

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 Kirchoff'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

Office hour: Mon 1-1:50 pm, Tue 11-11:50 am, Wed 10-10:50 am, and Thu 2-2:50 pm
Online, NO appointment is needed – just stop by.

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 the *Blackboard Discussion Board* instead of personal email so everyone in 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 prompt response.

REQUIRED COURSE MATERIAL

- A reliable computer, reliable Internet access, and microphone
- College Physics: A Strategic Approach by Knight, Jones, and Field, 4th ed.
- MasteringPhysics (electronic homework assignments)
- 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 Quiz	5.0%
Daily Check-in Test	10%
Homework	10%
Lab	10%
Weekly Quiz	55%
Final Exam	10%
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 day after grade is available.

READING QUIZ

- 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.
- Weekly reading quizzes will be assigned online through Blackboard. They typically consist of 5-10 questions, and usually due before each Monday's class at 12:30 pm.

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.
- Lectures on Mondays and Wednesdays will be asynchronous. Lecture notes and video recordings will be posted in Blackboard the day before. Daily check-in tests are due at 11:59 pm on Mondays and Wednesdays in Blackboard.

LAB

- You must attend the lab section that you are officially registered for.
- Lab are synchronous and will be done online via Blackboard Collaborate.
- Lab is based on small-group work, it's designed to provide you with a collaborative learning environment so you can help and learn from each other. Microphone is needed to facilitate group discussion.
- Lab grade will be divided equally between full participation and the individually submitted work. Lab packet is due at the end of your lab and will not be accepted if you miss the lab.
- 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 exams and to succeed in the course.
- Individual homework will be submitted via the MasteringPhysics online system.
- 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 night 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 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 Fridays during the class time 1:00-1:50 pm, online in Blackboard. You must access the quiz between 12:50-1:10 pm.
- 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. No cell phones or other communication devices.

FINAL EXAM

- Final exam will be cumulative.
- There is no make-up exam for the final and no one will be allowed to take the final at a different time.

MAKE UP POLICY

Life is full of surprises so it's understandable that you might miss an assignment due to an unexpected situation (like lost power or internet). The course policy has been set up to accommodate a few unexpected situations.

- Reading Quiz: Start early on reading quizzes, no late quizzes are possible.
- Lecture follow-up Test: Lowest two test scores will be dropped. These count towards ALL problems with technology.
- Friday Quiz: Lowest two Friday quiz scores will be dropped. These count towards ALL problems with technology.
- MasteringPhysics homework: It's better late than never: Possible credit for each item drops steadily to 50% after 48 hours and stays there until the last day of class on May 12.
- Lab: Makeup lab is scheduled at week 15 during your regular lab time, see schedule. Permission is required to attend the makeup lab. If you miss a lab, you must contact your TA and me as soon as possible.

If you must miss an assignment due to legitimate reasons*, contact me as soon as possible. **Legitimate reasons: officially-sanctioned UMBC activities, illness, family emergency, detention by authorities, or another insurmountable difficulty.*

WHERE TO GET HELP

In addition to Dr. Cui's office hours, please take advantage of the following FREE resources if you need any help.

- TAs will provide office hours via Blackboard Collaborate on the following dates:
 - 7-9 pm on Mondays, Tuesday, Wednesdays, and Thursday
 - NO appointment is needed – just stop by
- SI PASS sessions are available via Blackboard Collaborate on the following dates:
 - 1:00-1:50 pm on Wednesdays and 3:00-3:50 pm on Thursdays
 - NO appointment is needed – just stop by
- The Academic Success Center also supplies free tutoring service for this class by appointment. To make an appointment, please visit <https://irc.umbc.edu/tutor/>

ACADEMIC INTEGRITY

- Academic integrity is an important value at UMBC. 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. These principles and policies apply in both face-to-face and online classes. Resources for students about academic integrity at UMBC are available at <https://academicconduct.umbc.edu/resources-for-students/>.
- ALL incidents of alleged Academic Misconduct will be reported.

DISABILITIES

If you have any condition such as a physical learning disability, which will make it difficult for you to carry out the work as I have outlined or which will require academic accommodations, please notify me in the first week of the course.

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 - SP2021” 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 website for:

- Checking the *Announcements*.
- Accessing *Course Materials*: syllabus, reading quiz, lectures note, lab, and etc.
- Checking the *Grades* that you have earned.
- Interacting with the instructor and others online using *Discussion Board*.

