

Syllabus

PHY 2060 – Enriched Physics 1 – Spring 2024

Welcome to PHY 2060. If you are motivated, curious about physics, have a solid mathematics background and are not afraid of challenging problems, this is the place for you! The syllabus presented below is also available on the Canvas website in a more friendly setting, should you prefer to access it online.

Instructor : Dominique Laroche, Department of Physics

Office: NPB 2261, tel 352-392-8591 **Lab:** NPB B-2

Email : dlaroc10@ufl.edu I will attempt to respond to emails within 24 hours. Email is the preferred mode of communication, but message through canvas will also be answered.

TA: TBD

Learning environment: Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. I embrace the diversity of age, background, ethnicity, gender identity and expression, national origin, religious affiliation, sexual orientation and other visible and non visible categories that you bring with you to our shared study of physics. I expect that all students will contribute to a respectful, welcoming, and inclusive environment. Students will be required to work together throughout course. I expect respectful student collaborations such as attentive listening, patience and tolerance to divergence of opinions as well as responding to the contributions of all teammates.

Class details: In-person lectures will occur Tu & Th Period 6&7 (12:50 PM - 2:45 PM) in NPB 1002. The lectures will also be available synchronously on [zoom](#), and will be recorded. As per University and CDC guidelines, students are encouraged to wear mask inside UF facilities if they are feeling unwell.

Should the students feel unwell or are otherwise unable to attend the in-person lectures, they are encouraged to attend the remote lecture. If the students attending the remote lectures do not want their picture or voice recorded, they should keep their camera and/or microphone off. No preferential treatment will be given to students attending either lecture mode. The group discussion activities will be designed to be in hybrid form where both live and remote students can participate. Low stake quizzes might be done remotely under some circumstances upon prior arrangement with the instructor. Higher stakes exams (midterm and final examination) however must be done in person, with live proctoring.

Office hours (tentative): Mon 9:30 to 10:30 am (4th period) and Tu, 4:00 pm to 5:00 PM (9th period). Official office hours will be determined by a class survey to ensure that every student is available to attend at least one office hour time slot. Should you need to talk to me outside office hours, feel free to email me so that we can schedule an appointment. Office hours will be available in hybrid format (both in person and remote), with a zoom link provided once the office hours times have been settled.

In addition, optional “extra problem solving sessions” will be held before every quiz and examination. These will typically be 1h long and will be held in hybrid format in the early evening at a time to be

determined after a class survey has been answered.

Class website: Class syllabus and calendar, assignments, extra material as well as relevant announcements will all take place on the class Canvas website (www.ufl.instructure.com/courses for login). For technical issues with Canvas, please contact technical support by phone at (352) 392-4357 or by email at learning-support@ufl.edu

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, 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 me immediately.

Textbook : Physics Vol. 1, 5th ed. by Resnick, Halliday, and Krane (Wiley)

An electronic version of the text is available at a lower 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.

Course description :

This class aims to provide you with the information needed to understand and predict the results of physical situations regularly encountered, such as how fast objects fall, how to predict the trajectory of a thrown object or how planets orbit the sun. But as a first undergraduate course in physics, this class goes well beyond that. Learning how objects move and react to forces from a mechanics point of view will carry over to all branches of physics! The reaction of objects to forces is universal, regardless of the force origin, be it mechanical, electrical or nuclear! This enriched course is aimed at students with prior preparation in physics who wish to acquire a deeper understanding of the subject. The material will be covered at a faster pace than the one presented in the Physics with calculus sequence (PHY 2048-2049). Emphasis is placed on developing a solid conceptual understanding and on applying these concepts to the explanation of real world phenomena. Ability to communicate and explain these concepts and their applications will also be essential. PHY 2060 covers concepts in classical mechanics, including linear and rotational kinematics and dynamics, conservation laws, oscillations, fluids and special relativity.

PHY2060 is a general education course in physics, whose learning objectives fit within the umbrella of UF’s Physical Science general education courses available at the following URL:

<https://undergrad.ua.ufl.edu/general-education/gen-ed-program/subject-area-objectives/>

Course expectations:

Students enrolling in this class should be comfortable with differentiation, trigonometry, algebra and vector operations. Students will also be expected to be able to solve standard integrals and simple differential equations. The use of these skills will be an intrinsic part of the course. Class attendance will not be monitored, but is definitely expected.

