from the point of view of the calculus practitioner. We will review many topics from introductory physics (Physics 213-4) and examine how knowledge of calculus deepens our understanding, as well as cover new topics typically omitted from a trigonometry-based course. Specific goals for this course include:

1. improving the ability to explain the logic of a physics problem, both orally and in writing;
2. becoming comfortable using calculus as a problem-solving tool;
3. understanding the fundamental relationship between physics and calculus as well as the new insights calculus provides into physics;
4. mastering calculus-based physics models, especially Newton's second law, Maxwell's equations, and (hopefully) the wave equation.

3 Course Format

3.1 Grade Breakdown

The course grade will be based on the following formula:

- attendance (10%),
- homework assignments (35%)
- presentation (5%),
- term paper (10%),
- midterms (10% each), and
- final exam (20%).

3.2 Homework

Homework will be graded on the **redo system**. When you turn in your homework, you will receive one of three grades on each problem: 10 points (for a perfect problem), 0 (for a problem which is missing or for which no serious attempt was made), or redo (anything in between). Once you receive the homework back, you will have until the due date of the new homework passed out that same day to resubmit the problems with the redo grade. If the new solution is not substantially improved over the previous attempt, you will receive a zero. Otherwise, I will grade the problem normally. Since you will have two chances for each problem, I expect that everyone will have a very high homework grade. Homework will be assigned each lecture. Homework assigned on Tuesday will be due Friday at 5pm. Homework assigned Thursday will be due Monday at 5pm.

Homework assignments are your best opportunity for working out confusions and mastering the material. While you are encouraged to discuss problems with your classmates, **your write up must be your own!** Finding a joint solution and then each person copying that common solution is strictly prohibited. On the other hand, going home and each person writing up a solution on his or her own after working together to solve a problem is perfectly acceptable. While this is a fine line, it is remarkably easy for the grader (me) to tell which occurred, based on the quality of explanations provided in the solutions turned in. Please do a favor to both your learning and your grade by following these rules.

For more on my expectations on homework solutions, please see the document "The Care and Feeding of a Physics Problem Set."

3.3 Oral Presentation

Each student will make one oral presentation. The topics will be chosen jointly by me and the student. These might be presentations of a "Communicating Physics" problem in the text, or cover a related topic which I will not cover in lecture. They should be about 15 minutes long (not including a few minutes for questions). You will be graded equally on the correctness of the physics, the clarity of your presentation, and the mechanics of your delivery (projecting your voice, good board work or overheads, etc.).

3.4 Term Paper

The purpose of this paper is both to give you an opportunity to learn additional physics and improve your technical writing. As such, you will be graded equally on content, clarity of exposition, and style. You should use a formal tone and include proper citations. The paper should be 4-6 pages, **single spaced**, and cite **several** sources (Wikipedia and other web resources are excellent *starting points*, but generally should not be cited in the final paper).

Any topic given as an "Expand Horizons" problem in text would be acceptable. A "Communicating Physics" problem or some other topic may be chosen with prior approval. A one paragraph proposal will be due at the end of the tenth week of class; this should indicate that you have chosen a definite topic and that you have read a few sources. A **complete** rough draft will be due at the end of the twelfth week of class. The paper will be

due Friday at 5pm on the last day of class. While you will not receive a formal grade on the proposal and rough draft, I will penalize your final paper grade if you do not submit them on-time or if they are seriously inadequate.

3.5 Exams

The two midterms will be on or around Thursday, September 21, and Thursday, October 26. The final exam is scheduled for Thursday, December 7, at 8am. All tests will be in-class, closed-note, and closed-book. However, you will be permitted to bring in an $8.5'' \times 11''$ sheet of paper with any formulae or notes you want on it. The only rules are (1) it must be readable by the unaided eye, and (2) you must write everything yourself (i.e., photocopying the book or somebody else's notes is not permitted).

3.6 Textbook

The textbook for this course is *University Physics* by Ronald Lane Reese. This is an excellent book and you are strongly encouraged to read it. It is also a very thick book; it cannot be covered in its entirely in a year, let alone a semester. We will cover all or part of approximately 15 chapters. I will do my best to make it very clear which sections of the book you are responsible. If you are not sure, ask.

3.7 Course Outline

The table below shows a *tentative* schedule for the course, including the corresponding chapters from the book. We will probably not follow this schedule precisely, but we will follow the general order of the topics.

Week	Topics	Chapters in Book
08/22 08/24	3-dimensional vectors	2
08/29 08/31	rectilinear motion of a point particle	3
09/05 09/07	3-dimensional kinematics of a point particle	4
09/12 09/14	kinematics of extended objects	9 & 10
09/19 09/21	review, **first midterm**	
09/26 09/28	work and energy of point particles	8
10/03 10/05	work and energy of extended objects	8–10
10/10 10/12	electric and gravitational forces	6 & 16
10/17 10/19	electric and gravitational potential energy	8 & 17
10/24 10/26	review, **second midterm**, **proposal due**	
10/31 11/02	Gauss's Law	6 & 16
11/07 11/09	magnetism, **rough draft due**	20
11/14 11/16	electromagnetic induction	21
11/21 11/23	**Thanksgiving Break—Happy Holidays!**	
11/28 11/30	oscillations, waves, and light, **paper due**	7, 12 & 21
12/05 12/07	**Finals Week—Good Luck!**	