Syllabus: PHY 2060 - Enriched Physics 1 - Fall 2023

Instructors

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Class meeting time and location

Prof. Hershfield: Tuesday and Thursday, Periods 2 & 3 (8:30am - 10:25 am) in NPB 1002

Office hours

These will be determined during the first week of class so that as many students as possible can come regularly.

Course objectives and goals

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. While this course covers more advanced topics that PHY2048, it is hoped that the small class format and hand graded exams with partial credit will mean that PHY2060 is not more difficult than PHY2048.

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 the 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. This 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.

Textbook

The text book is Resnick, Halliday, Krane: Physics, Volume 1 [5th Edition, Wiley, ISBN 978-0-471-32057-9] is required. An electronic version of the text is available at a reasonable price via the University of Florida's opt-in program. You may also find affordable used versions or be able to borrow the book from a student who took this course previously.

Reading assignments

You are expected to read the material to be covered in each lecture before coming to the class. The lectures will cover a lot of material listed in the schedule, but they are not designed to be a substitute for the text. The lectures will consist mainly of illustrating concepts with experiments and demonstrations, discussing additional material omitted in the text, pointing out subtle points and common mistakes, and asking questions to find out and clarify misconceptions. The homework and exams will be based on materials covered in lectures as well as those listed in the schedule.

Grading

Your grade is based on the total number of points you receive from exams, quizzes, homework, and in-class assignments. There are 800 total possible points distributed as shown below.

Exam 1	200 points
Exam 2	200 points
Final	200 points
Homework	100 points
Quizzes	50 points
In-Class Assign.	50 points (max)
Total	800 points

Letter grades are computed from your point score with the following conversion table.

A	$\geq$ 720 points or 90%
A-	$\geq$ 680 points or 85%
B+	$\geq$ 640 points or 80%
B	$\geq$ 560 points or 70%
B-	$\geq$ 520 points or 65%
C+	$\geq$ 480 points or 60%
C	$\geq$ 440 points or 55%
C-	$\geq$ 400 points or 50%
D+	$\geq$ 360 points or 45%
D	$\geq$ 320 points or 40%
D-	$\geq$ 280 points or 35%
E	$<$ 240 points or 30%

Your scores will be entered into Canvas in a timely manner. Canvas may try to compute your grade based on the scores that we enter. Please disregard that. Our system of just adding points is sufficiently simple that you can do it yourself correctly. Below we discuss each component of your grade in more detail.

Exams

There will be two midterm exams and a final exam. They will be graded out of 100 and then your score will be multiplied by two to get the point score out of 200. The dates and chapters covered in the exams are on the class on Canvas. All exams are closed book, and no formula sheet or notes are permitted in the exam. Calculators are allowed provided that your calculator does not have internet access and can not store pdf's or other image files. There will be a review session for each exam, and we will provide previous years' exams as practice. If you miss an exam for a documented university sanctioned absence, there will be a make-up exam scheduled to fit both the instructor's and your schedules.

Homework

Homework is assigned weekly, and will be communicated in class and electronically. Cooperation on the homework is permitted; however, each student must write up their own homework solution. You can not

hand in group solutions. The instructors will not solve homework problems until after the due date for the homework assignment, although we will be happy offer suggestions and guidance. Each homework set carries a maximum score of 10 points. We anticipate assigning at least 10 homework sets. At the end of the semester we will divide your homework score by 0.9, which is like dropping one assignment. You can not receive over 100 points total for the homework part of the grade. There are no extensions or makeups on homework assignments unless clear documentation for university sanctioned reason is provided.

Quizzes

There will be five quizzes each worth 10 points. Thus, the total number of points for quizzes is 50 points. Quizzes will be announced ahead of time. The purpose of the quizzes is to make sure you are internalizing what you do in the homework assignments and can solve problems without all your notes, the book, etc. This is what you will be asked to do on exams, which count for many more points. You can make-up a quiz if you bring in documentation for a university sanctioned absence. The make-up quiz should be taken as soon as you return to class.

