

# Physics 152 - General Physics II

## Fall 2023

### Instructors

Paul Bourgeois	<a href="mailto:psbour+P152@umass.edu">psbour+P152@umass.edu</a>	Office: Hasbrouck 201
Nicholas Pittman	<a href="mailto:npittman+P152@umass.edu">npittman+P152@umass.edu</a>	Office: Hasbrouck 121
Lecture TA: Chetan Yadav	<a href="mailto:cyadav@umass.edu">cyadav@umass.edu</a>	Office: Hasbrouck 205

(Note: please address emails with the additional +152 to help us use Gmail's sorting)

### Schedule

Section 1: MWF 11:15 AM - 12:05 PM in Hasbrouck 20	Instructor: Paul Bourgeois
Section 2: MWF 12:20 PM - 1:10 PM in Hasbrouck 20	Instructor: Nick Pittman

### Office Hours & Help Room

Paul: Monday from 1 PM - 2:30 PM, Tuesday - Thursday from 1 PM - 3 PM in Hasbrouck 201  
Nick: Monday and Wednesday 3:45-4:30, and Thursday 2:30-4:00 (in Hasbrouck 121)  
Chetan: Wednesday 7-8pm (in Help Room in Hasbrouck)

There are multiple TAs available at basically any time during the week in the Physics Help Center (Hasbrouck 115- go in the main entrance, turn left and go through the double doors, and then it's the first room on the left near the stairs/elevator, with double doors). The TAs are there to help you, even if they are not specifically labeled for 152. A schedule for when the help room is open, and which TA has which slot, is/will be posted on Moodle (as well as the Help Room door).

### Discord

Nick made a Discord to help people in the class talk with other groups, for HW struggles, info, etc. Instructors and TA's won't monitor it at all, but feel free to use it to talk with other students in the class, for instance if you don't know many people and your group is stuck on a problem.

<https://discord.gg/aD6AQVRF9j>

## Lecture Recordings

We will record lectures using Echo360 and post them online for your use. We will try to put them up quickly after class so anyone who is out that day can keep pace.

We are legally required to inform you that the lectures are being recorded. It only captures video of the instructor's section of the room and our laptop screens. Please inform us if this is an issue.

## Email

Given the size of this course, our emails will get flooded if people email us about certain topics. Most questions are more efficiently answered after class, or in office hours. This will also help with the quality of the explanation, since we can converse back and forth.

Please do NOT email us for the following:

- Questions about the content of homework, lecture, or exams. These can be answered in office hours or after class, either by us or by the TAs.
- Questions about lab or discussion topics/absences/grading (direct these to your lab TA)
- You are sick for a class or two and were wondering if you missed anything important-announcements will be posted on Moodle, and lectures will be recorded and posted online.
- You submitted homework late and would like an extension (Unless you've been sick, etc.\*\*\*). Note that the HW doesn't have a very harsh late penalty for the first day, you only lose ~10% per day, and it only deducts from problems that are not completed by the deadline.
- Wondering what your overall grade is (we don't have a master spreadsheet so it's just as tough for us to calculate as it is for you, should be doable in under two minutes)
- Contesting the answer to an exam/HW question (bring this to us in office hours)

Please DO email us for the following:

- Correct a grade discrepancy between your gradebook and actual score on an exam (for lab, email your lab TA)
- You are sick, injured, or otherwise out, and need to discuss how to make up work.
- You anticipate being absent for an exam for an approved reason, and want to schedule a makeup
- A conflict prevents you from attending office hours, but you want to meet for something
- You are really struggling in the course or personally and want to set up an individual meeting. We are here to help you!

## Course Description & Topics

- Electromagnetism: Coulomb's Law, electric field, voltage, Gauss' Law, capacitors, dielectrics, circuits, resistors, Ohm's Law, Power, RC Circuits. Magnetic force and field, Ampere's Law, Lenz's Law, Maxwell's equations.
- Thermodynamics: Heat, kinetic theory, laws of thermodynamics, work, phase changes, Carnot cycle, heat engines/refrigerators, entropy.
- Math: Yes, this is a calculus-based physics course. Inherently, electromagnetism involves vector calculus (notably- the very-scary-looking integrals in Gauss' Law and Ampere's Law), but we know many of you have not taken that course yet. We will show you all the necessary tools and proceed slowly. In the two cases above, wisely picking a surface to work with turns it into an algebra problem (which we will do every single time). So in practice, knowing basic differentiation and integration methods from Calc 1 will suffice. The challenge will not be doing inhumane vector calc integrals, but rather becoming confident in knowing when you have to integrate for a problem, versus when you can use the algebraic form of equations.

