

Syllabus

PHY 2061 – Enriched Physics 2 – Fall 2022

Welcome to PHY 2061. If you are motivated and 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-4

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.

Class details: In-person lectures will occur Tu & Th Period 4&5 (10:40-12:35 AM) in NPB 1002. The lectures will also be available synchronously on zoom (<https://ufl.zoom.us/j/98387814457?pwd=Z1JFM0tpZTgyT0lyb1FjQ3k3MDdkUT09>), and will be recorded. As per University and CDC guidelines, students are encouraged to wear mask at all times inside UF facilities.

If they prefer, students are encouraged to attend the remote lecture rather than the live one. If the students attending the remote lectures do not want their picture recorded, they should keep their camera 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 exam (midterm and final examination) however must be done in person, with live proctoring.

Office hours (tentative): Mon 12:40 to 2:00 pm (6th period) and Th, 1:45 pm to 2:45 PM (7th 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).

In addition optional “extra problem solving sessions” will be held before every quiz and examination. The format and time of these will 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: This course requires that you have studied Newtonian mechanics in a previous calculus-based physics course such as PHY 2060 or PHY 2048.

Co-requisites : This course also requires that you have at least co-registered in a vector calculus course (Calc 3) such as MAC 2313.

Textbook : Physics Vol. 2, 5th ed. by Resnick, Halliday, and Krane (Wiley)

Supplementary textbook : Students looking for more advanced material can look at Introduction to Electrodynamics, 4th Edition, (Cambridge University Press) by D. J. Griffiths. This textbook is the standard textbook for PHY 3323, an upper level class in Electrodynamics.

Course description :

This is the second semester of the Enriched Physics With Calculus (Honors Physics) sequence PHY 2060-2061. 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 and technology. Ability to communicate and explain these concepts and their applications will also be essential. Topics covered include a variety of electromagnetic phenomenon such as electrostatics (Coulomb's law, Gauss's Law, potentials and fields in matter), magnetostatics (Biot-Savard law's, Ampere's law, fields in matter), DC and AC circuits (resistors, capacitors, inductors), electric and magnetic induction, Maxwell equations as well as mirrors and lens.

Course expectations and objectives:

Students enrolling in this class should be comfortable with calculus I and II: vector calculus, differentiation, integration and trigonometry. Students are also expected to be able to solve ordinary differential equations and be learning about multi-variable calculus in Cartesian, spherical and cylindrical geometries, as well as line and surface integrals. Students will be expected to use these skills throughout the class.

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 the instructor.

All exams and quizzes will be “closed-book” and no notes will be allowed. Essential mathematical formulas/expressions will be provided, and they will be shared with the class ahead of time. The graded assignment for this class will require the students to answer a variety of questions. These questions can be divided in 4 categories:

- a) showing a qualitative conceptual understanding of the material
- b) performing order of magnitude estimates
- c) symbolically solving problems
- d) Explaining concepts to different audiences types.

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 class. 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. Part of the grade will be based on “in-class discussion”, usually occurring once a

week, and material outside the textbook will regularly be presented. You are responsible for all material covered in the text AND in class.

Students will be expected to have read the relevant material before coming to class. The material covered in the textbook will be quickly covered in class, and a large section of the lectures will consist 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.

Diversity and inclusion: Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. I recognizes the value in diversity, equity and inclusion in all aspects of this course. This includes, but is not limited to differences in race, ethnicity, gender identity, gender expression, sexual orientation, age, socioeconomic status, religion and disability. Students will be required to work together throughout course. I expect respectful student collaborations such as attentive listening and responding to the contributions of all teammates.

Grading:

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

Homework (9)	→ 18% of total grade
Quizzes (3)	→ 12% of total grade
In-class mid-term exam	→ 15% / 0% of total grade
Final exam	→ 35% / 50% of total grade
In-class discussion	→ 9% of total grade
Term paper	→ 11% of total grade

Homework will be assigned almost every week. It will consist of two parts each worth $\frac{1}{2}$ of the homework grade. The first part will be individual and will consist of a handful problems to solve individually, and will generally be due on Tuesdays at 11:59 pm on Canvas. 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 the other examinations. Only a subset of the questions will be graded each week, but solutions to all problems will be posted.

