

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. Qualitatively and quantitatively reason with definitions of distance, displacement, speed, velocity, and acceleration.
2. Create and interpret graphs of position vs. time, velocity vs. time, and acceleration vs. time.
3. Solve problems related to one-dimensional and two-dimensional motion.
4. Identify forces and draw free-body diagrams, calculate components and vector sums of forces.
5. Apply Newton's laws of motion to solve problems involving conservative and non-conservative forces and motion.
6. Apply equilibrium conditions to extended objects to determine unknown forces and torques.
7. Apply conservation of energy to solve problems involving energy transfers and transformations for a system.
8. Apply the first law of thermodynamics and the ideal gas law to solve problems relating to thermal processes for ideal gases.
9. Apply properties of fluid pressure and Archimedes' principle to solve problems relating to buoyancy.

PREREQUISITE

High school mathematics, including trigonometry, or MATH 150.

INSTRUCTOR

Dr. Lili Cui lili@umbc.edu

Office hour:

- In Person: MON 2:10 – 3:00 pm and WED 11:10 AM – 12:00 PM, in PHYS 226A
- Online: THU 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, 4th ed.
- TurningPoint App and subscription
- 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%
Lecture Participation	5%
Homework	10%
Lab	10%
Quiz	35%
Exam 1	10%
Exam 2	10%
Final Exam	15%
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 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.
- To prepare you actively engage in class, weekly reading quizzes will be assigned online through Blackboard. Reading quizzes typically consist of approximately ten questions, and usually due before every Friday'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 PowerPoint 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.
- TurningPoint App will be used to track participation and promote active learning by providing instant feedbacks for both the instructor and students. Your submitted answers will be graded on full participation and sometimes accuracy.
- 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.
- 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 Fridays 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.

EXAMS & FINAL EXAM

- Exam 1, exam 2, and the final exam will be in person and cumulative.
- See schedule for the time and dates.
- 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 a class or two. 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: You will be given three "free" days for not participating in lecture. These count towards ALL absences and TurningPoint App malfunctions.
- Homework: Lowest two scores will be dropped. These count towards ALL problems with technology.
- Lab: Makeup lab is scheduled at Week 15 during your regular lab time, see schedule. If you miss a lab, you must contact your TA and me as soon as possible. Permission is required to attend the makeup lab.
- Quiz: Lowest two quiz scores will be dropped. These count towards ALL absences and problems with technology.

WHERE TO GET HELP

- SI PASS sessions will be offered for this class, detailed information will be posted in Blackboard site. <https://si.lrc.umbc.edu>
- 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.
- The Academic Success Center also supplies free tutoring service for this class by appointment. To make an appointment, please visit <https://lrc.umbc.edu/tutor/>

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

- 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 it or which will require academic accommodations, please notify me in the first two weeks 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 “PHYS111 - SP2023” 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.

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

TEACHING ASSITANT INFO

Prajwal Panda
Sharad Pandey
Yasir Sarkar

ppanda1@umbc.edu
sharadp1@umbc.edu
ysarkar1@umbc.edu

TA schedule for the labs

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30		Lab 05 (4902) 8:30-10:20 AM <i>Sharad Pandey</i>			
9:00					
9:30					
10:00					
10:30					
11:00	Lab 11 (6159) 11:00-12:50 <i>Prajwal Panda</i>	Lab 06 (4903) 11:30-1:20 <i>Prajwal Panda</i>			
11:30					
12:00					
12:30					
1:00	Lab 02 (4900) 1:00-2:50 PM <i>Yasir Sarkar</i>	Lab 07 (4904) 2:00-3:50 PM <i>Prajwal Panda</i>			
1:30					
2:00					
2:30					
3:00	Lab 10 (6070) 3:00-4:50 PM <i>Sharad Pandey</i>	Lab 08 (5614) 4:00-5:50 PM <i>Yasir Sarkar</i>			
3:30					
4:00					
4:30					
5:00	Lab 03 (4901) 5:30-7:20 PM <i>Yasir Sarkar</i>				
5:30					
6:00					
6:30					
7:00					