While the class readings will not be assessed formally, you will be expected to have read the textbook chapters ahead of time. The reading assignments are listed in the class schedule date-by-date. The lectures will cover key concepts listed in the schedule, but they are not designed to be a substitute for the textbook. The lectures will consist mainly of illustrating the key concepts with experiments and demonstrations (when possible), discussing additional material omitted in the text, pointing out subtle points and common mistakes, asking questions to find out and clarify misconceptions, and applying the learned concepts to solve problems. The homework and exams will be based on materials covered in lectures as well as material from the reading.

There is no secret to success in this class. If you attend class, read the textbook ahead of times, review the class notes, and work the problems and examples diligently, both individually and in small groups, then you will learn the material. I cannot stress how important learning to solve the problems on your own is. Simply reading out (or copying) the solutions is generally insufficient to learn the material! As a personal piece of advice, do not fear getting the wrong answer. Understanding what leads you to the wrong answer, or knowing the mistakes you tend to make is one of the best way to master a subject. On average, you are expected to devote 8 to 12 hours a week (outside of classes) to keep up with the material. If at any time you have a question, either during classes or outside of classroom hours, please do not hesitate to talk to me.

Course learning goals:

At the end of this course, students will be expected to have achieved the [General Education](#) learning outcomes as follows:

Content: *Students demonstrate competence in the terminology, concepts, theories and methodologies used within the discipline(s).*

i) **Identify, describe, and explain** the physics of mechanics, including the mathematical description of: Measurement units and significant figures, kinematics in 1, 2 and 3 dimensions, forces, collisions and momentum conservation, Static equilibrium and rotation dynamics, work and energy conservation, gravitation, fluids, harmonic motion, waves, including sound propagation and special relativity **(P)**.

Assessments: Homework problems, in-class discussions, quizzes, term paper and exams.

ii) **Identify, describe, and explain** how the scientific theories apply to real world situations and can be tested. **(P)**. **Assessments:** questions relating to experimental demonstrations in quizzes and exams, and in-class discussions.

Critical Thinking: *Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s).*

i) **Critically analyze, evaluate, and synthesize** information in a problem using physics knowledge to develop a solution strategy and eventually a solution to the problem. **(P). Assessments:** Homework, in-class discussions, quizzes, exams.

ii) **Apply techniques of discovery and critical thinking** effectively to solve scientific problems and to evaluate outcomes. **(P). Assessments:** in-class discussions, term paper.

Communication: *Students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).*

i) **Develop and present in writing** quantitative and qualitative arguments for physics problem solutions using step by step logical reasoning. **(P). Assessments:** Homeworks, quizzes and exams.

ii) **Communicate and vulgarize** scientific knowledge clearly and succinctly. **(P). Assessments:** In-class discussion and term paper.

Most of these learning outcomes will be assessed on a weekly basis through one of means described above. These learning outcomes fit within the umbrella of [General Education](#) objectives of Physical Sciences (P). A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Teaching considerations:

Lectures: The format of the class will be synchronous lectures. The lectures will consist of a mixture of black board lecturing, demonstrations, either in person or through a video, and small group discussions. During class, you are encourage to actively participate and ask questions. If I do not notice a raised hand, you are welcome to politely interject to capture my attention. If you are late to class, make sure that you enter as quietly as possible to not disturb the class. Also, please make sure that your cell phone is silenced for the duration of the lecture.

Online attendance is encouraged, especially if you are feeling under the weather. All classes will be available for live viewing on zoom, and will also be recorded. The zoom chat will only be monitored sporadically during the class, so you are encouraged to verbally signal if you have a question or if there is a technical issue with the video. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature. The chat will not be recorded or shared.

Communication: The preferred of mode of communication is through email. To the best of my abilities, I will try to answer inquiries within 24 hours. Messages sent through Canvas will also be answered within the same timeframe.

Attendance and preparation: Attendance in class is definitely expected, although not monitored. While lecture notes will not be posted, recording of classes will be available, should need them to review the material or if you were unable to attend a lecture.

