

PHY 2060 Enriched Physics 1 — Spring 2012

Class Meetings	Tuesday and Thursday, periods 4 and 5, in 1002 NPB
Instructor	Prof. Selman Hershfield, 2138 NPB (392-9387, selman@phys.ufl.edu)
Office Hours	TBA
Web Page	http://www.phys.ufl.edu/courses/phy2060/spring11/
Required Text	<i>Physics, Volume 1</i> , R. Resnick, D. Halliday, and K. S. Krane (5th ed., Wiley, 2001)

Summary: This is the first course in the Enriched Physics sequence PHY 2060–2061 for students with prior preparation in physics who wish to acquire a deeper understanding of the subject. The enriched sequence covers similar material to the Physics With Calculus sequence PHY 2048–2049, but treats basic topics at a faster pace, incorporates more advanced material, and places greater emphasis on instilling conceptual understanding and on developing the ability to solve more challenging problems. PHY 2060 treats concepts in classical mechanics, including kinematics, dynamics, conservation laws, oscillations, and special relativity.

Aim: On completion of this course, you should have a sound understanding of key concepts in classical mechanics and special relativity, and be able to apply this understanding to analyze, and make quantitative predictions about, the physics of unfamiliar situations. The course should also improve your problem-solving skills.

Prerequisites: PHY 2060 is *not* designed to be a first course in physics.

- You should have studied physics at high-school level. Completion of an AP course is helpful but not essential. However, if you have had no physics in high school, you will be at a significant disadvantage.
- You need to be proficient at algebra, at geometry and trigonometry (see page A-20 of the text), and at performing elementary vector operations (see Sec. 2-2 of the text).
- You should have successfully completed MAC 2311 Calculus 1 or equivalent, and have taken or be currently be enrolled in MAC 2312 Calculus 2. The course will make extensive use of differentiation, and at several points during the semester you will be expected to complete problems involving integration. The section "Derivatives and Integrals" on page A-21 of the text contains a useful summary of the calculus results that you will need.

If you are in doubt as to whether you should take PHY 2060 or one of the alternatives (such as PHY 2048), please consult the instructor immediately.

Text: You will need access to the course text to supplement the lectures, to complete reading assignments and as a source of practice problems. It is essential that you use the Fifth Edition of *Physics*, because earlier editions are substantially different.

Class Meetings: Normally, each class will combine both a lecture presentation and a discussion session (i.e., problem-solving with active student participation).

Grading: Grading will be based on an absolute point scale from 0 to 100. The letter grade assignment will be based on the students total point score. Points will be assigned for homework (max 20 points), quizzes (max 10 points), and exams (max 70 points). The conversion to letter grades will be done using the following conversion table after rounding the total number of points to zero decimal places.

Letter Grade	Point Range
A	≥ 85
A-	≥ 78
B+	≥ 71
B	≥ 65
B-	≥ 58
C+	≥ 51
C	≥ 45
C-	≥ 42
D+	≥ 38
D	≥ 35
D-	≥ 30
E	< 30

Homework: Homework is assigned weekly typically on Tuesday and due the following week. The assignments will be communicated both in class on the board, on the 'News' on our class web site. Cooperation on homework is permitted and discussion of problems is encouraged. The faculty (instructor + teaching assistant) will not solve homework problems until after the due date for the homework assignment. You must always show your algebra to obtain credit for a problem, including a problem which requires a formula for an answer.

Each homework set carries a maximum score of 20 points. The final homework score is calculated as an average of all homework scores, dropping the 2 worst homeworks. Homework grading will be done in such a way that two worst homework scores are ignored in the computation of the final score. Therefore, there will be no extensions or makeup homework assignments. The only exception is long-term illness which will be reviewed on a case by case basis.

Quizzes: On most Tuesdays a 15-min quiz will be administered in class. The material on the quiz will correspond to the material covered in the previous week. Each quiz will carry a maximum score of 20 points. The final quiz score is calculated as an average of all quiz scores, dropping the worst quiz.

Exams: In addition to the final exam, three other in-class exams will be administered. These will cover significant chunks of the class material. Each exam will carry a maximum score of 70 points. The final exam will also carry a maximum score of 70 points. The total score for exams will be computed based on the formula:

$$0.33 * [E1 + E2 + \text{Makeup} - \min(E1, E2, \text{Makeup}) + 1 * F]$$

where E1, E2, and F are the scores on the two 'midterm' exams and final, respectively. The minimum function removes the lowest value of E1, E2 and the Makeup. In other words, in the computation of the exam contribution, the Makeup can replace a low test score from the first two exams *but* the Makeup - if lower than both E1 and E2 - is not counted.

Schedule of lectures: The schedule below lists the topics planned for each lecture, cross-referenced to the text, as well as the date of each exam. This schedule is likely to evolve. It is your *responsibility* to be aware of any changes announced in class. (Many announcements will also be posted on the Web.)

