

### SYLLABUS

**COURSE DESCRIPTION** This algebra-based physics course is intended for those majoring in the life sciences and others for whom basic knowledge of physics is helpful or desired.

**LEARNING GOALS** This course addresses the General education program (GEP)'s functional competency Scientific and Quantitative Reasoning. It has been approved to meet the GEP Sciences distribution requirement. In particular, it addresses the following two competencies:

- Understand and use mathematical and scientific methods of inquiry, reasoning, processes, and strategies to investigate and solve problems.
- Organize, interpret, draw inferences, and make predictions about natural or behavioral phenomena using mathematical and scientific models and theories.

By the end of this semester, students should be able to demonstrate the following abilities:

1. Apply the charge model to explain basic electric phenomena.
2. Use Coulomb's law to calculate vector properties (magnitude and direction) of electrical forces between charged particles, and electric fields of charged particles.
3. Calculate electric potential and electric potential energy of discrete charge configurations, and apply conservation of energy to solve problems.
4. Apply Ohm's law to calculate resistance, current, voltage and power in circuits.
5. Apply Kirchhoff's laws to analyze series and parallel configurations of circuits containing batteries, resistors and capacitors.
6. Calculate the magnetic fields due to moving charges, and currents in wires of different geometries, namely, straight wire and loops.
7. Calculate the magnetic forces on moving charges and on current-carrying wires in magnetic fields.
8. Understand general characteristics of waves on strings, sound waves and light waves.
9. Apply the principle of wave superposition to the phenomena of interference.
10. Understand and apply the laws of reflection and refraction.
11. Use the thin-lens equation to analyze image formation by lenses and mirrors.

**PREREQUISITE** Completed PHYS 111 with a C or better

**INSTRUCTOR** Dr. Lili Cui [lili@umbc.edu](mailto:lili@umbc.edu)

Office hour:

- In Person: MON 2:10 – 3:00 pm and FRI 11:10 am – 12:00 pm, in PHYS 226A
- Online: SUN 6:30-7:20 pm, via Bb Collaborate in Blackboard

Email policy:

- Visiting my office hour is the best way of contact. The time is set aside for you, and you will get individual attention. I'd love to use the time to know you in person.
- Physics-related questions should be posted on *Discord* instead of personal email so everyone in the class can benefit from the discussion.
- Email is a great method for non-physics questions. Please include your full name, course number, and use your UMBC email address to ensure a prompt response.

**REQUIRED TEXTBOOK & OTHER MATERIAL**

- A reliable computer, reliable Internet access, and a microphone
- College Physics: A Strategic Approach by Knight, Jones, and Field, 4<sup>th</sup> ed.
- Poll Everywhere app (free and optional)
- A clear and focused mind, positive attitude, and patience

## SUCCESS STRATEGY

- Be sure you have the time required for the course. You are expected to attend all classes – lectures and labs. In addition, experience shows that success requires at least 8 hours of intensive effort outside of class each week. If you typically spend much less than 8 hours of outside study, you are unlikely to be able to learn the material. If you typically spend much more than 12 hours of outside study, you should consult with the instructor about ways to study more efficiently.
- Physics is about understanding, not memorization. Instead of only paying attention to results, it is more important to understand how you get results.
- You have many resources including the textbook, study group, your friends, Teaching Assistants, me, YouTube and more. Use them wisely.
- It is essential to develop an ability to think and learn for yourself. You must be actively engaged to learn the material, you cannot passively watch me or your classmates and expect to understand the concepts and develop problem solving skills. Cognitive science has proven that the mind must interact to learn.

Success in the course is not “a piece of cake” but can be achieved with effort and the right study strategies.

## GRADING POLICY

Type of Assignment	Percentage
Reading Assignment	5%
Homework	10%
Lab	10%
Quiz	25%
Exam 1	15%
Exam 2	15%
Final Exam	20%
Total	100%

I do not grade on a curve. Why should I assume that x% of you will be failing this course? If you all do an excellent job, you all deserve an A. How well your neighbor is doing should not affect your grade. Help each other and learn from each other.