The second part will be a group section where you will have to provide a detailed and thorough solution to a single problem. This part of the homework will generally be due on Wednesday at 11:59 pm. In the solution, I will expect to find the following:

a) The solution, with all steps included

b) Useful information to achieve the solution such as :

- i) Pitfall encountered / likely mistakes
- ii) Alternative ways to solve the problem
- iii) Difficulties and approach/tricks to overcome them

These solutions will be posted in the Canvas discussion board. The objective is to provide a student's perspective on how to solve the problems and what common mistakes to avoid. An incorrect but detailed and insightful solution will receive a better grade than a correct but incomplete solution. Ten homework will be assigned during the term, and the 9 best ones will count towards the final grade. Homework will be preferably turned as a .pdf file by email, but paper format will be accepted as well. If this causes issues for you, please contact the instructor. Group of 4-6 students will be determined at random and changed every 2-3 times throughout the semesters. Requests for student pairs to be together will be accepted.

In class discussion: Starting during the 2nd week of lecture, the class will be divided in groups of 4-6 students (same groups as for the homework), which will remain together for half the semester. All groups will have 15-20 minutes to discuss one or two 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, 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 E&M 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.

The **quizzes** will be held in class, will last 75 minutes and will consist of 2-4 slightly modified homework problems / In-class group assignment / textbook example. One question might include additional recommended problems. Each quiz will only cover the material that has been covered since the last quiz/exam. Only the best 3 quizzes (out of 4) will count towards the final grade.

Both 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 50% of the final grade and the mid-term will not count towards the final grade. Otherwise, the mid-term will be worth 15% and the final exam 35%. The midterm will be held in class. The **Final exam date is :** **12/14/2022 from 5:30 – 7:30 pm.**

The **term paper** will consist of two parts of equal worth : a 3-6 pages paper explaining how one or many electromagnetism 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 second part will consist of vulgarizing the first topic in 1 page or less. The target audience should be someone with little to no physics background such as a younger sibling/cousin, a parent, a high school student, etc. The paper should be written in font size 12 and using double spacing. The use of equations in the first part is encouraged. The term paper can be done individually or as a team of 2. It will be due on Wednesday December 1st by midnight by email and will be worth 11% of the final grade. The subject selection must be validated by me and be turned in before October 1st. An evaluation rubric will be made available for the paper.

The grading scheme is outlined below. The passing grade for Physics major 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. Additional opportunities might be made available upon request to the instructor in the form of in-class participation.

Tentative calendar (tentative):

Please note that an updated calendar will be kept up to date on the Canvas website.

Meeting #	Date	Topics	Key events/deadlines
1	08/25	Introduction, important math review	
2	08/30	Physical dimensions, mechanics review	
3	09/31	Coulomb’s Law (Ch. 25)	
4	09/01	Electric field (Ch. 26)	
5	09/06	Gauss’ Law (Ch. 27)	HW #1, Discu. #1
6	09/08	Gauss’ Law, conductors (Ch. 27)	
7	09/13	Electric potential, energy (Ch. 28)	HW #2, Discu. #2
8	09/15	Continuous potential distributions (Ch. 28)	
9	09/20	Continuous potential distributions (Ch. 28)	Discu. #3
10	09/22	Electric materials (Ch. 29)	Quiz #1
11	09/27	Electric materials (Ch. 29)	HW #3
12	09/29	Capacitors (Ch. 30)	
13	10/04	Magnetism (Ch. 32)	HW #4, Discu. #3
14	10/06	Magnetic field (Ch. 33)	Term paper subject
15	10/11	Ampere’s Law (Ch. 33)	HW#5, Quiz #2
16	10/13	Faraday’s Law (Ch. 34)	
17	10/18	Mid-term	Mid-term
18	10/20	Faraday law and magnetic dipoles (Ch. 34)	Discussion #5
19	10/25	Magnetic materials (Ch. 35)	HW #6, Discu. #6
20	10/27	Currents and circuits (Ch. 31)	
21	11/01	RC circuits (Ch 31)	HW #7, Discu. #7
22	11/03	Inductance (Ch. 36)	
23	11/08	AC circuits (Ch. 37)	Quiz # 3
24	11/10	RLC circuits (Ch. 37)	
25	11/15	Maxwell’s Equations (Ch. 38)	HW #8, Discu. #8
26	11/17	Refraction, Doppler effect (Ch. 39)	
27	11/22	Mirrors and lenses (Ch. 40)	HW #9, Discu. #9

28	11/24	No class, Thanksgiving	
29	11/29	Light interference (Ch. 41)	HW #10, Discu. #10
30	12/01	In class problem solving	Term paper
31	12/06	Review	Quiz #4
32	12/14	Final exam : 5:30 – 7:30pm	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.aa.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.aa.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/>) 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/>) 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/>