Grading:

The graded material will consist of the following, and will be counted out of a total of 100 points.

Homework (9+1)	→ 9% of total grade
Quizzes (3+1)	→ 15% of total grade
In-class mid-term exam	→ 16.5% / 0% of total grade
Final exam	→ 35% / 51.5% of total grade
In-class discussion (9)	→ 13.5% of total grade
Term paper	→ 11% of total grade

Homework [Content i), Critical thinking i), Communication i]):

Homework will be assigned almost every week. I strongly encourage everybody to come up with the solutions on their own, and not to look up the answers online. Doing so will be great beneficial to your understanding of the material and to your performance during other examinations. Only a subset of the questions will be graded each week, but solutions to all problems will be posted. Homework will be turned as a .pdf file on canvas, and must clearly contain your first and last name in the filename.

In class discussion [Content i)&ii), Critical thinking i)&ii), Communication ii]):

Starting during the 2nd week of lecture, the class will be randomly divided in groups of 4-6 students, which will remain together for at least half the semester. All groups will have 15-20 minutes to discuss two or three questions. Groups will likely need more time after class to finalize their answer. A written answer will have to be submitted before the beginning of the next lecture (typically Wednesdays at 11:59 pm), and a different member of the group will be expected to summarize their answer at the next lecture each week. The objective of this assignment is to a) Deepen your conceptual understanding of physics and b) be exposed to your peers reasoning and learn how to share your ideas about a novel problem in a group. Criteria for evaluation will be:

- i) Explanation of the thought process
- ii) Pitfalls encountered and mistakes avoided (explaining the mistake of a group member is a good example)
- iii) Exactness of the solution
- iv) Alternate approaches

Some of these problems will be quite challenging, and it will be possible to achieve an A in the discussion without having the correct solution. The goal is to involve all members of the group in the discussion and to describe the process leading towards the solution. Please note that bonus points will be awarded for especially insightful discussion answers. In the making of groups, I will accept request to pair up to 3 students together.

Quizzes [Content i), Critical thinking i), Communication i)]

The quizzes will be held in class, will last 75 minutes and will consist of 2-3 slightly modified homework problems / In-class group assignments / textbook examples. One additional question will typically

consist of a problem never encountered previously. Each quiz will only cover the material that has been presented since the last quiz/exam. Only the best 3 quizzes (out of 4) will count towards the final grade.

Mid-term and final exam [Content i), Critical thinking i), Communication i)]

The mid-term and the final exam will be comprehensive. If the grade on the final exam is better than one on the mid-term exam, the final exam will be worth 51.5% of the final grade and the mid-term will not count towards the final grade. Otherwise, the mid-term will be worth 16.5% of the final grade, and the final exam 35%. The midterm will be held in class. The **Final exam date is : 5/03/2023 @ 10:00 AM - 12:00 PM, and will be held in NPB 1002.**

Term paper [Content i), Critical thinking ii), Communication ii)]

The term paper will be a 1-2 pages vulgarization paper explaining how one or many mechanics concepts covered in class can be used to explain either

- a) a natural phenomenon
- b) a currently used device/apparatus
- c) a current or past specialized scientific/medical equipment/apparatus.

The target audience should be someone with little to no physics background such as a younger sibling/cousin, a parent, a high school student, a friend majoring in a non-science major, etc. The paper should be written in font size 12 and using single spacing. The paper will be due on April 20th by midnight and will be worth 10% of the final grade. The subject selection must be validated by me and be turned in before the spring break. An evaluation rubric will be made available on canvas for the paper.