In-Class Assignments

Because this course is scheduled for two consecutive periods, we will use a combination of lecture and other interactive activities. Sample activities include: work on challenging problems or old exam problems in small groups, have tutorials and hands-on sessions on programming, and "playing" with physics demonstrations. You will receive a few points usually just for participating in these activities. The total number of points awarded will be substantially larger than 50 points, but the maximum allowed for this portion of your grade is 50 points. This effectively allows you to drop some in class assignments that you may have missed on not scored 100% on. As in all other aspects of this course we will accept documentation for university sanctioned absences.

Course schedule (tentative)

The schedule of what is planned for each lecture, cross-referenced to the text, as well as the date of each exam is given in Canvas. The Canvas page will also have links to my lecture notes and solutions to problems that you have been asked to work out in class (posted after class). Sometimes the schedule does change due to weather (hurricanes) in the fall. Announcements of changes will be posted on canvas and be sent to your UF-email address.

Class attendance, make-up exams, etc...

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx .

Accommodations for students with disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://disability.ufl.edu) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UF grading policies

Information on current UF grading policies for assigning grade points can be found here:
https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Online course evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at `https://evaluations.ufl.edu`. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at `https://evaluations.ufl.edu/results/` .

The Honor Pledge

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. 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."
See `https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/` .
The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

Campus Resources

Health and Wellness

U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392- 1575 so that a team member can reach out to the student.

Counseling and Wellness Center: `https://counseling.ufl.edu/`, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.

University Police Department, 392-1111 (or 9-1-1 for emergencies). `http://www.police.ufl.edu/`

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learningsupport@ufl.edu. `https://elearning.ufl.edu` .

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. `https://career.ufl.edu/`

Library Support, `http://uflib.ufl.edu/find/ask/` . Various ways to receive assistance with respect to using the libraries or finding resources.

Acadmic Resources incluing study skills and tutoring. `https://academicresources.clas.ufl.edu/`

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. `http://writing.ufl.edu/writing-studio/`

U Matter, We Care: `https://umatter.ufl.edu/`

PHY2060 - Enriched Physics 1 with Calculus - Fall 2023

Reference

- **Syllabus** (https://ufl.instructure.com/courses/490459/pages/syllabus)
- **Old Exams** (https://ufl.instructure.com/courses/490459/pages/old-exams)
- **Old Quizzes** (https://ufl.instructure.com/courses/490459/pages/old-quizzes)
- **Mechanical Universe Video Series** ⤷ (https://www.youtube.com/playlist?list=PL8_xPU5epJddRABXqJ5h5G0dk-XGtA5cZ)

Schedule

These lecture notes will be updated prior to each lecture, and material related to in-class work will be posted after class.

- **Thursday, August 24** - **Course overview, dimensional analysis, motion in 1D** (https://ufl.instructure.com/courses/490459/files/80020589?wrap=1) (Secs. 2-3 to 2-6)

- **Tuesday, August 29** - **Force and Newton's Laws** (https://ufl.instructure.com/courses/490459/files/80020588?wrap=1) (Secs. 3-2 to 3-8)
- **Thursday, August 31** - **Reference frames, relative motion** (https://ufl.instructure.com/courses/490459/files/80020585?wrap=1) (Secs. 3-2, 4-6), **projectile motion** (https://ufl.instructure.com/courses/490459/files/80020585?wrap=1) (Secs. 4-1, 4-3)

- Monday, September 4 - Labor Day
- **Tuesday, September 5** - **Projectile motion** (https://ufl.instructure.com/courses/490459/files/80020584?wrap=1) (Secs. 4-1, 4-3), **circular motion** (https://ufl.instructure.com/courses/490459/files/80020584?wrap=1) (Sec. 4-5)
- **Thursday, September 7** - **Tension, normal forces and frictional forces** (https://ufl.instructure.com/courses/490459/files/80020587?wrap=1) (Secs. 5-2, 5-3)

- **Tuesday, September 12** - **Uniform circular motion, linear momentum and impulse** (https://ufl.instructure.com/courses/490459/files/80020583?wrap=1) (Secs. 6-2, 6-3)
- **Thursday, September 14** - **Conservation of momentum, 1D collicions** (https://ufl.instructure.com/courses/490459/files/80020582?wrap=1) (Secs. 6.4, 6-5)

