

University of Kentucky

Course: PHY 404G

Course Title: Mechanics

Syllabus

INSTRUCTOR: Dr. Max Brown

OFFICE: CP 181B

E-MAIL: Max.Brown@uky.edu

OFFICE HOURS: 10:00-11:00 M-R in CP 181B or <https://uky.zoom.us/my/max.brown>

Or I will be happy to make an appointment.

SEMESTER: Fall 2026

LECTURE: MWF: 9:00-9:50 in F Paul Anderson Tower 257

PRE-REQ: PHY 232 **CO-REQ:** MA 214

EXAM DATES: Exam 1: Wednesday, September 30th

Exam 2: Monday, November 9th

Final Exam: Wednesday, December 16th 8:00 am

COURSE EVALUATION: TCEs are available November 29th through December 13th

NOTICE TO STUDENTS WITH DISABILITIES:

Any student who requires an accommodation due to a documented disability may contact the Disability Resource Center. The Disability Resource Center is located at 725 Rose Street, Suite 407 Multidisciplinary Science Building, and can be found online at <http://www.uky.edu/DisabilityResourceCenter/>

COURSE DESCRIPTION – COURSE RATIONALE:

A lecture and problem course covering the fundamental laws of mechanics. Topics include Newton's Laws, Kepler's Laws, oscillatory motion and an introduction to Lagrangian methods.

REQUIRED MATERIALS:

- 1) **Textbook:** Classical Mechanics, by John R. Taylor. I recommend a physical textbook but digital versions also exist.
- 2) **Computer/Tablet** for accessing materials through Canvas and submitting assignments.

JUST FOR FUN:

<https://www.youtube.com/3blue1brown>
<https://www.youtube.com/minutephysics>
<https://www.youtube.com/user/destinws2>
<https://www.youtube.com/user/1veritasium>
<https://www.youtube.com/user/acapellascience>
<https://www.youtube.com/user/physicswoman>
<https://testtubegames.com/>

COURSE SPECIFIC REQUIREMENTS, EXPECTATIONS, POLICIES:

- 1) As with all PHY courses, this class is intrinsically difficult. Do not be surprised if you spend more time on this class than any two or even three of your other courses. **When you are having trouble please come to my office, take advantage of the [Physics Learning Center](#) in CP 171, [The Study](#), read the textbook (or maybe a different textbook) AND ask your classmates for help (maybe in CP 133, the SPS room).**
- 2) **Lecture begins at 9:00** and I intend to use every minute of class. I frequently like to start class with a short video of physics that is interesting in some way these will start at 8:55 to not waste your precious lecture time.
- 3) **Cell phones are not tolerated in class.** If you have an emergency, you are welcome to take your call in the hallway. If you are unable to remember this rule you will be required to turn in your cell phone for the remainder of the class or leave the lecture.
- 4) **Collaboration vs. Plagiarism:** Students are STRONGLY encouraged to collaborate with each other, the instructor, and search for other sources of help (Resource room CP 171/tutoring/online videos) as they tackle this difficult subject. However, this NEVER includes the direct duplication of anyone's work. Blindly copying AI results will almost certainly result in failure of exams and subsequent failure of the course. **Always cite your sources and collaborators even if they are artificial.**
- 5) **Cheating:** Any individual caught cheating will receive at least receive a zero on the assignment in question. Anyone who is caught cheating a second time, in the same class or anytime in the future, will immediately receive a failing grade for the course. For more information, please see the policies outlined at https://www.uky.edu/Ombud/ForStudents_AcademicIntegrity.php.
- 6) **Absences:** All students will be credited with 2 excused absences (two days of the lecture worksheets will be dropped) for regular lecture days (excludes exams). Any other absences must have a documented excuse, which will undergo verification, or will result in a zero.

EVALUATION PROCEDURES:

Long Answer Homework:	30%	A: 90% or above
Midterm Exams:	30%	B: 80% - 89.99%
Final Exam:	20%	C: 70% - 79.99%
Lecture:	5%	D: 60% - 69.99%
Reading Discussion: `	5%	E: below 60%
Recitation:	10%	
(Sum)*(Review exam score) = Total grade		

Major Assignments:

Review Exam: We will have one "Review Exam" focused on memorizing material presented in pre-requisite classes. The material tested consists of one page and will be provided on the first day of class. Friday Sept 4th will be set aside for this exam. Any student who is unhappy with their performance may request a retake exam to be scheduled outside of class time.

Long Answer Homework: Each week you will be required to turn in a set of problems with your work carefully written/typed out. At least one problem each week will be graded for both presentation as well as accuracy. **If your Long Answer Homework is submitted 24 hrs early, you get +10% bonus. If less than 24 late, you get a 10% penalty. If more than 24 hours late, zero credit.** Extensions are available if requested before the due date.

