

PHYS 122 H: Introductory Physics II | Spring 2021

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Teaching Assistant: TBA

Class Times: M/W/F 2:00-2:50 PM on Blackboard Collaborate

Discussion: Tuesdays 2:30 – 4:20 on Blackboard Collaborate

Alternate Location: On rare occasions there have been “outages” of BB Collaborate. If this happens, or blackboard is just down altogether, we will reconnect the class through webex at:

<https://umbc.webex.com/meet/meyer> (this is NOT the primary class location, see above!)

**At present this number forwards to my personal cell phone. If the issue is not (or only somewhat) urgent, please send an email with "PHYS 122H" (and/or "URGENT") in the subject line and/or message me on slack.*

Welcome to PHYS 122H! In this course we will take on two of the pillars of classical physics: thermodynamics and electromagnetism. The former involves heat, temperature, entropy and explains things as every day as engines and refrigerators and as difficult to grasp as the expansion of the Universe and eruptions from black holes. The latter (electricity and magnetism) covers charges, currents, and electric and magnetic fields under static and time-variable conditions. With it we can grasp a great deal of phenomena, from the inner workings of electronics to lightning.

As was the case in PHYS 121H, the goal of this course is not only to teach you the basics of these branches of classical physics, but also to **think like a physicist**. Many of you will find this challenging at first, especially if you have been taught in an environment with a lot of testing which tends to emphasize memorization and learning ‘by rote’ rather than true understanding and physical insight. Be not afraid – we will help you to learn these other skills as well. Because our goal is to teach you to think like a physicist, this is largely an active learning course. **This means that you will be responsible for your first exposure to the material, through both reading and pre-lecture videos.** The in-class time will be spent challenging you and asking questions to cement your understanding of the concepts. There will be many opportunities in class, during the discussion session, during office hours, and online to ask questions and improve your understanding. If you have not experienced ‘active learning’ before, you might be worried, but don’t be. We’ve worked hard to make sure that the expectations for the course are as clear as possible so as long as you follow directions outlined in this syllabus and show up to class with a spirit of curiosity and openness to learning, you will do great.

Elements of this Course:

Reading Before Lecture.

Below you will find a course schedule which lists the topic of each lecture, as well as the dates of quizzes, and when pre-lectures (described below) and homework is due. For each lecture, to the right you will find a corresponding reading assignment. One of the major transitions you will make in college is towards a much higher reliance on reading and self-teaching from reading. Why is this important? As you get to higher and higher levels in your chosen field (whether physics or something else), you will inevitably get to the point where *there is no class for what you want to learn*. There are only books and published papers. At this point, your years of training yourself to read and understand concepts from a textbook or similar source will really be important. The Course Materials Initiative

(CMI) which is offered for this course, provides you with electronic access to the textbook we use (see below). However, if you prefer to read a paper copy, you are by all means encouraged to obtain one (be sure to get the right edition (6th), but used is fine and usually much cheaper).

Pre-Lecture.

Each week, there will be one or two “pre-lecture” videos provided under the FlipItPhysics program (see “Accessing Course Materials” below or on the Blackboard site). These videos are required watching & will provide an introduction to the material that will be covered that day. *I highly recommend that you first read the associated material in the textbook* (which will necessarily be more comprehensive & informative than a video), and *then* watch the pre-lecture as a kind of “summing it all up” experience, though you are encouraged to do what works for you. Further below in this syllabus you will find a detailed schedule for the semester that lists both the reading sections for each lecture and the dates that pre-lectures are due.

During the pre-lecture, there are “checkpoint” questions that will check your understanding of the material at a basic level (this is also why it is best that you read first, watch video second). In the FlipItPhysics system, you will login to watch the video and complete the checkpoint. Both must be completed by 8 AM on the day assigned in order to get credit (note: for obvious reasons, it is generally preferable to do these the day before or earlier unless you enjoy getting up very very early).

The combined pre-lecture and checkpoints are worth 5% of your final grade.

Quizzes.

Each week that there is not an exam, there will be a “quiz” due on the Friday. These are really more like weekly mini take-home exams. The problems for the quiz are released on blackboard on Monday night, and you have until Friday at 9 AM to complete your solutions. You are allowed to use your book, notes, lectures, and flip-it videos for reference, as well as other physics books you may have on hand. However, you are *strictly forbidden* from consulting with other students on these problems or using the internet in any other way (i.e., you may not google the solution). Your solutions, which must be entirely your own work, must be uploaded to blackboard as a single PDF file (multiple files or images will be given a zero automatically by the system) before the due date. In the normal “in-person” class, you would be given 15 minutes at the beginning of class on the Friday to reproduce one of the problems on a blank piece of paper (you would not know in advance which one). For the online course, one of the problems will be graded “closely” according to the rubric available on blackboard, on a 10/10 scale. The other two are graded for “honest effort” completion – a full and honest but ultimately incorrect solution will be given 1 point (out of 2) while a full and complete solution will get 2 points out of 2. Missing, sloppy, or simply inadequate (not an “honest effort”) solutions will get zero points. The total quiz is thus worth 14 points (as there are always three problems). Quiz solutions must follow the “Beautiful Solution” rubric which is explained in a separate document posted on blackboard.