TEACHING ASSISTANT INFO

Dongli Deng dedong1@umbc.edu
 Ellen Gulian egulian1@umbc.edu
 Mahendra Panuganti lq30411@umbc.edu
 Maida Ranjbar rmaida1@umbc.edu

TA schedule for the labs

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00					Lab 09 (1594) 8:00-9:50 am <i>Dongli Deng</i>
8:30				Lab 04 (1574) 8:30-10:20 am <i>Mahendra Panuganti</i>	
9:00					
9:30					Lab 10 (5698) 10:00-11:50 am <i>Mahendra Panuganti</i>
10:00					
10:30					
11:00				Lab 05 (1578) 11:00-12:50 <i>Mahendra Panuganti</i>	
11:30					
12:00					
12:30					
1:00					
1:30				Lab 06 (1582) 1:30-3:20 pm <i>Maida Ranjbar</i>	
2:00					
2:30					
3:00					
3:30			Lab 11 (8245) 3:30-5:20 pm <i>Maida Ranjbar</i>	Lab 12 (9202) 3:30-5:20 pm <i>Dongli Deng</i>	
4:00					
4:30					
5:00					
5:30			Lab 02 (1566) 5:30-7:20 pm <i>Ellen Gulian</i>	Lab 07 (1586) 5:30-7:20 pm <i>Maida Ranjbar</i>	
6:00					
6:30					
7:00					
7:30			Lab 03 (1570) 7:30-9:20 pm <i>Dongli Deng</i>	Lab 08 (1590) 7:30-9:20 pm <i>Ellen Gulian</i>	
8:00					
8:30					
9:00					

PHYS 112 – Spring 2021 Schedule*

	Date	Lecture Topic	Textbook	Lab
Week 1	Jan 27 (W)	//Orientation// - sync meeting in Bb Collaborate		No Lab
	Jan 29 (F)	Electric charge	20.1-20.2	
Week 2	Feb 01 (M)	Electric force	20.3	Lab #1 Electric Charge and Force
	Feb 03 (W)	More on electric force		
	Feb 05 (F)	Quiz 1 (cumulative) 1:00-1:50 PM		
Week 3	Feb 08 (M)	Electric field	20.4-20.5	Lab #2 Electric Field
	Feb 10 (W)	More on electric field	20.6-20.7	
	Feb 12 (F)	Quiz 2 (cumulative) 1:00-1:50 PM		
Week 4	Feb 15 (M)	Electric potential energy	21.1-21.3	Lab #3 Electric Potential
	Feb 17 (W)	Electric potential	21.4	
	Feb 19 (F)	Quiz 3 (cumulative) 1:00-1:50 PM		
Week 5	Feb 22 (M)	Electric field and potential	21.5-21.6	Lab #4 Capacitor
	Feb 24 (W)	Capacitance	21.7-21.8	
	Feb 26 (F)	Quiz 4 (cumulative) 1:00-1:50 PM		
Week 6	Mar 01 (M)	Ohm's law	22.1-22.6	Lab #5 Resistor Circuit
	Mar 03 (W)	Kirchhoff's law	23.1-23.3	
	Mar 05 (F)	Quiz 5 (cumulative) 1:00-1:50 PM		
Week 7	Mar 08 (M)	Resistors circuit	23.4-23.5	Lab #6 More on Resistor Circuit
	Mar 10 (W)	Capacitors circuit	23.6	
	Mar 12 (F)	Quiz 6 (cumulative) 1:00-1:50 PM		
Week 8	Mar 15-19	Spring Break		
Week 9	Mar 22 (M)	RC Circuit	23.7	Lab #7 RC Circuit
	Mar 24 (W)	RC Circuit applications	23.8	
	Mar 26 (F)	Quiz 7 (cumulative) 1:00-1:50 PM		
Week 10	Mar 29 (M)	Magnets and magnetic field	24.1-24.3	Lab #8 Magnetic Field
	Mar 31 (W)	More on magnetic field	24.4	
	Apr 02 (F)	Quiz 8 (cumulative) 1:00-1:50 PM		
Week 11	Apr 05 (M)	Magnetic force	24.5	Lab #9 Magnetic Force
	Apr 07 (W)	More on magnetic force	24.6	
	Apr 09 (F)	Quiz 9 (cumulative) 1:00-1:50 PM		
Week 12	Apr 12 (M)	Wave properties	15.1-15.4	Lab #10 Wave Properties
	Apr 14 (W)	Sound intensity and intensity level	15.5-15.6	
	Apr 16 (F)	Quiz 10 (cumulative) 1:00-1:50 PM		
Week 13	Apr 19 (M)	Wave interference	16.1, 16.6	Lab #11 Wave Interference
	Apr 21 (W)	Interference of light	17.1-17.2	
	Apr 23 (F)	Quiz 11 (cumulative) 1:00-1:50 PM		
Week 14	Apr 26 (M)	Reflection and refraction	18.1-18.3	Lab #12 Ray Optics
	Apr 28 (W)	Total internal reflection and plane mirror	18.3	
	Apr 30 (F)	Quiz 12 (cumulative) 1:00-1:50 PM		
Week 15	May 03 (M)	Thin lens (ray diagram)	18.4-18.5	Make-up Lab
	May 05 (W)	Thin lens (lens equation)	18.7	
	May 07 (F)	Quiz 13 (cumulative) 1:00-1:50 PM		
Week 16	May 10 (M)	Modeling the human eye	19.1-19.2	No Lab
	May 12 (W)	Summary		
Final	May 19 (W)	Final Exam (comprehensive); 1:00-3:00 PM		

*This schedule is tentative and may be adjusted throughout the semester as needed by the instructor. Refer Blackboard for the most updated information.