The grading scheme is outlined below. The passing grade for general education courses is C and above. More information is available in the University official grading policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	→	85% -- 100%	→	4.0 Grade point
A-	→	80% -- 84.999%	→	3.67 Grade point
B+	→	75% -- 79.999%	→	3.33 Grade point
B	→	70% -- 74.999%	→	3.0 Grade point
B-	→	65% -- 69.999%	→	2.67 Grade point
C+	→	60% -- 64.999%	→	2.33 Grade point
C	→	55% -- 59.999%	→	2.0 Grade point
C-	→	50% -- 54.999%	→	1.67 Grade point
D+	→	45% -- 49.999%	→	1.33 Grade point
D	→	40% -- 44.999%	→	1.0 Grade point
E	→	0% -- 39.999%	→	0.0 Grade point

Make-Up of Graded Material: Consistent with university policies

(<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext>), students will be allowed to make-up in-class graded material (exams and quizzes). In most circumstances, the reason for the make-up will need to be documented by a note typically from a medical doctor, an attorney, or a UF official. Other valid reasons include religious holidays and death from family members. Notes from family members are not acceptable. When possible, the student should inform the instructor in advance

of absences from graded assignments. Barring exceptional circumstances, make-up for the homework and in-class discussion will not be allowed, as the solutions will be posted after the deadline. To make up for missed homework/class discussion one “bonus” homework and class discussion will be available.

Tentative calendar (tentative):

Please note that an updated calendar will be kept up to date on the Canvas website. The reading assignment, homework and discussion are expected to have been completed prior to the lecture they are listed with.

Meeting #	Date	Topics	Reading assignment	Key events/deadlines
1	01/9	Introduction, important math review	N/A	
2	01/11	Physical dimensions, significant figures, vector operations, motion in 1D	Chapter 1 and 2 <i>26 pages</i>	Office hours survey
3	01/16	Forces and Newton’s law, concept of mass	Chapter 3 (except 3-2) <i>13 pages</i>	In-class discussion
4	01/18	Reference frames and relative motion Projectile motion	Chapter 3-2, 4-6 Chapter 4-1, 4-2, 4-3 <i>10 pages</i>	<u>Due:</u> HW #1, Discu. #1
5	01/23	Projectile motion Uniform circular motion	Chapter 4-3, 4-4 Chapter 4-5 <i>9 pages</i>	In-class discussion
01	01/25	Tension and normal forces	Chapter 5-1-5-2 <i>7 pages</i>	<u>Due:</u> HW #2, Discu. #2
7	01/30	Friction	Chapter 5-3 <i>4 pages</i>	Quiz #1
8	02/01	Uniform circular motion and fictitious forces, Introduction to linear momentum	Chapter 5-4, 5-5, 5-6, 6-1, 6-2 <i>9 pages</i>	<u>Due:</u> HW #3
10	02/06	Linear momentum and impulse, conservation of momentum	Chapter 6-2 – 6-5 <i>10 pages</i>	In class discussion
11	02/08	Center of mass, many-body collisions	Chapter 7-1 – 7-5 <i>11 pages</i>	<u>Due:</u> HW #4, Discu. #3
12	02/13	Variable mass problems, rotational kinematics	Chapters 7-6 and 8 <i>13 pages</i>	In class discussion
13	02/15	Torque, moment of inertia	Chapter 9-1 – 9-4 <i>11 pages</i>	<u>Due:</u> HW #5, Discu. #4
14	02/20	Static equilibrium, rotational dynamics	Chapter 9-5 – 9-7 <i>9 pages</i>	In class discussion
15	02/22	Introduction to Angular momentum	Chapter 10-1 – 10-2 <i>4 pages</i>	<u>Due:</u> Discu. #5 Quiz #2