## Moodle

We will post official announcements through Moodle as well as announcing them in class. This includes HW due dates and exam dates. We will also put a link to the lecture recordings up here.

Grades will be posted in Moodle for exams, however the HW and Lab/Discussion grades won't show up there until the end of the semester when we import them. They are available on MasteringPhysics and through your 152 Lab Moodle course (not the lecture one), respectively.

## Homework

Expect ~1 HW per week, probably due Thursday night at 11:59P.M (TBD).\*\*\* While they won't be extremely long, they will take some decent time and thought, and you will get stuck sometimes. Our goal will be to teach you the fundamentals well enough in class that you can approach any problem we have assigned. We strongly encourage you to work with your friends on these, start them early and work on them in pieces, and take them to the help room, us, or your TAs if you have questions!

The online software MasteringPhysics will be used for the homework assignments. Details on how to subscribe to the MasteringPhysics system will be posted on Moodle (please follow these very carefully- simply going to the Mastering website and trying to subscribe will NOT work properly, we have a special setup with Pearson!)

The late penalty will only apply to the individual problems not submitted prior to the deadline, and the penalty decays slowly each hour. So if you miss the deadline by a couple hours, it won't tank your grade.

## Textbook

The homework follows the accompanying text from MasteringPhysics, *Physics for Scientists and Engineers, 5th Ed.* by Randall D. Knight. It should be available as an e-Text through the MasteringPhysics website, included with the subscription you already have for the HW. There is also a similar text available online for alternative explanations:

<https://openstax.org/details/books/university-physics-volume-2>

## Exams

Exam Dates:

- Midterm 1 - Wednesday, March 8th, 7 PM - 9 PM
- Midterm 2 - Wednesday, April 19th, 7 PM - 9 PM
- Final (basically just a third midterm)- TBD, will be during finals week

There are two midterm exams and one final exam. Exams are non-cumulative, and will be about 25 multiple choice questions each. Your best two exams will be worth 20% of the final grade, and the lowest-scored exam will be worth 10% of the final grade. We will provide practice exams beforehand to streamline studying, and exams will largely reflect the content of the practice exams. We will go over the practice exams in detail in class a few days before the exam.

At exams we will provide you with an equations sheet with all the equations needed to complete the exam. You can also bring a ~3 inch by ~5 inch notecard (NOT a full size piece of paper) with anything you want written on both sides as a cheat sheet. We will show you the equations sheet before the exam so you don't waste space writing duplicate equations.

There are NO scheduled makeup exams. Let us know (preferably in advance) if you anticipate an absence from an exam so we can set one up. Generally, a written justification is required from a coach, doctor, dean, counselor, etc.

## Accommodations

If you have not already done so, please inform us of any accommodations you are requesting within the first week (or as soon as you can). Don't leave it until the night of the exam.

## Labs

Physics 152 is a lab based course in which you will perform a series of experiments to develop your skill in the scientific method. All of the lab content is on a SEPARATE Moodle. The labs will count as 15% of your course grade.

## Discussions

During the off weeks when your lab section is not performing an experiment, you will meet with your lab section for discussion sessions. The discussions are at the time your lab section meets. The discussions are only 50 minutes long. These discussion sessions will help you with problem-solving skills. Students have commented they feel better prepared for exams because of their participation in discussions. Participation in discussions will count as 5% of your course grade.

The best 5 out of 6 discussions will be counted towards your final grade, so you have the option of missing one discussion without penalty. THERE ARE NO MAKE UPS FOR MISSED DISCUSSIONS.

## Grade Breakdown

- 5% Discussions
- 15% Labs
- 30% Homework
- 50% Exams (20% for two highest-scoring exams and 10% for lowest-scoring exam)

## Grade Scale

We'll round to the nearest integer (so 92.4999 gets an A-, 92.50 gets an A).

Instructors reserve the right to lower the grade cutoffs, but this is unlikely. If it happens, expect it to be on the order of ~2-5% on the final grade.

A = (93 - 100)	B = (83 - 86)	C = (73 - 76)	D = (60 - 66)
A- = (90 - 92)	B- = (80 - 82)	C- = (70 - 72)	F = (0 - 59)
B+ = (87 - 89)	C+ = (77 - 79)	D+ = (67 - 69)	

## Extra Credit (Pre- & Post-Exam Reflections)

There will be a pre-exam and post-exam reflection available before and after each exam in a short window. Completing each will contribute .5% of extra credit onto your final course average, so in total you can get up to 3% from these.