The quizzes are worth 7.5% of your final grade.

Lecture.

For the spring 2021 semester, the course will be entirely online. You will join the online class using blackboard collaborate every class period (MWF at 2 PM) – attendance is required. The lecture will be a bit different than you may have experienced before. It is most definitely NOT the place where I, the professor, tell you physics concepts for the first time. That MUST occur before you arrive in the lecture space, through the assigned reading and pre-lecture. The class period is much better spent *attacking*

misconceptions and accordingly it will consist of group problem solving and ‘clicker questions’ (many of these conceptual) that challenge your understanding. It is vital that you come prepared to lecture; further, you should anticipate being called on by the professor to explain your answer to a problem you have been assigned to work live in class. This will be part of your participation grade.

Clickers in class: In the previous “in-person” course, we used devices called ‘clickers’ which allowed me to instantly poll the class with multiple-choice questions. There are great for getting instant feedback on what you do and don’t understand. (They are also used to track attendance and attention). In the online course, we will use the same software – TurningPoint, but rather than physical devices you will “click in” your answer either through a web browser or (more easily) using your smartphone, if you have one. It is your responsibility to make sure the clicker software is working properly by the third class. Participation credit for lecture (through clicker responses) is worth 5% of your final grade. It is ok to get wrong answers on the clicker questions – while you should try your best to get it right, you are graded only on whether you answer or not.

Recordings: All classes are recorded (as screencasts) and will be available on Blackboard soon after the class ends.

Participation credit for lecture (through clicker responses) is worth 5% of your final grade.

Discussion.

Discussions are weekly meetings where you work on a packet of problems in small groups and under the observation of the discussion instructor. For this course, discussion will be held on Tuesdays from 2:30--4:20 PM on Blackboard Collaborate. Discussion is designed to provide you with a collaborative learning environment so you can help and learn from each other. Some of the assigned problems will be quite challenging. We find that this is the best environment to tackle these problems, which can have solutions which are at first counter-intuitive, because of the group environment. However, each student is ultimately responsible for writing out and fully understanding the solution to all problems in the packet. “Direct copying”, besides sabotaging your learning, will also be penalized if observed by the instructor.

The discussion grade is a “completion” grade – before you can leave the discussion, the TA will check your answers and be sure that you understand all the solutions with a few pointed questions. If any answers are incorrect, you will be sent back to figure it out (perhaps with a hint). In the rare case where, despite working diligently through the entire discussion, a student is unable to finish all the problems, it will still be possible to get a full completion grade at the discretion of the TA.

Attendance at discussion is mandatory and full attendance is required. A penalty of 50% of the grade will be imposed if you arrive more than 10 minutes late. You are allowed to bring your calculator and any notes you have taken from lecture, the textbook, or FlipItPhysics, but you are not allowed to use any other electronics such as laptops or cellphones. You are certainly encouraged to request hints from the TA or your classmates when stuck on a problem!

The discussion grade is 10% of your total final grade.

Homework.

A major part of the learning process and your success will come about as a result of doing homework. If you do not put forth a serious effort into your homework (and the quiz problems), you will likely

NOT do well in this class. Individual homework will be submitted via the FlipItPhysics online system. For each pre-lecture unit, there is one associated homework unit. As a general rule, assignments will be due about 4 days after the pre-lecture at 11:59 PM (*i.e.*, *midnight*). *Please print out the course schedule and keep track of the homework deadlines!*

You are normally allowed six submissions per question. Homework questions can in general be difficult and you will probably find that you will spend a significant amount of time on them. Don't put off assignments until the night before they are due. Instead, start your homework early so you have the time to properly digest the concepts and get assistance from the TA hours or office hours, or other students. Sometimes you will need to “sit” on a question you at first fail to answer and return to it after thinking about it for a while. Like in the discussion, you are encouraged to work together, however, it is your responsible to fully understand the material.

Homework is worth 10% of your final grade, however you should **not** make the mistake of thinking it is not very important. It is the primary way that you will prove your mastery of the concepts to yourself and prepare for exams (which are 65% of your final grade). Take homework seriously.

