

PHY 2060 Enriched Physics 1 — Spring 2014

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/spring14/
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 total point score. Points will be assigned for homework (max 15 points), quizzes (max 10 points), class participation (max 5 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	Letter Grade	Point Range
A	≥ 85	C	≥ 45
A-	≥ 78	C-	≥ 42
B+	≥ 71	D+	≥ 38
B	≥ 65	D	≥ 35
B-	≥ 58	D-	≥ 30
C+	≥ 51	E	< 30

Homework: Homework is assigned weekly and due the following week. The assignments will be communicated both in class and on the course web site. Cooperation on homework is allowed, including discussing a problem with the me; however, you must write up the solution yourself. No two solutions should be exactly the same. 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 lowest scores. 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: For most weeks an announced 15-min quiz will be administered in class. The quiz will be on the most recent homework assignment. Each quiz will carry a maximum score of 10 points. The final quiz score is calculated as an average of all quiz scores, dropping the lowest score.

Participation: As part of a free trial (no cost to you) we are going to use an in-class response system from Via Response. I will be asking questions in class, usually as part of my regular presentation, and you will respond via an internet connected device, e.g. a smart phone, tablet, or laptop. This is the first time that we are using this response system in the Physics department. It will mean that you do not need to purchase a separate “clicker,” but can rely on something that you likely already carry with you. We will start this during the second week of class, after the course roster has been finalized. A correct answer to a participation question gets 2 points and any other response gets 1 point. Your lowest 20% of scores will be dropped, allowing for absences or missing questions for other reasons.

Exams: In addition to the final exam, three other in-class exams will be administered. These will cover significant chunks of the class material. 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. All exams and quizzes are closed book with no formula sheets allowed.

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	01/07/14	First class: Motion in one dimension (Secs. 2-3 to 2-6)
2	01/9/14	Force and Newton's laws (Secs. 3-2 to 3-8)
3	01/14/14	Reference frames and relative motion (Secs 3-2, 4-6), Projectile motion (Secs. 4-1, 4.3)
4	01/16/14	Projectile motion (Secs 4-3 and 4.4), Uniform circular motion (Sec 4.5)
5	01/21/14	Uniform circular motion (Sec 4.5),
6	01/23/14	Tension, normal forces and frictional forces (Secs 5-2, 5-3)
7	01/28/14	Uniform circular motion (Sec 5-4), Linear momentum and impulse (Secs 6-2, 6-3)
8	01/30/14	Conservation of Momentum, One dimensional collisions (Secs 6-4, 6-5)
9	02/04/14	Many-particle Systems (Secs 7-3, 7-4)
10	02/06/14	Many-particle Systems (Secs 7-5, 7-6)
11	02/11/13	Review
Exam 1	02/13/14	Exam in class
12	02/18/14	Rotational Kinematics (Secs 8-1 to 8-6)
13	02/20/14	Torque and Rotational Inertia (Secs 9-1 to 9-4)
14	02/25/14	Rotational Dynamics (Secs 9-5 to 9-8)
15	02/27/14	Conservation of Angular Momentum (Secs 10-1 to 10-5)
16	03/11/14	Work, Energy and Power (Secs 11-1 to 11-3), Work Done by a Variable Force (Sec 11-4)
17	03/13/14	The Work-Energy Theorem (Secs 11-6 to 11-8)
18	03/18/14	Potential Energy (Secs 12-1 to 12-5)
19	03/20/14	Conservation of Energy (Secs 13-1 to 13-5)
20	03/25/14	Gravitation (Secs 14-2 to 14-7)
21	03/27/14	Simple Harmonic Oscillations (Secs 17-1 to 17-4)
22	04/01/14	Review
Exam 2	04/03/14	In class exam
23	04/08/14	Real Harmonic Oscillations (Secs 17-5, 17-7 and 17-8)
24	04/10/14	Postulates of special relativity (Sec 20-2)
25	04/15/14	Time dilation and length contraction (Sec 20-3)
26	04/17/14	The Lorentz transformation (Secs 20-4 to 20-7)
27	04/22/14	Makeup Exam in Class
Final Exam	04/28/14	5:30-7:30PM in NPB 1002

How to Succeed in PHY 2060: The short answer to this question is: do the homework on your own or with as little external help as possible. Obviously, we do not want you to be stuck for hours on a single problem; however, being stuck and then figuring out how to do the problem will be a tremendous boost to your confidence. This means that you need to start the homework assignment early, as opposed to the night before it is due.

The goal of doing the homework is not just to get the problems correct, but to learn how to do all similar problems by solving a particular problem. If you get help from a solution manual, a friend, a tutor, or me, you still need to make sure that you know how to do the problem on your own. A good way to check this is to come back to the problem a few days later. If you can do the problem by yourself, then you have probably mastered this kind of problem. Another good way to check if you have learned how to do a class of problems is to try problems near the assigned problem in the book. The answers to all odd numbered problems are in the back of the book. The number of problems assigned each week is based on how many different problems I think you need to do to master the material. It may be that you need to do more than that number of problems to master the material. The odd numbered problems are a good place to start. Last year's exams will also be posted to the course web site, along with solutions.

To assess your progress in mastering the course material, weekly quizzes will be given. This will be based on the homework topic and in some cases actually be almost identical to the homework. (I also sometimes put homework problems on exams.) If you are getting 90-100% on the quizzes, then you have mastered the material. Otherwise, you will likely need to go back and do some extra problems. The material in the course is cumulative, meaning that you need to master the earlier topics to do the problems later in the course. Thus, if you do poorly on a quiz, it is very important to go back and make sure you have mastered the material.

If you are having difficulty in the course, such as doing poorly on more than one quiz, please come see me. The class has 4 periods reserved per week for a three credit course. I intend to use the last half period of each 2 period time slot as a study hall to help individual students with problems and to serve as an additional office hour that everyone is guaranteed to be able to attend.

Finally, based on past experience I offer a word of warning. Many of you will have seen the material at the beginning of the course before in your high school Physics class. Be careful not to conclude that you will have seen all the material in the course before and hence this is an easy course. At some point in the semester we will do material that is more advanced than what you did in high school. This will be a different point for each student so be careful. As long as you can do the homework on your own and do well in the quizzes, you will be fine on the exams.

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.