Besides this (and potentially incentivizing the final course survey), there is no additional extra credit.

## Academic Honesty

We expect all students to adhere strictly to the UMASS [Academic Honesty](#) Policy. We encourage collaboration among students but submitting identical work is considered academic dishonesty. We expect you to submit your assignments written in your own words. Any suspicions of academic dishonesty will be dealt with in the manner outlined in the University's [Academic Regulations](#).

There are solutions out there to almost all the HW problems on Chegg, etc. Glancing at them if you're stuck is okay, but straight up taking their answer without any thought is not. (Also, they are sometimes explained poorly/misleadingly or done with a weird method). Similarly, blindly copying your friend's answers is not okay, but getting helped through in extreme detail and being very confused for much of it is fine. This goes for the lab too.

Exams will all be individual assignments. Any sort of communication during the exam or disclosure of specific exam questions to individuals taking makeups will be treated as a serious violation of the UMass Academic Honesty Policy.

## Weekly Schedule (Exact topics tentative)

Monday	Wednesday	Thursday	Friday
Week 1: 2/6 Go over syllabus Review of 151 Math review	2/8 Electric charge Coulomb's law Insulators & Conductors		2/10 Electric field Continuous charge distributions
Week 2: 2/13 Electric field cont'd	2/15 Electric Flux & Gauss' Law	HW 1 Due (stops before flux)	2/17 Gauss' Law cont'd
Week 3: 2/20 No class- President's day	2/22 (Monday Schedule) Voltage & Potential Energy	HW 2 Due (Covers Gauss' Law and some E field)	2/24 Voltage cont'd
Week 4: 2/27 Voltage cont'd Capacitors	3/1 Capacitors cont'd ---End of Exam 1 Material---	HW 3 Due (Covers voltage and capacitance)	3/3 Dielectrics
Week 5: 3/6 Exam 1 Review in Class	3/8 (Exam 1 7-9PM) Capacitor circuits		3/10 Capacitor circuits cont'd
Week 6: 3/13 No class- Spring Break	3/15 No class- Spring Break		3/17 No class- Spring Break
Week 7: 3/20 Resistance & resistors Ohm's Law	3/22 Ohm's Law cont'd Resistor circuits	HW 4 Due (covers capacitor circuits)	3/24 Circuits cont'd Power
Week 8: 3/27 RC Circuits	3/29 Magnetic field Magnetic force Cross products	HW 5 Due (covers resistor and RC circuits)	3/31 Mag field cont'd Biot-Savart Law Currents near wires
Week 9: 4/3 Ampere's Law Solenoids	4/5 Magnetic flux Lenz's/Faraday's Law	HW 6 Due (Covers mag field and Ampere's Law)	4/7 Faraday's Law cont'd Maxwell's Equations EM Waves? ---End of Exam 2 Material---

Week 10: 4/10 Built-in catch-up day	4/12 <b>Exam 2 Review in Class</b> <b>(Possibly move to next day)</b>	HW 7 Due (Covers mag flux and Faraday's Law)	4/14 Built-in catch-up day
<b>Week 11: 4/17</b> <b>No class- Patriot's Day</b>	4/19 <b>(Exam 2 7-9PM)</b> Ideal gas law & pressure		4/21 Ideal gas law cont'd Temperature and heat
Week 12: 4/24 Thermal expansion 0th and 1st Laws of Thermo Applications of 1st law	4/26 Applications of 1st law cont'd Heat capacity Heat transfer	HW 8 Due (Covers up through 1st law basics)	4/28 Heat transfer cont'd Phase changes
Week 13: 5/1 Degrees of freedom Equipartition theorem	5/3 Adiabatic expansion Intro to Carnot cycle	HW 9 Due (Covers 1st law processes, phase changes, and specific heat)	5/5 Carnot cycle & engines
Week 14: 5/8 Engines cont'd Refrigerators	5/10 Entropy 2nd and 3rd Laws of Thermo	HW 10 Due (Covers adiabatic processes & engines)	5/12 Entropy cont'd Built-in catch-up day
Week 15: 5/15 Built-in catch-up day	5/17 (Last Day) <b>Exam 3 Review in Class</b>	HW 11 Due (covers entropy & stat mech)	<b>Final exam TBD</b>