

SYLLABUS

COURSE DESCRIPTION

This is a four credit-hour, calculus-based physics course for students majoring in science or engineering. This course covers basic mechanics and some modern physics. By the end of this semester, you will be able to:

- Understand a small set of fundamental physical principles
 - the momentum principle (Newton's laws, conservation of momentum)
 - the energy principle (conservation of energy)
 - the angular momentum principle (conservation of angular momentum)
 - the fundamental assumptions of statistical mechanics
- Use these principles to explain a wide variety of physical phenomena
- Use these principles to predict the behavior of a variety of physical systems
- Model complicated physical systems by making approximations and idealizations in order to be able to apply fundamental principles
- Create 3D animated computer models of physical situations

The course will emphasize rigorous problem-solving in physics using interactive instruction, cooperative learning, educational software, and computer applications important for science and engineering students.

PREREQUISITE

You must have completed MATH 151, or be enrolled in it this semester.

The math skills required is a good knowledge of algebra and a basic knowledge of derivatives, which can be obtained from a semester of calculus. No prior experience with computer programming is required. We will teach you everything you need to know for the computer modeling that is a component of the course.

INSTRUCTOR CONTACT INFO

Dr. Lili Cui lili@umbc.edu

Office Hours: 2-3 pm MTuW

Room 226 Physics Building (same room as the Physics Tutorial Center)

- **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.
- **I do not answer specific physics questions through email.** Physics related questions should be *posted on the **Discussion Boards** (in Blackboard) instead of personal email.*
- For other questions, email is a great method of contact. Please include your full name, course and discussion section number, give detailed information, and use your UMBC email address to ensure prompt response. *If I fail to respond to your email within one business day, most likely your question is answered directly in the syllabus, Blackboard announcements, or is better addressed in the Discussion Board.*

REQUIRED TEXTBOOK & OTHER MATERIAL

- *Matter & Interactions*, by Chabay and Sherwood, 3rd edition
- *WebAssign* (online discussion & homework system)
- *Clicker*, Turning Technologies clicker RFC-03
- Non-programmable and non-graphing calculator
- A clear and focused mind, good attitude

SUCCESS STRATEGY

- Make sure you have the time required for the course. You are expected to attend all classes – lectures and discussions. In addition, experience shows that success requires **at least 8 hours of intensive effort outside of class**. If you typically spend much less than 8 hours studying for the course, you are unlikely to be successful. If you typically spend much more than 12 hours studying, you should consult with the instructor about ways to improve efficiency.
- Physics is about understanding, not memorization. Instead of only paying attention to the results, it is more important to **understand how to get the 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	Maximum Points
Exam (four mid-term)	200 pts (50%)
Final Exam	80 pts (20%)
Homework	40 pts (10%)
Discussion	40 pts (10%)
Reading Quiz	20 pts (5%)
In Class Participation & Quiz	20 pts (5%)
<i>Total</i>	<i>400 pts</i>

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.

360 pts or above (>90%)	A
320-359 pts (80% - 89%)	B
280-319 pts (70% - 79%)	C
240-279 pts (60% - 69%)	D
239 pts or below (<59%)	F

If you have an A average (288/320) at 5 pm on May 14, you need not take the final exam. Check your grades on Blackboard routinely. You need to review your points for discussions and exams as soon as they are returned to you. **Please contact me or your TA for any grading questions within one week of receiving your graded exam/homework/discussion.**

LECTURES

- You are required to **read the textbook sections prior to every class**; it makes for efficient learning. You are required to complete the **weekly reading quiz through Blackboard**. The class time will be spent on clarifying and applying the materials.
- **Your participation (not merely attendance) in the lectures is required** with the use of clicker. See Blackboard announcement on how to register your clicker. You need to bring your clicker (with good battery) to every class.

- There is a **short quiz at the beginning/end of Friday's lecture**, either by clicker or paper/pencil.
- 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.
- If you miss one lecture, you are responsible for making up the material.

HOMework

- Individual homework will be submitted via the **WebAssign online system**, see *Blackboard announcement on how to enroll WebAssign*. Homework will be assigned at the end of class on Wednesdays and Fridays. Wednesday's homework is due at 2 am on Friday, and Friday's homework is due at 2 am on the next Wednesday.
- A major part of what I expect you to learn in this class will come as a result of doing homework. **You need to fully understand how to solve the assigned homework problems to do well on the exams and to succeed in this course.**
- Homework questions are *not* easy and occasionally you will find yourself spending a lot of time on them. This is expected. ***Don't put off assignments until the night before they are due.*** Start your homework early enough so you have time to get help.
- **The answer key to some of the homework questions will be posted on Blackboard.**
- You are encouraged to work together, however, you must fully understand how to solve problems on your own to prepare for exams.

