

General Physics II PY 212 Fall 2024

PY 212 is a calculus-based introduction to basic principles of physics, emphasizing electromagnetism, circuits, and optics for science majors, engineers, and premedical students. Interactive, student-centered lectures, discussion, and laboratory. Carries natural science divisional credit in CAS. This course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Quantitative Reasoning II, Critical Thinking, Teamwork/Collaboration.

Section	Professor	Contact Info.
A1 – TR 9:30 am-10:45 am	Prof. Lee Roberts	roberts@bu.edu PRB 373
B1 – TR 2:00 pm-3:15 pm	Prof. Frank Golf	fgolf@bu.edu PRB 375
C1 – TR 5:00 pm-6:15 pm	Prof. Jim Miller	miller@physics.bu.edu PRB 379

This is a multi-lecture-section team-taught course. Exams, homework assignments, and labs are the same regardless of your registered lecture section. Letter grades will be determined by consensus of all three instructors, based on criteria given below. If you must miss a lecture, you are encouraged to attend another the same day. All lectures will be conducted in SCI 113.

Course Prerequisites:

Absolute prerequisites are **CAS PY 211 and CAS MA 124**, (or an equivalent calculus course). Inform the instructor if these prerequisites have not been met. It is very important that the math requirements are met to ensure successful work in PY212. We will review mathematical and calculus topics as the course progresses, but a solid foundation has historically been highly correlated with better student outcomes. Most students in PY212 will be concurrently taking MA225; many students will have already completed MA225. Differential equations will be introduced but with solutions provided; interpreting the solution is the objective.

Course web sites:

1. For grades (and only grades), Blackboard Learn: <http://learn.bu.edu>
2. For discussion and announcements, Piazza: <https://piazza.com/bu/fall2024/py212>
3. For online instructional material, Mastering Physics Course ID: duffy08558
4. For homework submission: Gradescope: <https://www.gradescope.com>

Course ID: 822368 Entry Code: BKKNN8

Exams:

Three quizzes will be given *out of class* on the following dates:

- Quiz #1 – Monday, Sept. 30, 8:00 – 9:30 PM, rooms TBA
- Quiz #2 – Monday, Oct. 21, 8:00 – 9:30 PM, rooms TBA
- Quiz #3 – Monday, Nov. 18, 8:00 – 9:30 PM, rooms TBA

The final exam date and location is set by the University Registrar and will be announced when ready. The final exam will be cumulative.

Reserve these dates on your calendar. There is no ordinary provision for make-up exams or alternate times. For a large class such as this, there are inevitable medical or emergency reasons

that interfere with the scheduled exam time for some students. We anticipate make-up exams for students with a **documented** excuse that is provided **in advance** of the scheduled exam time. The content of the make-up exam will cover the same topics as the primary exam, but every question will be different. The make-up exam will occur at a single time as soon as possible after the primary exam. **Students without advance permission for a make-up will either be excluded (earning a score of zero) or in rare cases be allowed to take the make-up with a score penalty.**

For exam taking accommodations such as extra time, please send your accommodation letter to Prof. Duffy (aduffy@bu.edu) who will collect the requests for all sections.

Grading Summary:

36% Quizzes 1-3 (12% each quiz)
24% Final exam
16% Laboratory reports and prelab assignments
16% Homework
4% Discussion (worksheets)
3% PreLectures (on Mastering)
1% Pre and post-test (based on participation, but you only get credit if you take it seriously)

The following absolute grading scale will be applied to the total score. These letter grade thresholds provide a target:

A and A-	90% to 100%
B+, B, and B-	75% to 89.99%
C+, C, and C-	55% to 74.99%
D	45% to 54.99%
F	less than 45%

We reserve the right to be more generous than indicated above, if overall grades warrant that.

Textbook with Mastering Physics:

The textbook for this course is University Physics by Young and Freedman, 15th edition, combined with online instructional material called Mastering Physics. Reading assignments from the textbook will accompany the lectures. Mastering Physics is required for the homework. Most students have purchased 24-month access when they took PY211 last semester. The Mastering Physics subscription includes an accompanying electronic textbook accessible via web browser or iOS/Android application. The course ID is **duffy08558**. For students who need single semester access, the ISBN is 9780136781004 (should be around \$76).

A physical copy of the textbook may be offered at the time of registration for Mastering Physics but is not required. Students who like physical copies of textbooks to study from may take this offer, or purchase used copies of previous editions.

PreLectures:

You have an assignment, called a **PreLecture**, that you should complete on Mastering before the regular live lecture each Tuesday and Thursday. The due time is 8 am on the lecture day (feel free to treat the deadline as the night before). Each PreLecture will introduce material that will be covered further during each lecture. Each PreLecture includes one or more videos plus some assessment questions. Your answers to the PreLecture questions will be used to fine-tune the lectures.