***A note on time spent on this course:** new students may not be aware of the “3x” rule for estimating how much time a college course will require outside of lecture (and discussion). In general, the number of hours is at least 3 times the credit hours. That means that you should be spending about 9 hours per week reading and studying outside the classroom. Exceeding this number slightly is normal and often typical for physics courses. In my experience, students need to spend about 10-15 hours per week on the course to do well, and this includes significant time reviewing/solidifying material for midterms well in advance. Please spend some time planning where in the week you will put the time for this course. If you need help sticking to a plan, consider getting a “reading buddy” to read the text or watch pre-lecture at the same time as you (similar to how “workout buddies” can greatly improve your attendance at the gym!). If you feel that you are struggling with the load in this course, please come speak to me about it in office hours. It’s important that problems are addressed early and feedback is always welcome.*

[Accessing Course Materials & Resources](#)

Blackboard.

This course will use a custom site at blackboard.umbc.edu to transmit course materials (such as lecture slides, solutions, etc) and organize announcements (which will also arrive in your inbox). It is the main site for all course information. Your grade will also be visible and updated regularly here. The Blackboard site will include a discussion board where you can post questions – please use it!

Textbook.

This course is participating in the “Course Materials Initiative” (CMI). Through this program, all students receive immediate access to an electronic version of the required textbook (e-textbook), **Physics for Scientists and Engineers 6th edition by Tipler**, via the *VitalSource Bookshelf* link in *Blackboard*. The charge for electronic access to the book is billed through your tuition and fees statement at UMBC. **A code will be emailed to you before the semester starts.** Please contact the bookstore if you do not have access to the book at least a week before classes begin! You will have

access to the e-book for three full years (from the beginning of the semester). Make sure to download the VitalSource App for offline use.

Opting Out of CMI - Your participation in the CMI is completely optional. You may opt out of the program and receive a full refund by completing the [CMI Consent for Removal Form](#) (search on my.umbc.edu) and submitting it in person to the Bookstore Textbook Managers desk by September 11th.

Please visit the CMI webpage, bookstore.umbc.edu/cmi, for more information!

FlipItPhysics.

As well as having automatic access to an electronic version of the required textbook, CMI also gives you access to the FlipIt Physics website (www.flipitphysics.com) using your individual code which is emailed to you. If you have opted out of CMI, you can still join the course under a temporary account (in case you drop the course), and you will have several weeks to purchase access through the site itself.

The code to join this course (PHYS 122H Spring 2021) is: ddb62e3d

Your Grade:

Pre-lecture and checkpoint on FlipItPhysics: 5%

Quizzes: 7.5%

Lecture Participation (clicker): 5%

Homework: 7.5%

Discussion: 10%

Exams (each, there are 3): 15%

Final Exam: 20%

You can find your current grade on the course Blackboard site. It will generally be up-to-date to within the last week.

Make-up and Late Policies:

Extension Request Form: New this semester, I have created a google form for you to put in your requests for homework extensions or absences. You must use this form in order to get an extension – please do not use email/slack for these requests because they can get lost.

Lecture: You will be given three “free” days for not clicking in lecture. These count towards ALL absences and clicker malfunctions.

Online FlipIt Physics pre-lecture, checkpoints and homework: A one-time extension of one week is available twice per semester (for a single assignment) to all students. Otherwise make-up work is generally not allowed except in extreme circumstances*.

Discussion: There is no make-up discussion. If you must miss a discussion for legitimate reasons*, contact Dr. Meyer as soon as possible to make an alternative arrangement.

Quizzes: There are no make-up quizzes, however if you miss a quiz for legitimate reasons*, you must contact me as soon as possible to make alternate arrangements.

Mid-term exams: Make-ups will only be allowed for legitimate reasons*, and it is your responsibility to contact me regarding arrangements for a possible make-up.

Final exam: There is no make up for the final exam. An alternate time for the final exam will be allowed in cases where the final exam of another class conflicts with our final exam (you will be required to provide documentation showing this). It is your responsibility to find out when your final exams will occur and e-mail me well in advance of the week of finals if you discover a conflict with another class.

**Legitimate reasons are defined as officially-sanctioned UMBC activities, illness, family emergency, detention by authorities, or another insurmountable difficulty. I'll request written verification for the cause of your absence.*

Course Resources and Additional Help:

Instructor Office Hours: Generally M/W/F afternoons but may vary due to external (e.g. department or research-related) commitments. Appointments in increments of 15 minutes are available for booking at least 1 hour in advance. See google calendar link on blackboard to sign up for office hours. If you need a different time, please contact me on slack or by email.