90.0% or Above	A
80.0% - 89.9%	B
70.0% - 79.9%	C
60.0% - 69.9%	D
59.9% or Below	F

- There is NO extra credit at the end of the term. It is far easier to fix problems early in the semester than after the tests have been taken.
- Check your grades on Blackboard routinely. Please contact me or your TA for any grading questions within TWO days after grade is available.

## READING ASSIGNMENT

- You are required to read the textbook sections (see schedule) prior to every class; it makes for efficient learning. The class time will be spent on clarifying and applying the materials.
- To prepare you actively engage in class, weekly reading assignments will be given online through Blackboard. They typically consist of approximately ten questions, and usually due before every Monday's class at 9:30 am.

## LECTURE

- Lectures focus on deepening your understanding of the more difficult concepts and developing scientific reasoning and systematic problem-solving skills, not on delivering the basic content.
- The lecture slides will be posted on Blackboard the night before every lecture. You are expected to print them out to take lecture notes on; it gives you the structure of every lecture and facilitates the note-taking process. But remember these slides are not the complete content of the class but only an outline, studying them out is not a substitute for attending lectures.
- Poll Everywhere App will be used to promote active learning by providing instant feedback for both the instructor and students. Participation is not required but highly recommended.
- If you miss one lecture, you are responsible for making up the material.

## LAB

- You must attend the lab section that you are officially registered for.
- Many of the main concepts of the course will be introduced or reinforced in weekly laboratory sessions, through direct experience with the physical world. *In some cases, later lectures will build on the understanding you achieve in lab.*
- Lab grade will be divided equally between your full participation and submitted work. Written lab packet is due at the end of your lab session.
- Your lab TA will give specific guidelines.

## HOMEWORK

- A major part of what I expect you to learn in this class will come as a result of doing homework. The homework assignments are designed primarily to build conceptual understanding, develop scientific reasoning skills, and provide practice and feedback with systematic problem solving. You need to fully *understand* how to solve the assigned homework problems to do well on the quizzes and to succeed in the course.
- Individual homework will be submitted via Blackboard, typically due on Tuesdays, Thursdays, and Sundays at 11:59:00 PM, however the due dates may be adjusted on occasions.
- Homework questions are not easy, and you will find yourself spend a lot of time on them. This is expected. Don't put off assignments until the hour before they are due. Instead start your homework early enough so you have time to get help.
- You are encouraged to work together, however, you must fully understand how to solve problems on your own.
- Since the main purpose of homework is to prepare you for the quizzes and exams, keep a careful written record of your work for future studying.
- There are websites where you can view (or perhaps purchase) solutions to homework problems. I cannot stop you from cheating, but I strongly recommend you don't. *Consider your goals...are you trying to just get the homework done or do you actually want to learn something?* I guarantee that the more you use solutions written by someone else, the less likely you will be able to produce your own solutions on quizzes and exams.

## QUIZ

- You have to do well on all quizzes to be able to get a good grade for the course.
- The reading quizzes, lectures, lab activities, and homework will help you acquire the understanding and problem-solving skills you'll need.
- Weekly quizzes will be given on Mondays at 8:00-8:50 am, online in Blackboard. You must access the quiz between 8:00-8:20 am. Each quiz is 30 minutes long.
- Quizzes are cumulative.
- Quizzes are individual work and academic integrity will be enforced. They are open book and open note, but you cannot talk to anyone nor access Internet to search for answers. No cell phones or other communication devices.

## MIDTERM & FINAL EXAM

- Exam 1, exam 2, and the final exam will be in person and cumulative.
- See schedule for the exact time and dates.

## MAKE UP POLICY

Life is full of surprises so it's understandable that you might miss a class or two. The course policy has been set up to accommodate a few unexpected situations.

- Reading Assignment: Start early, no late assignments are possible.
- Homework: Lowest two homework scores will be dropped. These count towards ALL absences and problems with technology.
- Quiz: Lowest two quiz scores will be dropped. These count towards ALL absences and problems with technology.
- Lab: If you must miss a lab for legitimate reasons\*, contact your TA and me as soon as possible. With written verification of your absence, you might be allowed to attend the makeup lab scheduled on Week 15. Only one make up lab is allowed for the entire semester.
- Midterm and Final Exam: If you must miss an exam for legitimate reasons\*, contact me before the scheduled exam. Failure to do so could result in a zero for that exam. With written verification of your absence, a makeup exam can be arranged.