Piazza:

In PY212 we use piazza, an online collaborative bulletin board, for posting homework assignments, solutions, lecture notes, and for class announcements. Piazza is where you will find the syllabus, schedule, contact information, and so on. You can post administrative questions and have the best chance they will be answered quickly. We also encourage questions about physics concepts and problem solving on piazza, and we likewise encourage students in the course to help with the answers. <https://piazza.com/bu/fall2024/py212>

Discussion Sections:

Discussion sections are a required part of the course. Your teaching assistant will supplement the lecture material, assist in problem solving, and help prepare you for exams. Worksheets are an important part of the discussion section. These are supplemental problems, designed at a good level for exam practice. You will work on these collectively in small groups, facilitated by a learning assistant and teaching fellow. One problem will be collected, reflecting your attendance, and graded for quality of work. You will be allowed to miss one discussion section without penalty. If you have good reason to miss a discussion, you may attend another discussion with advance approval by both section instructors.

Homework:

Weekly homework problems will be posted on Piazza, roughly a week before they are due. Collaborative effort is encouraged, but it is your responsibility to understand the problems and your proposed solution. See below for comments about academic conduct and Chegg in particular. Failure to understand the homework problems is inevitably linked to poor performance on exams. The work you turn in for grading must be your own. Teaching staff will gladly help you during discussion sections and office hours.

There are two components of the weekly homework assignments:

Mastering Physics – these problems are presented online. They include reading and short-answer questions: you can typically solve them quickly if you have kept up with the reading, PreLectures, and lectures. There will also be longer questions that you should work out separately with pencil and paper (or stylus and tablet). The longer questions will include multi-part tutorials. You will have more than one attempt to get the correct answer (quickly guessing to get started is not a sound learning strategy).

Written homework – these problems will be presented in a PDF file posted to piazza under Resources/Homework. The problems will have rich content allowing you to demonstrate your problem-solving techniques in detail including figures and written answers. These problems will be graded by teaching fellows and graders. You will be graded on the clarity of your work as well as the final answer. Your problem sets should be neat and readable. **For each homework, it is your responsibility to prepare a legible PDF and upload it to Gradescope on time.** Using a scanner application is much preferred over photographic snapshots. Exporting from tablet-based note-taking software also works well. Your solution should be sufficiently well organized that your approach to the problem is clear to the grader. For most full-length problems, one page of work per problem is appropriate. Place a box around final answers so they are easy to find. Solutions will be posted on piazza. Once the solutions are posted we do not accept homework for grading. The lowest homework score will be dropped.

Homework Deadlines – Homework must be completed by 11:59 pm Boston time on Friday of the week the homework is due. It is your responsibility to upload the homework to Gradescope on time. The Gradescope system will allow late submissions, but a penalty will be applied. The

absolute deadline is usually 12 hours after the original deadline, i.e. noon on Saturday.

Labs

Labs are a required part of the course. You will perform six labs and present your work in the form of a brief written report. The schedule, report guidelines, and other relevant information is posted on piazza under Resources/Labs. There will be a Pre-Lab assignment for each lab that you will complete before the lab period and submit via Gradescope. The deadline is the beginning of your lab period. This is a strict deadline and Pre-Lab submissions will be marked late at the start time of the lab section even though Gradescope will show a deadline at the end of the lab week.

Fall 2024 Lab Schedule

Week	Experiment
2 (9/9-9/13)	Electric Charge and Coulomb's Law
6 (10/7-10/11)	Ohm's Law
9 (10/28-11/1)	e/m Ratio of the Electron
11 (11/11-11/15)	Faraday's Law
14 (12/2-12/6)	Interference and Diffraction

Missing a lab: All labs are required, with one allowance per semester for an absence due to a documented medical issue or other circumstance. In the case of a documented need to miss a lab, approved in advance, the lab grade will be determined by the average of the other labs. This accommodation may happen only once. Missing a lab without permission will result in a score of zero for that lab. You must attend the lab section you registered for. You are expected to work in pairs. Labs must be completed and submitted by no later than the end of that lab session. It is your responsibility to turn in labs on time, **late work will not receive any grade**. *The lab component of this course is an essential part of the Hub credits as well as satisfying the CAS Natural Science Laboratory requirement. Therefore, the rules are very strict.*

Blackboard:

Although most grading will be immediately available from Gradescope, Blackboard will be used to collect the scores from exams, homework, and labs. It is your responsibility to check the accuracy of your scores in Blackboard. Report discrepancies to the responsible instructor: discussion TF, lab TF, or lecturer. **It is your responsibility to check that your grades have been recorded correctly.** If any of your grades are missing or incorrect, contact your teaching assistants and your professor.

Getting support through Office Hours and Piazza

The PY212 staff will hold office hours each week. You can attend office hours given by any member of the instructional team. The office hour schedule will be available on Piazza. Please also ask questions about the course through the PY212 site on Piazza. You should also feel free to answer any questions posted by other students – but you should be careful to be helpful without simply giving away answers to homework questions. With all PY212 students, Learning Assistants, Teaching Fellows, and professor monitoring the Piazza site, this should be the best way to get questions answered quickly. If you have a personal question for your professor, contact them after lecture, during their regular office hour, or via a private message on Piazza.