Slack: It is required that all students in the course join the slack group (phys122h.spring2021). This invite link is good through Feb 18, 2021:

https://join.slack.com/t/phys122hspring2021/shared_invite/zt-la6qrmv4-E5zI4rv30xHaJs6KTQIPsA

Physics Tutors: The LRC has physics tutors with walk-in hours as well as more in-depth small group sessions. The times and locations will be posted on Blackboard as soon as we know the details for the online Fall 2020 semester.

Academic Integrity

All instances of academic misconduct will be addressed according to the UMBC Policy on Academic Integrity. Examples include attempting to make use of disallowed materials on quizzes and exams, attempting to communicate with anyone other than the instructor or TA during an exam, altering graded work and submitting it for regrading, asking someone else to take an exam in your place, copying another's work on homework, asking someone else to do homework and representing it as your own, and permitting or assisting another student to carry out any of the above. Penalties range from a grade of 0 on a homework or exam to an F in the course (at my discretion), and from denotation of academic misconduct on the transcript to expulsion (as determined by official hearing of the Academic Conduct Committee).

Course Schedule

Week	Date	DoW	Pre-Lecture	Quiz	HW	Lecture Topic	Textbook
			Due 1:00 PM	2 PM	12 AM*		
1	Jan 27	W	1			Intro to Thermodynamics	17: 1-3
	Jan 29	F	2			Heat, Calorimetry	18: 1-3
2	Feb 1	M	3		1	Ideal Gas Law, Kinetic Theory of Gases	17: 4
	Feb 3	W			2	Molar Heat Capacity, PV diagrams	18: 4-8
	Feb 5	F	4	1	3	Ideal Solids, Thermal Expansion	20: 1-4
3	Feb 8	M				Equipartition and Adiabatic Compression	18: 8-9
	Feb 10	W	5		4	Heat Engines	19: 1-3
	Feb 12	F	6	2		Irreversibility, Entropy	19: 5
4	Feb 15	M			5	Thermo Review	
	Feb 17	W			6	Thermo Review	
	Feb 19	F				Midterm 1 (Units 1-6, Ch 17, 18, 19, 20)	
5	Feb 22	M	7			Electric Charge, Coulomb's Law	Ch 21: 1-3
	Feb 24	W	8			Electric Field	Ch 21: 4-6
	Feb 26	F	9		7	Electric Field – Applications	Ch 22: 1-2
6	Mar 1	M		3	8	Electric Flux, Gauss' Law	Ch 22: 1-2
	Mar 3	W	10		9	Gauss' Law	Ch 22: 3
	Mar 5	F	11			Applications of Gauss' Law	Ch 22: 4-6
7	Mar 8	M		4	10	Electric Potential	Ch 23: 1-3
	Mar 10	W	12		11	The Field from Electric Potential	Ch 23: 4-6
	Mar 12	F	13			Conductors and Capacitance	Ch 24: 1
	Mar 15						
	Mar 17					<i>Spring Break</i>	
	Mar 19						
8	Mar 22	M	14	5	13	Capacitors	Ch 24: 1-3
	Mar 24	W				Review	
	Mar 26	F				Midterm 2 (Units 7-13, Ch 21, 22, 23)	
9	Mar 29	M	15		14	Electric Current, Dielectrics	Ch 24: 3-5
	Mar 31	W	16			Circuits	Ch 25: 1-4
	Apr 2	F	17		15	Kirchoff's Rules	Ch 25: 5
10	Apr 5	M		6	16	RC Circuits	Ch 25: 6
	Apr 7	W	18		17	More Circuits	Ch 25
	Apr 9	F	19			Magnetic Force	Ch 26: 1
11	Apr 12	M		7	18	Forces and Torques on Currents	Ch 26: 2
	Apr 14	W			19	Circuits, Intro Magnetism Review	Ch 26: 3-4
	Apr 16	F				Midterm 3 (Units 14-19, Ch 24, 25, 26)	
12	Apr 19	M	20	8		Biot-Savart Law	27: 1-3
	Apr 21	W	21			Gauss' Law for Magnetism	27: 1-3
	Apr 23	F	22		20	Ampere's Law	27: 4
13	Apr 26	M		9	21	Magnetic Flux	28: 1
	Apr 28	W	23		22	Faraday's Law	28: 1-3
	Apr 30	F	24			Motional EMF	28 3-4
14	May 3	M		10	23	Inductance	28: 5-6
	May 5	W	25		24	AC Circuits	29: 1-2
	May 7	F				E&M Review	
15	May 10	M			25	E&M Review	
	May 12	W				E&M Review	
	May 15	F				Likely Final Exam Based on Prior Year Schedule (1 – 3 PM)	

*Homework is generally due at 11:59 the day before noted. Other "due times" listed here are for the day of the note.