Exams: We will have two "midterm" exams and one final exam. Questions will be based on lecture and homework and will focus on the ability to solve problems using the material we have studied. All exams should be considered "cumulative" although questions will be focused on recent material. Students are allowed to bring one 8.5" x 11" sheet of paper as a "cheat sheet." There are no other restrictions on your cheat sheet.

Minor Assignments:

Lecture Grade: Most lectures will include daily worksheets. These will include concept questions and very short calculation questions to ensure you are following the lecture. Class attendance is required for full credit.

Reading Discussion: Nearly every class has an assigned reading as listed in the schedule at the end of the syllabus. After completing the reading you are expected to go into canvas and participate in the associated discussion. You can write down the most important ideas from the reading, ask a question, answer a peer's question, find an online resource, or draw a connection to some other idea in physics or technology.

Recitation: Approximately every two weeks we will have a recitation activity in place of lecture during class time. In groups of three or four, you will work through questions to clarify the text, strengthen your problem solving abilities, and visualize/represent these subtle concepts.

Course Evaluations: Course evaluations are an important component of our department's instructional program. This semester we will use the TCE student evaluations system which is used university wide. These evaluations will be held during the last two weeks of class.

***The instructor reserves the right to make changes to (delete, add, or modify) this Syllabus as the semester progresses.**

Proposed Schedule				
Date	Day	Topic	Reading	HW
24-Aug	Monday	Introduction: Vectors and scalars	1.1-1.2	
26-Aug	Wednesday	Newton's Laws and Diff Eqs	1.3-1.5	
28-Aug	Friday	Coordinate systems and Conservation Laws	1.6-1.7	
31-Aug	Monday	Projectile motion with resistance	2.1-2.3	
2-Sep	Wednesday	Quadratic Air Resistance	2.4-2.7	1
4-Sep	Friday	Review Exam Recitation 1: Conservation of Momentum	3.1-3.3	
7-Sep	Monday	Holiday-Labor Day	No Class	
9-Sep	Wednesday	Angular Momentum	3.4-3.5	2
11-Sep	Friday	Angular Momentum again	3.5	
14-Sep	Monday	Recitation 2: Energy and Work	4.1-4.2	
16-Sep	Wednesday	Conservative Forces	4.3-4.5	3
18-Sep	Friday	Energy in One-Dimension	4.6-4.7	
21-Sep	Monday	Central Forces	4.8-4.9	
23-Sep	Wednesday	Multiparticle Systems	4.9-4.10	4
25-Sep	Friday	Catch Up day		
28-Sep	Monday	Review		
30-Sep	Wednesday	Exam 1	Ch 1 – 4	
2-Oct	Friday	Recitation 3: Simple Harmonic Motion	5.1-5.2	
5-Oct	Monday	Damped Harmonic Motion	5.3-5.4	
7-Oct	Wednesday	Driven Harmonic Motion	5.5-5.6	
9-Oct	Friday	Fourier Series	5.7-5.8	
12-Oct	Monday	Calculus of Variations	6.1-6.2	
14-Oct	Wednesday	Euler-Lagrange Equations	6.3-6.4	
16-Oct	Friday	Recitation 4: Applying Lagrange Equations	7.1-7.2	
19-Oct	Monday	Lagrangians for Constrained Systems	7.3	
21-Oct	Wednesday	Lagrangians in Generalized Coordinates	7.4-7.5	
23-Oct	Friday	Recitation 5: Practice with Lagrangians	7.5	

26-Oct	Monday	Holiday-Fall Break	No Class	
28-Oct	Wednesday	Consequences of Lagrangians	7.6-7.8	
30-Oct	Friday	Two Bodies with Central Forces	8.1-8.3	
2-Nov	Monday	Equations for Orbits	8.4-8.7	
4-Nov	Wednesday	Catch Up Day		
6-Nov	Friday	Review		
9-Nov	Monday	Exam 2	Ch 5 – 8	
11-Nov	Wednesday	Accelerating Frames	9.1-9.3	
13-Nov	Friday	Recitation 6: Rotating Frames	9.4-9.7	
16-Nov	Monday	Coriolis Forces	9.8-9.10	
18-Nov	Wednesday	Rotation of a Rigid Body	10.1-10.2	
20-Nov	Friday	Recitation 7: Moment of Inertia Tensor	10.3-10.4	
23-Nov	Monday	Precession of a Top	10.5-10.6	
25-Nov	Wednesday	Holiday- Thanksgiving		
27-Nov	Friday	Holiday- Thanksgiving		
30-Nov	Monday	Coupled Oscillators	11.1-11.2	
2-Dec	Wednesday	Normal Modes	11.3-11.4	
4-Dec	Friday	Recitation 8: Systems with many coupled objects	11.5-11.6	
7-Dec	Monday	Catch Up	13.1-13.2?	
9-Dec	Wednesday	Review		
16-Dec	Wednesday	Final Exam	8:00 AM	