DISCUSSION

- You must attend the discussion section that you are officially registered for.
- **Full attendance is required for every discussion.** Discussion is based on group work, it's designed to provide you with a collaborative learning environment so you can help and learn from each other. To ensure the integrity of group work and the fairness to each group member, full attendance is mandatory and **there will be a penalty for arriving late or leaving early.** 20% will be removed from the discussion score for every five minutes that a student is tardy in coming to the discussion. In addition, those arriving late to class will not be allowed to benefit from the work of students who arrive on time. If you are ten minutes late, you will be automatically removed from your original group. You might need to work on your own or join another group.
- There will be **one in-discussion quiz on computational modeling**, see the schedule for the exact date. The discussion VPython activities and homework will help you acquire the computational problem solving skills you'll need.
- **The answer key to all discussion activities will be posted on Blackboard.**
- Your discussion instructor will provide specific guidelines.

EXAM

- **You have to do well on all exams to be able to get a good grade for the course.** The reading quiz, lecture, discussion activities, and homework will help you acquire the understanding and problem solving skills you'll need.
- You are allowed to bring a **3"*5" index card** and **use a non-programmable and non-graphing calculator** during exams. No cell phones or other communication devices.

FINAL EXAM

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

MARK UP POLICY

Life is full with 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. Those of you representing UMBC in officially sanctioned university activities should speak with me as soon as possible to address possible conflicts.

- Lecture: You will be given **4 free days** for not clicking in lecture. **These count towards ALL absences and clicker malfunctions.** *No individual accommodations are possible.* If you attend class but forget your clicker, you do not get participation points.
- Reading Quiz and Homework: **Full credit is assigned for completing 90% of the total points of Reading Quiz and Homework.** This allows you to try a few times and miss a few questions for whatever reasons. Late submissions will not be accepted. *No individual accommodations are possible.*
- Discussion: There is no make-up discussion. **Full credit is assigned for completing 90% of the total WebAssign discussion points.** This allows you to try a few times and miss a few questions for whatever reasons. *No individual accommodations are possible.*
- Exam: If you must miss an exam due to officially-sanctioned UMBC activities, illness, family emergency, detention by authorities, or another insurmountable difficulty, *contact me as soon as possible.* At my discretion, I'll request written verification of the cause of your absence and arrange a makeup exam over the same material.

CLASSROOM COURTESY

Every student deserves a good learning environment.

- **Respect each other.**
- Arrive at class on time, pack and leave when the instructor says class is over.
- Do not talk during the class to distract your fellow students or me, unless you are asked to discuss questions.
- Unless instructed otherwise the use of laptops etc is allowed only for valid course-related activities. You should not be checking e-mail, tweeting etc. during lectures or the discussion sessions.

TUTORIAL CENTER (FREE)

- The **Physics Tutorial Center** is on a walk-in basis and provides one-to-one help. See my Blackboard announcement for updated schedule.
- The Learning Resource Center supplies private tutors. Please contact at (410) 455-2444 or visit <http://www.umbc.edu/lrc/> to make individual arrangement.

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.

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.
- If you are taking the exam with the Student Support Services, inform me by email with the detailed information **at least 48 hours before every exam.**

**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 “PHYS121-SP2014” 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 Documents**: syllabus, reading quiz, lectures note, learning objectives, answer keys, and etc.
- Checking the **Grades** that you have earned.
- Interacting with the instructor and others online using **Discussion Boards**.

**TA CONTACT
INFO**

- Roy Prouty proutyr1@umbc.edu
- Gene Shanholtz eshanh1@umbc.edu

TA/LA Teaching Schedule for Discussions

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00				PHYS121-07 (7321) Th 8-9:50 Gene Shanholtz* Brandon Alexander Andreas Seas	
8:30					
9:00					
9:30					
10:00					
10:30					
11:00					
11:30					
12:00					
12:30			PHYS121-H (5035) W 1-2:50 Dr. Laszlo Takacs* Kevin Whitley	PHYS121-04 (3769) Th 12:30-2:20 Roy Prouty* Amy Gottlied Wei Trinh	
1:00					
1:30					
2:00					
2:30				PHYS121-03 (3768) Th 2:30-4:20 Gene Shanholtz* Hailey Lynch Wei Trinh	
3:00					
3:30					
4:00					
4:30			PHYS121-06 (3771) W 4:30-6:20 Roy Prouty* Toby Clevinger Hailey Lynch	PHYS121-05 (3770) Th 4:30-6:20 Gene Shanholtz* Amy Gottlied Brandon Alexander	
5:00					
5:30					
6:00					
6:30			PHYS121-02 (3767) W 6:30-8:20 Roy Prouty* Toby Clevinger Andreas Seas		
7:00					
7:30					
8:00					