*\*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.*

## FREE TUTORING

- Physics Tutoring Center is located in PHYS 226A and it offers free walk-in tutoring. Operation hours and staffing information will be posted in our Blackboard site.
- Academic Success Center also supplies free tutoring service by appointment. To make an appointment, please visit <https://academicsuccess.umbc.edu/tutoring/>

## COURSE WEBSITE

I will put most of my teaching materials in our course site through Blackboard. After log in myUMBC, click on the "Blackboard" tab and then click on "PHYS112 - SP2024" in the "My Courses" area. You are responsible for all content delivered via Blackboard. You are *required* to logon to the course website *at least once between lectures*.

You will use the Blackboard for:

- Checking the *Announcements*.
- Accessing *Course Materials*: syllabus, lectures note, homework, lab, and etc.
- Checking the *Grades* that you have earned.

Discord server will be set up and used for 24/7 online interaction outside of the classroom.

## ACADEMIC INTEGRITY

- "By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal." To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook.
- ALL incidents of alleged Academic Misconduct will be reported.

## DISABILITIES

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 creates 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](https://sds.umbc.edu) for registration information and office procedures.

SDS email: [disAbility@umbc.edu](mailto:disAbility@umbc.edu)

SDS phone: [410-455-2459](tel:410-455-2459)

If you will be using SDS approved accommodations in this class, please contact the instructor to discuss implementation of the accommodations.

## SEXUAL ASSAULT, SEXUAL HARASSMENT, AND GENDER BIASED VIOLENCE AND DISCRIMINATION

UMBC Policy in addition to federal and state law (to include Title IX) prohibits discrimination and harassment on the basis of sex, sexual orientation, and gender identity 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 related retaliation should contact the University's Title IX Coordinator to make a report and/or access support and resources. The Title IX Coordinator can be reached at [titleixcoordinator@umbc.edu](mailto:titleixcoordinator@umbc.edu) or 410-455-1717.

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 making a report, please use the [Online Reporting/Referral Form](#). Please note that, if you report anonymously, the University's ability to respond will be limited.

Notice that Faculty and Teaching Assistants are Responsible Employees with Mandatory Reporting Obligations.

**TEACHING  
ASSITANTS**

Achala Denagamage [achala\\_1@umbc.edu](mailto:achala_1@umbc.edu)  
 Maddie Killiam [mkillia1@umbc.edu](mailto:mkillia1@umbc.edu)  
 Nikita Parajuli [nikitap1@umbc.edu](mailto:nikitap1@umbc.edu)

**LAB TA ASSIGNMENT**

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00					<b>Lab 09</b> (4830) 8:00-9:50 AM <i>Nikita Parajuli</i>
8:30				<b>Lab 04</b> (4827) 8:30-10:20 AM <i>Maddie Killian</i>	
9:00					
9:30					<b>Lab 10</b> (5318) 10:00-11:50 AM <i>Achala Denagamage</i>
10:00				<b>Lab 05</b> (4828) 11:00-12:50 <i>Nikita Parajuli</i>	
10:30					
11:00					
11:30					
12:00					
12:30					
1:00					
1:30				<b>Lab 06</b> (4829) 1:30-3:20 PM <i>Maddie Killian</i>	
2:00					
2:30					
3:00					
3:30				<b>Lab 12</b> (5713) 3:30-5:20 PM <i>Maddie Killian</i>	
4:00					
4:30					
5:00					
5:30			<b>Lab 02</b> (4825) 5:30-7:20 PM <i>Achala Denagamage</i>	<b>Lab 11</b> (5577) 5:30-7:20 PM <i>Nikita Parajuli</i>	
6:00					
6:30					
7:00					
7:30			<b>Lab 03</b> (4826) 7:30-9:20 PM <i>Achala Denagamage</i>		
8:00					
8:30					
9:00					