- **Tuesday, September 19** - [Many particle systems, center of mass (https://ufl.instructure.com/courses/490459/files/80020581?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020581?wrap=1) (Secs. 7-3 to 7-6)
- **Thursday, September 21** - [Review for Exam 1 (https://ufl.instructure.com/courses/490459/files/80020586?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020586?wrap=1)

- **Tuesday, September 26** - In-class Exam 1 on Chapters 2-7
- **Thursday, September 28** - [Rotational kinematics (https://ufl.instructure.com/courses/490459/files/80020580?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020580?wrap=1) (Secs. 8-1 to 8-6)

- **Tuesday, October 3** - [Torque and rotational inertia (https://ufl.instructure.com/courses/490459/files/80020579?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020579?wrap=1) (Secs. 9-1 to 9-4)
- **Thursday, October 5** - [Rotational dynamics, static (https://ufl.instructure.com/courses/490459/files/80020578?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020578?wrap=1) s (Secs. 9-5 to 9-8)
- Friday, October 6 - Homecoming

- **Tuesday, October 10** - [Conservation of angular momentum (https://ufl.instructure.com/courses/490459/files/80020577?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020577?wrap=1) (Secs. 10-1 to 10-5)
- **Thursday, October 12** - [Work, energy and power (https://ufl.instructure.com/courses/490459/files/80020574?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020574?wrap=1) (Secs. 11-1 to 11-8)

- **Tuesday, October 17** - [Potential energy (https://ufl.instructure.com/courses/490459/files/80020576?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020576?wrap=1) (Secs. 12-1 to 12-5)
- **Thursday, October 19** - [Conservation of energy (https://ufl.instructure.com/courses/490459/files/80020574?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020574?wrap=1) (Secs. 13-1 to 13-5)

- **Tuesday, October 24** - [Gravitation (https://ufl.instructure.com/courses/490459/files/80020572?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020572?wrap=1) (Secs. 14-2 to 14-7)
- **Thursday, October 26** - [Review for Exam 2 (https://ufl.instructure.com/courses/490459/files/80020571?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020571?wrap=1)

- **Tuesday, October 31** - In-class Exam 2 on Chapters 8 through 14 (up through Sec. 14-7)
- **Thurday, November 2** - [Fluids (https://ufl.instructure.com/courses/490459/files/80020573?wrap=1)](https://ufl.instructure.com/courses/490459/files/80020573?wrap=1) (Secs. 15-1 to 15-5 and 16-1 to 16-4)

- **Tuesday, November 7** - **Simple harmonic oscillations (https://ufl.instructure.com/courses/490459/files/80020570?wrap=1)** (Secs. 17-1 to 17-4)
- **Thurday, November 9** - **Real harmonic oscillations (https://ufl.instructure.com/courses/490459/files/80020570?wrap=1)** (Secs. 17-5, 17-7, 17-8)

- **Tuesday, November 14** - **Wave motion (https://ufl.instructure.com/courses/490459/files/80020569?wrap=1)** (Secs. 18-1 to 18-10)
- **Thurday, November 16** - **Sound waves (https://ufl.instructure.com/courses/490459/files/80020568?wrap=1)** (Secs. 19-1 to 19-9)

- **Tuesday, November 21** - **Postulates of special relativity (https://ufl.instructure.com/courses/490459/files/80020567?wrap=1)** (Sec. 20-2)
- Thursday, November 23 - Thanksgiving

- **Tuesday, November 28** - **Time dilation and length contraction (https://ufl.instructure.com/courses/490459/files/80020566?wrap=1)** (Sec. 20-3)
- **Thurday, November 30** - **The Lorentz transformation (https://ufl.instructure.com/courses/490459/files/80020565?wrap=1)** (Secs. 20-4 to 20-7)

- **Tuesday, December 5** - **Review for final exam (https://ufl.instructure.com/courses/490459/files/80020564?wrap=1)**

- **Tuesday, December 12** - Cumulative Final Exam @ 10:00am - 12:00pm