Schedule

	Date	Lecture Topic	Textbook	Lab
Week 1	Jan 27 (M)	3D vector properties	1.1-1.6	Introduction to 3D Vector & VPython
	Jan 29 (W)	Motion and modeling	1.5, 2.8	
	Jan 31 (F)	Uniform motion and graphs	1.6-1.9	
Week 2	Feb 03 (M)	Momentum principle	2.1-2.2	Mapping the CASTLE
	Feb 05(W)	Applying momentum principle	2.3-2.5	
	Feb 07 (F)	Free fall and projectile motion	2.6	
Week 3	Feb 10 (M)	Gravitational force	3.1-3.5	Fan Cart Motion
	Feb 12 (W)	Electric Force	3.6-3.10	
	Feb 14 (F)	Ball-spring model and spring force	2.5	
Week 4	Feb 17 (M)	Springs in series and parallel	4.5, 4.11	Space Voyage
	Feb 19 (W)	Applications <i>Help session 12-1 PM</i>		
	Feb 21 (F)	Exam 1 (Ch.1-3)		
Week 5	Feb 24 (M)	Spring mass system	4.1-4.3	Springs
	Feb 26 (W)	Interatomic bond	4.4-4.5	
	Feb 28 (F)	Young’s modulus	4.6-4.9	
Week 6	Mar 03 (M)	Momentum principle (statics)	5.1-5.2	Young’s Modulus
	Mar 05 (W)	Momentum principle (circular motion)	5.3-5.7	
	Mar 07 (F)	Energy principle	6.1-6.4	
Week 7	Mar 10 (M)	Energy transfer – work	6.6-6.8	Problem solving
	Mar 12 (W)	Applications <i>Help session 12-1 PM</i>		
	Mar 14 (F)	Exam 2 (Ch.4-5)		
Week 8	Mar 16-22	Spring Break ☺		
Week 9	Mar 24 (M)	Gravitational potential energy	6.9-6.13	Computational Modeling Quiz
	Mar 26 (W)	Electric potential energy	6.14	
	Mar 28 (F)	Energy graphs	6.11	
Week 10	Mar 31 (M)	Mass energy equivalence	6.5, 6.15-6.17	Throw ball up & Space Voyage (part 2)
	Apr 02 (W)	Spring potential energy	7.1-7.3, 7.11	
	Apr 04 (F)	Internal energy, thermal energy and heat	7.4-7.9	
Week 11	Apr 07 (M)	Energy quantization	8.1-8.2	Springs (part 2)
	Apr 09 (W)	Spectra	8.3-8.6	
	Apr 11 (F)	Rotational kinetic energy	9.1-9.3	
Week 12	Apr 14 (M)	Point-particle system vs. real system	9.4-9.5	Hydrogen Spectra
	Apr 16 (W)	Applications <i>Help session 12-1 PM</i>		
	Apr 18 (F)	Exam 3 (Ch.6-8)		
Week 13	Apr 21 (M)	Collisions in 1D	10.1-10.4	Jump Up
	Apr 23 (W)	Collisions in 2D and 3D	10.6-10.7	
	Apr 25 (F)	Angular momentum	11.1-11.3	
Week 14	Apr 28 (M)	Angular momentum principle	11.4-11.5	Rutherford Scattering
	Apr 30 (W)	Conservation of angular momentum	11.7-11.8	
	May 02 (F)	Three fundamental principles	11.6	
Week 15	May 05 (M)	Entropy and temperature	12.1-12.5	Statistical Mechanics
	May 07 (W)	Specific heat <i>Help session 12-1 PM</i>	12.6	
	May 09 (F)	Exam 4 (Ch.9-12)		
Week 16	May 12 (M)	Semester summary		No discussion
Final	May 16 (F)	Final Exam (Ch. 1-12) 8:00 AM – 10:00 AM in MEYR 030		