[Accessibility and Disability Accommodations, Guidance and Resources](#)

Accommodations for students with disabilities are provided for all students with a qualified disability under the Americans with Disabilities Act (ADA & ADAAA) and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would create equal access for students when barriers to participation exist in University courses, programs, or activities.

If you have a documented disability and need to request academic accommodations in your courses, please refer to the SDS website at sds.umbc.edu for registration information and office procedures.

SDS email: disAbility@umbc.edu

SDS phone: (410) 455-2459

If you will be using SDS approved accommodations in this class, please contact me (instructor) to discuss implementation of the accommodations. During remote instruction requirements due to COVID, communication and flexibility will be essential for success.

[Sexual Assault, Sexual Harassment, and Gender Based Violence and Discrimination](#)

UMBC's [Policy on Sexual Misconduct, Sexual Harassment and Gender Discrimination](#) and Federal Title IX law prohibit discrimination and harassment on the basis of sex in University programs and activities. Any student who is impacted by sexual harassment, sexual assault, domestic violence, dating violence, stalking, sexual exploitation, gender discrimination, pregnancy discrimination, gender-based harassment or retaliation should contact the University's Title IX Coordinator to make a report and/or access support and resources:

Mikhel A. Kushner, Title IX Coordinator (she/her/hers)

410-455-1250 (direct line), kushner@umbc.edu

You can access support and resources even if you do not want to take any further action. You will not be forced to file a formal complaint or police report. Please be aware that the University may take action on its own if essential to protect the safety of the community.

If you are interested in or thinking about making a report, please see the [Online Reporting Form](#). Please note that, while University options to respond may be limited, there is an anonymous reporting option via the online form and every effort will be made to address concerns reported anonymously.

[Notice that Faculty are Responsible Employees with Mandatory Reporting Obligations:](#)

All faculty members are considered *Responsible Employees*, per [UMBC's Policy on Sexual Misconduct, Sexual Harassment, and Gender Discrimination](#). Faculty are therefore required to report possible violations of the [Policy](#) to the Title IX Coordinator, even if a student discloses something they experienced before attending UMBC.

While faculty members want you to be able to share information related to your life experiences through discussion and written work, students should understand that faculty are required to report Sexual Misconduct to the Title IX Coordinator so that the University can inform students of their [rights, resources and support](#).

If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, UMBC has a number of [Confidential Resources](#) available to support you:

- The [Counseling Center](#): 410-455-2742 / After-Hours 410-455-3230
- [University Health Services](#): 410-455-2542
- Pastoral Counseling via [Interfaith Center](#): 410-455-3657; interfaith@umbc.edu

Other Resources:

- [Women's Center](#) (for students of all genders): 410-455-2714; womenscenter@umbc.edu.
- [Shady Grove Student Resources](#), [Maryland Resources](#), [National Resources](#).

Child Abuse and Neglect:

Please note that Maryland law and [UMBC policy](#) require that I report all disclosures or suspicions of child abuse or neglect to the Department of Social Services and/or the police.

Pregnancy

UMBC's [Policy on Sexual Misconduct, Sexual Harassment and Gender Discrimination](#) expressly prohibits all forms of Discrimination and Harassment on the basis of sex, including pregnancy. [Resources for pregnant students](#) are available through the University's Office of Equity and Inclusion. Pregnant and parenting students are encouraged to contact the Title IX Coordinator to discuss plans and assure ongoing access to their academic program with respect to a leave of absence or return following leave related to pregnancy, delivery, or the early months of parenting.

In addition, students who are pregnant may be entitled to accommodations under the ADA through the [Student Disability Service Office](#), and/or under Title IX through the [Office of Equity and Inclusion](#).

Religious Observances & Accommodations

UMBC [Policy](#) provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance, and as early as possible. For questions or guidance or to request an accommodation, please contact the [Office of Equity and Inclusion](#) at oei@umbc.edu.

Hate, Bias, Discrimination and Harassment

UMBC values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement.

Consistent with these principles, [UMBC Policy](#) prohibits discrimination and harassment in its educational programs and activities or with respect to employment terms and conditions based on race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information.

Students (and faculty and staff) who experience discrimination, harassment, hate or bias or who have such matters reported to them should use the [online reporting form](#) to report discrimination, hate or bias incidents; reporting may be *anonymous*.