16	02/27	Angular momentum	Chapter 10-3, -- 10-5 <i>9 pages</i>	In-class discussion
17	02/29	Work, energy and power	Chapters 11-1 – 11-3 <i>7 pages</i>	Due: HW #6, Discu. #6
18	03/05	Midterm – in class	Chapters 1-11 (review)	Mid-term
19	03/07	Pre-recorded lecture: Kinetic and potential energy, springs	Chapter 11-4 – 11-8 <i>12 pages</i>	
20	03/12	Spring Break	N/A	Turn-in term paper topic
21	03/14	Spring Break	N/A	
22	03/19	Potential energy	Chapter 12 <i>11 pages</i>	In-class discussion
23	03/21	Conservation of energy + gravitation	Chapters 13-1 – 13-5 and 14-1 – 14-2 <i>14 pages</i>	Due: HW #7, Discu. #7
24	03/26	Gravitation + fluids statics	Chapters 14-3 – 14-8 Chapter 15 <i>26 pages</i>	In-class discussion
25	03/28	Fluid dynamics	Chapter 16-1 – 16-4 <i>8 pages</i>	Due: HW #8, Discu. #8
26	04/02	Simple harmonic oscillator	Chapter 17-1 – 17-6 <i>14 pages</i>	
27	04/04	Damped and forced oscillators	Chapter 17-7 – 17-9 <i>6 pages</i>	Due: HW #9 Quiz #3
28	04/09	Waves	Chapter 18 <i>18 pages</i>	In-class discussion
29	04/11	Sound waves, Doppler effect	Chapter 19 <i>16 pages</i>	Due: Term paper, Discu. #9
30	04/16	Special relativity: Time dilatation and length contraction	Chapter 20-1 – 20-3 <i>7 pages</i>	In-class discussion
31	04/18	Special relativity: Lorentz transformation, momentum	Chapter 20-4 – 20-9 <i>13 pages</i>	Due: HW #10, Discu. #10
32	04/23	Special relativity : energy	N/A	Quiz #4
33	04/25	Reading day – extra problem solving session!	N/A	In-class extra problem solving
34	05/03	Final exam : 10:00AM – 12:00PM	N/A	Final exam

Incomplete Policy:

A grade of incomplete is typically given to students who endure a situation in which they are incapable of completing the coursework. The I-grade is not to be given to students who are simply dissatisfied with their performance in the course. If you find you are in a situation that might qualify you for an I-grade in this course and you want to pursue this potential option, then you must contact me immediately and be sure to have the necessary documentation from a medical doctor or an attorney. Again, letters from family members are not acceptable. A letter of understanding indicating when and how the incomplete grade will be made up will eventually be drafted and signed by the student and the Instructor. A PDF of the policy is posted at: <http://www.phys.ufl.edu/downloads/gradepolicy.pdf>.

Grading adjustments:

The graded material will be returned in a timely manner through the same means as the delivered material, typically within one-week of submission. If students notice an error or are dissatisfied with the grading, they should contact the instructor within 2 days of receiving it, and set-up a time to review the grading. Failure to do so will result in the student relinquishing the opportunity to review the grading.

STUDENTS with DISABILITIES:

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center (352-392-8565 or <https://disability.ufl.edu/students/get-started/>). It is important for students to share their accommodation letter with their instructor and discuss their access needs, AS EARLY AS possible in the semester.

Academic Honesty: Each student is expected to hold himself/herself to a high standard of academic honesty. Under the UF academic honesty policy, 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.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. The code of conduct is accessible at the following website : <https://sccr.dso.ufl.edu/process/student-conduct-code/> . If you have any questions or concerns, please consult with the instructor or TAs in this class. **Violations of this policy will be dealt with severely. There will be no warnings or exceptions.**

Online course evaluation : Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.ufl.edu/students/ . Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/ . Summaries of course evaluation results are available to students at gatorevals.ufl.edu/public-results/ .

In-class Recording policy :

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons). This applies as well to the lecture recording provided by the instructor on Canvas.

COUNSELING, MENTAL HEALTH and ADDITIONAL RESOURCES:

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-

392-1575, or visit [U Matter, We Care website \(https://umatter.ufl.edu/\)](https://umatter.ufl.edu/) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: [Visit the Counseling and Wellness Center website \(https://counseling.ufl.edu/\)](https://counseling.ufl.edu/) or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website (<https://shcc.ufl.edu/>).

University Police Department: Visit UF Police Department website (<https://police.ufl.edu/>) or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website (<https://ufhealth.org/emergency-room-trauma-center>).

E-learning technical support: Contact the UF Computing Help Desk (<https://helpdesk.ufl.edu/>) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601 (<https://career.ufl.edu/>). Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources (<https://cms.uflib.ufl.edu/ask>).

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring (<https://teachingcenter.ufl.edu/>).

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information (<https://sccr.dso.ufl.edu/policies/student-honor-%20code-student-conduct-code/>).

On-Line Students Complaints: View the Distance Learning Student Complaint Process (<https://distance.ufl.edu/getting-help/student-complaint-process/>)