### PHYS 111 – Spring 2024 Schedule\*

	Date	Lecture Topic	Textbook	Lab
Week 1	Jan 29 (M)	Introduction and Electric Charge	20.1-20.2	No Lab
	Jan 31 (W)	Electric Force	20.3	
	Feb 2 (F)	More on Electric Force	20.6	
Week 2	Feb 5 (M)	<b>Quiz 1 (8AM)</b> , Electric Field	20.4	Lab 1 Electric Charge and Force
	Feb 7 (W)	Electric Field of Point Charges	20.5	
	Feb 9 (F)	More on Electric Field	20.6-20.7	
Week 3	Feb 12 (M)	<b>Quiz 2 (8AM)</b> , Electric Potential Energy	21.1	Lab 2 Electric Field
	Feb 14 (W)	Electric Potential	21.1-21.3	
	Feb 16 (F)	More on Electric Potential	21.4	
Week 4	Feb 19 (M)	<b>Quiz 3 (8AM)</b> , Electric Field and Potential	21.5-21.6	Lab 3 Electric Potential
	Feb 21 (W)	Capacitance	21.7	
	Feb 23 (F)	More on Capacitance	21.8	
Week 5	Feb 26 (M)	<b>Exam 1 (1:00-1:50 PM, in person), location TBA</b>		Lab 4 Introduction to Circuit
	Feb 28 (W)	Ohm's Law and Electric Power	22.1-22.6	
	Mar 1 (F)	Kirchhoff's Law	23.1-23.2	
Week 6	Mar 4 (M)	<b>Quiz 4 (8AM)</b> , Resistor Circuit	23.3-23.4	Lab 5 Electric Current
	Mar 6 (W)	Resistors in Series and Parallel	23.5	
	Mar 8 (F)	More on Resistor Circuit		
Week 7	Mar 11 (M)	<b>Quiz 5 (8AM)</b> , RC Circuit	23.7	Lab 6 Voltage and Ohm's Law
	Mar 13 (W)	More on RC Circuit	23.8	
	Mar 15 (F)	Application		
Week 8	Mar 18-22	Spring Break		
Week 9	Mar 25 (M)	<b>Quiz 6 (8AM)</b> , Magnets and Magnetic Field	24.1-24.2	Lab 7 RC Circuit
	Mar 27 (W)	Magnetic Field of Long Straight Current	24.3	
	Mar 29 (F)	Magnetic Field of Current Loop	24.4	
Week 10	Apr 1 (M)	<b>Quiz 7 (8AM)</b> , Magnetic Force	24.5	Lab 8 Magnetic Field and Force
	Apr 3 (W)	Motion of Charged particles in B Field	24.6-24.7	
	Apr 5 (F)	Magnetic Force on Current		
Week 11	Apr 8 (M)	<b>Exam 2 (1:00-1:50 PM, in person), location TBA</b>		Lab 9 Wave Properties
	Apr 10 (W)	Wave Properties	15.1-15.4	
	Apr 12 (F)	Sound Intensity and Intensity Level	15.5-15.6	
Week 12	Apr 15 (M)	<b>Quiz 8 (8AM)</b> , Wave Interference	16.1,16.6	Lab 10 Wave Interference
	Apr 17 (W)	Interference of Light	17.1-17.2	
	Apr 19 (F)	More on Interference of Light		
Week 13	Apr 22 (M)	<b>Quiz 9 (8AM)</b> , Reflection and Refraction	18.1-18.2	Lab 11 Ray Optics
	Apr 24 (W)	Total Internal Reflection	18.3	
	Apr 26 (F)	Plane Mirror	18.4-18.5	
Week 14	Apr 29 (M)	<b>Quiz 10 (8AM)</b> , Thin Lens (Ray Diagram)	18.7	Lab 12 Thin Lenses
	May 1 (W)	Thin Lens (Lens Equation)	19.1-19.2	
	May 3 (F)	Modeling the Human Eye	18.6	
Week 15	May 6 (M)	<b>Quiz 11 (8AM)</b> , Spherical Mirror	18.7	Makeup Lab
	May 8 (W)	Spherical Mirror (Lens Equation)		
	May 10 (F)	More on Spherical Mirror		
Week 16	May 13 (M)	<b>Quiz 12 (8AM)</b> , Summary		No lab
Final	May 22 (W)	<b>Final Exam (comprehensive, in person); 1:00 AM - 3:00 PM, location TBA</b>		

\*This schedule is tentative and may be adjusted as needed. Refer to class announcement and Blackboard for the most updated information.