Lecture #	Date	Section# from Text
1	01/10/12	First class: Motion in one dimension (Secs. 2-3 to 2-6)
2	01/12/12	Force and Newton's laws (Secs. 3-2 to 3-8)
3	01/17/12	Reference frames and relative motion (Secs 3-2, 4-6), Projectile motion (Secs. 4-1, 4.3)
4	01/19/12	Projectile motion (Secs 4-3 and 4.4), Uniform circular motion (Sec 4.5)
5	01/24/12	Uniform circular motion (Sec 4.5),
6	01/26/12	Tension, normal forces and frictional forces (Secs 5-2, 5-3)
7	01/31/12	Uniform circular motion (Sec 5-4), Linear momentum and impulse (Secs 6-2, 6-3)
8	02/02/12	Conservation of Momentum, One dimensional collisions (Secs 6-4, 6-5)
9	02/07/12	Many-particle Systems (Secs 7-3, 7-4)
10	02/09/12	Many-particle Systems (Secs 7-5, 7-6)
Exam 1	02/14/12	Exam in class
11	02/16/12	Rotational Kinematics (Secs 8-1 to 8-6)
12	02/21/12	Torque and Rotational Inertia (Secs 9-1 to 9-4)
13	02/23/12	Rotational Dynamics (Secs 9-5 to 9-8)
14	02/28/12	Conservation of Angular Momentum (Secs 10-1 to 10-5)
15	03/01/12	Work, Energy and Power (Secs 11-1 to 11-3), Work Done by a Variable Force (Sec 11-4)
16	03/13/12	The Work-Energy Theorem (Secs 11-6 to 11-8)
17	03/15/12	Potential Energy (Secs 12-1 to 12-5)
18	03/20/12	Conservation of Energy (Secs 13-1 to 13-5)
19	03/22/12	Gravitation (Secs 14-2 to 14-7)
20	03/27/12	Simple Harmonic Oscillations (Secs 17-1 to 17-4)
21	03/29/12	Review
Exam 2	04/03/12	In class exam
22	04/05/12	Real Harmonic Oscillations (Secs 17-5, 17-7 and 17-8)
23	04/10/12	Postulates of special relativity (Sec 20-2)
24	04/12/12	Time dilation and length contraction (Sec 20-3)
25	04/17/12	The Lorentz transformation (Secs 20-4 to 20-7)
26	04/19/12	Review
27	04/24/12	Makeup Exam in Class
Final Exam	05/02/12	3-5PM in NPB 1002

How to Succeed in PHY 2060: You should *attend class* to learn about the basic concepts and how to apply them in solving problems. The material presented may seem familiar at the start of the semester, but the pace is quite fast and very few students will have a thorough understanding of all the topics covered. Arrive on time for class, since announcements will generally be made at the start of each lecture.

It will likely benefit you to read the textbook in advance to acquaint yourself with the material to be covered in class. This is particularly true if your prior preparation is a little weak, because the lectures will cover the introductory material (e.g., motion in one dimension) quite quickly. You should work all the homework assignments, which form an essential part of the course. With all the opportunities to achieve a high score, you should look to the homework to establish a strong foundation for your overall course score. In past semesters, students who achieved an "A" grade in the course typically scored at least 95% on the homework.

Problem-solving provides a good measure of your understanding of basic principles by testing your ability to combine different physical concepts as they apply to unfamiliar situations. If you find that you are struggling with the homework, or if you want to improve your performance on the exams, you should practice additional problems beyond the assigned homework. Your grade in this course will be based solely on your success at solving problems during homework assignments and exams, so there will be a direct payoff for your effort.

The best source of practice problems is the text, which has sets of Exercises and Problems at the end of each chapter. Exercises are similar in difficulty to the more straight-forward exam questions, Problems, which are usually more challenging, are closer in character to the harder exam problems. Brief answers are provided to odd-numbered Exercises and Problems, so you can check your solutions. You will learn most if you try each problem on your own first. If you get stuck, talk the problem over with a friend, consult the instructor, or check the solution (if one is available). Whenever you need help to complete a problem it is essential, though, that you consolidate your new understanding by successfully doing another problem of the same type by yourself. Don't despair if you seem to make a lot of mistakes at the start. A successful physicist is basically somebody who has made all possible mistakes in the past and has learned how to avoid repeating most of them!

If you are encountering difficulties with PHY 2060, don't wait to seek help. The course content is largely cumulative, so if you fall behind it will be hard to catch up. You are encouraged to consult with the instructor in person or via e-mail. When using e-mail, please make any physics questions as specific as possible, and recognize that it may be some time before you get a reply (especially outside normal business hours). Discussion of complex matters is usually best conducted face to face, either immediately after class or during office hours. If your schedule prevents you from attending office hours, feel free to contact the instructor to set up an appointment at a more convenient time.

Accommodations: Students requesting classroom accommodations must first register with the Disabilities Resources Center. The Disabilities Resources Center will provide documentation to the student, who must then deliver this documentation to the instructor when requesting accommodations.

Academic Honesty: All University of Florida students are required to abide by the University's Academic Honesty Guidelines and by the Honor Code, which reads as follows:

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Cheating, plagiarism, or other violations of the Academic Honesty Guidelines will not be tolerated and will be pursued through the University's adjudication procedures.