If you are struggling in our course, you need more support than available in office hours and Piazza, or a personal issue arises that impacts your participation in our course, please reach out to

your professor directly via e-mail. Extra academic support is also available through the Educational Resource Center physics tutors.

Ethics Policy

You are expected to be familiar with and adhere to Boston University's Academic Conduct Code. <https://www.bu.edu/academics/policies/academic-conduct-code/> Cheating on exams will not be tolerated. Evidence of cheating will be reported to your College's Dean which will likely lead to the Academic Conduct Committee.

The homework and labs you turn in must be your own work, subject to reasonable collaboration with your peers in this class as discussed above. Use of solution manuals, solutions from previous years, or solutions found on the internet is expressly forbidden.

In particular, use of Chegg, Course Hero, or similar sites where other people solve your homework assignments is forbidden. This is a violation of BU Academic Conduct and of copyright on the written homework assignments.

Proprietary material: Almost all the material in the course is created by us and is copyrighted. You are not allowed to post any course material anywhere outside of our course websites. Using sites like Chegg and Course Hero is strictly prohibited. Similarly, you are not allowed to post any course material to any artificial intelligence system. Artificial Intelligence (AI) tools and resources are becoming more common and accessible. Nevertheless, all students are expected to refrain from use of AI (e.g., GenAI, ChatGPT, etc.) for all work in this course. College is a space for learning to think and developing skills, and this course is specifically a space for learning skills, which includes writing and argumentation; AI tools can only serve to rob you of the opportunity to learn these critical skills. In addition, the course material is someone's creative work, and you have no right to upload that work to any AI systems or anywhere else.

Evidence of Chegg, AI (or similar) use will result in a score of zero for the entire homework assignment. Repeated use will result in increasing penalties including letter grade reduction. Flagrant use will be reported as Academic Misconduct. Identified uploaders will be reported for misconduct. The use of Chegg, Ai (or similar) disrespects the efforts of the instructors and the hard work of your fellow students.

Schedule:

Week	Lecture	Date	Topic	Chapter	Homework Due	Discussion + Lab
1	1	3-Sep	Electric Charges and Forces	21		
	2	5-Sep	Electric Field	21		
2	3	10-Sep	Electric Field	21	(HW1) 13-Sep 11:59 pm	Discussion 1 Lab 1
	4	12-Sep	Gauss's Law	22		
3	5	17-Sep	Gauss's Law	22	(HW2) 20-Sep 11:59 pm	Discussion 2
	6	19-Sep	Electric Potential	23		
4	7	24-Sep	Electric Potential	23	(HW3) 27-Sep 11:59 pm	Discussion 3
	8	26-Sep	Force, Field, Energy, Potential	23		
5		30-Sept	Quiz 1	21-23	(HW4) 4-Oct 11:59 pm	Discussion 4
	9	1-Oct	Capacitance and Dielectrics	24		
	10	3-Oct	Current and Resistance	25		
6	11	8-Oct	Direct Current Circuits	26	(HW5) 11-Oct 11:59 pm	Discussion 5 Lab 2
	12	10-Oct	Direct Current Circuits	26		
7		15-Oct	Substitute Monday (No Class)		(HW6) 18-Oct 11:59 pm	Discussion 6
	13	17-Oct	Magnetic Field and Forces	27		
8		21-Oct	Quiz 2	24-26	(HW7) 25-Oct 11:59 pm	Discussion 7
	14	22-Oct	Magnetic Field and Forces	27		
	15	24-Oct	Sources of Magnetic Field	28		
9	16	29-Oct	Sources of Magnetic Field	28	(HW8) 1-Nov 11:59 pm	Discussion 8 Lab 3
	17	31-Oct	Electromagnetic Induction	29		
10	18	5-Nov	Induction and Inductance	29, 30	(HW9) 8-Nov 11:59 pm	Discussion 9
	19	7-Nov	Inductors and Inductance	30		
11	20	12-Nov	Inductors and Inductance	30	(HW10) 15-Nov 11:59 pm	Discussion 10 Lab 4
	21	14-Nov	Alternating Current	31		
12		18-Nov	Quiz 3	27-31	(HW11) 22-Nov 11:59 pm	Discussion 11
	22	19-Nov	Electromagnetic Waves	32		
	23	21-Nov	Electromagnetic Waves	32		
13	24	26-Nov	The Nature of Light	33		
		28-Nov	Thanksgiving - No Class			
14	25	3-Dec	The Nature of Light	33	(HW12) 6-Dec 11:59 pm	Discussion 12 Lab 5
	26	5-Dec	Interference and Diffraction	35, 36		
15	27	10-Dec	Interference and Diffraction	35, 36	(HW13) 11-Dec 11:59 pm	

There is a final exam during the exam period covering all chapters.