PHYS 111 – Spring 2023 Schedule*

	Date	Lecture Topic	Textbook	Lab
Week 1	Jan 30 (M)	Introduction and Human Motion	1.1-1.6	No Lab
	Feb 1 (W)	Position and Velocity	2.1-2.3	
	Feb 3 (F)	Quiz 1 (8AM), Acceleration	2.4	
Week 2	Feb 6 (M)	More on Velocity and Acceleration		Lab 1 Introduction to Motion
	Feb 8 (W)	1D motion	2.5	
	Feb 10 (F)	Quiz 2 (8AM), more on 1D motion	2.6	
Week 3	Feb 13 (M)	Free fall	2.7	Lab 2 Changing Motion
	Feb 15 (W)	Vectors	3.1-3.4	
	Feb 17 (F)	Quiz 3 (8AM), Projectile Motion	3.5	
Week 4	Feb 20 (M)	More on Projectile Motion	3.6	Lab 3 Creating Mathematical Models of Motion
	Feb 22 (W)	Kinematics of Circular Motion	3.7	
	Feb 24 (F)	Exam 1 (8:00-8:50 AM, in person), location TBA		
Week 5	Feb 27 (M)	Newton's Laws	4.1-4.7	Lab 4 Force and Motion
	Mar 1 (W)	Applying Newton's Laws	5.1-5.2	
	Mar 3 (F)	Quiz 4 (8AM), Applications	5.3-5.4	
Week 6	Mar 6 (M)	Friction	5.5	Lab 5 Force, Mass, and Acceleration
	Mar 8 (W)	Interacting Objects	5.7-5.8	
	Mar 10 (F)	Quiz 5 (8AM), Applications		
Week 7	Mar 13 (M)	Dynamics of Circular Motion	6.1-6.4	Lab 6 Gravitational Forces
	Mar 15 (W)	Gravitation	6.5	
	Mar 17 (F)	Quiz 6 (8AM), Circular Orbit	6.6	
Week 8	Mar 20-24	Spring Break		
Week 9	Mar 27 (M)	Torque	7.3-7.4	Lab 7 Torque and Equilibrium
	Mar 29 (W)	Static Equilibrium	8.1	
	Mar 31 (F)	Exam 2 (8:00-8:50 AM, in person), location TBA		
Week 10	Apr 3 (M)	Spring Force	8.3	Lab 8 Elasticity
	Apr 5 (W)	Young's Modulus	8.4	
	Apr 7 (F)	Quiz 7 (8AM), Energy and Work	10.1-10.2	
Week 11	Apr 10 (M)	Work and Kinetic Energy Theorem	10.3	Lab 9 Work and Energy
	Apr 12 (W)	Potential Energy and Conservation of Energy	10.4-10.7	
	Apr 14 (F)	Quiz 8 (8AM), Power	10.10	
Week 12	Apr 17 (M)	Metabolic Energy	11.1-11.2	Lab 10 Conservation of Energy
	Apr 19 (W)	Application		
	Apr 21 (F)	Quiz 9 (8AM), Mass and Spring Oscillation	14.1-14.3	
Week 13	Apr 24 (M)	Simple Harmonic motion	14.4	Lab 11 Oscillation
	Apr 26 (W)	Pendulum Motion	14.5	
	Apr 28 (F)	Quiz 10 (8AM), Ideal Gas Law	12.1-12.3	
Week 14	May 1 (M)	Work in Ideal Gas Process	11.3-11.4	Lab 12 First Law of Thermodynamics
	May 3 (W)	Heat and First Law of Thermodynamics	12.5-12.7	
	May 5 (F)	Quiz 11 (8AM), Density and Pressure	13.1-13.2	
Week 15	May 8 (M)	Buoyant Force	13.3	Makeup Lab
	May 10 (W)	More on buoyant Force		
	May 12 (F)	Quiz 12 (8AM), Review		
Week 16	May 15 (M)	Summary		No lab
Final	May 22 (M)	Final Exam (comprehensive, in person); 10:30 AM - 12:30 PM, location TBA		

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