

PHY 340 Analytical Mechanics

Syllabus

Instructor	<i>Sheng-Chiang (John) Lee</i>	Textbooks
Office/Contact	SEB 206; 478-301-2599 Lee_SC@Mercer.Edu	<i>Classical Mechanics</i> , by John R. Taylor
Office Hour	MWF 1~2pm or by appointment	
Pre-Requisite	PHY 162, MAT 293 and MAT 330	

Course Description:

As an junior-level course of Classical Mechanics for undergraduate students, this course explores the applications of Newtonian Mechanics with deeper understanding of the subtleties and limitations, as well as exposing students to later alternative and equivalent formulations of Classical Mechanics: Lagrange and Hamiltonian formulations, if time allows.

Objectives:

After taking this course, you should be able to

- Understand the laws of Mechanics in their applications beyond introductory physics level.
- Understand the limitation and validity of the Newtonian Mechanics
- Appreciate the weakness and strength of different formulations of Classical Mechanics.
- Apply Lagrange Mechanics in some simple situations

Tentative Coverage:

- Ch1 Newton's Laws of Motion
- Ch2 Projectiles and Charged Particles
- Ch3 Momentum and Angular Momentum
- Ch4 Energy
- Ch5 Oscillations
- Ch6 Calculus of Variations
- Ch7 Lagrange's Equations
- === Selective Topics =====
- Ch8 Two-body Central-Force Problems
- Ch9 Mechanics in Noninertial Frames
- Ch10 Rotational Motions of Rigid Bodies
- Ch11 Coupled Oscillators and Normal Modes
- =====
- Ch13 Hamiltonian Mechanics

Grading Methods:

Grading Scale:

Score:	90+	85~89	80~84	75~79	70~74	60~69	59-
Grade:	A	B+	B	C+	C	D	F

Grading Components:

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	Homework	Peer Instruction	Midterm and Final Projects	Final Exam
Weight	30%	10%	20% (midterm) + 20% (final) = 40%	20%

Homework:

A selected set of problems from the end of each chapter will be assigned to students. Though you are recommended to do them all, you only need to choose **Three** problems among them for each chapter as your homework assignments. They are due in one week after finish a chapter. Late homework will suffer 5% penalty per day, and will **NOT** be accepted after another week unless students are legitimately excused.

Special Note: Since *Mathematica*® is now available in the physics department, you are welcome to use it for your homework. It makes typing equations and documenting your work much easier. It may also help you visualize your results and advance your appreciation of physics. However, you should **NOT** use *Mathematica*® to help you solve equations/differential equations, perform vector analyses, and so on, unless permitted by the instructor. **YOU** should have the ability to perform analytical calculations by hands.

Peer Instruction:

Close to the end of the semester, each student will prepare an optional topic from the textbook and teach the class. The peer instructor should present the material in an organized manner and ready to take questions from the class at any time. The grade will based on the student's understanding and preparedness of the material, the clarity of presentation, and how the questions are handled.

Midterm and Final Projects:

There will be two major computational projects for the two major parts of the course: Newtonian Mechanics and Lagrange/Hamiltonian Mechanics. The topics of the projects should be at an appropriate level for this course and require the instructor's approval. The projects should follow the format of a professional presentation/publication. The grades of the projects are based on a) your use of the knowledge acquired in this course, b) the clarity of the presentation of your calculation, and c) how well you follow the guideline of a professional presentation/publication provided by the instructor. The midterm project is at the end of the week after Fall break, and the final project is due with the final exam on **12/12**.

Final Exam:

A take-home final exam will be administered in the final week and is due at 12pm (noon) on **12/12**.

Class Evaluation

In an ongoing effort to improve the quality of instruction, each student enrolled in this course is required to complete an end-of-semester course evaluation that will be administered through **BlackBoard** during the last week of the semester. Students should submit complete evaluation preferably by 12/06 and no later than 12/12.

Important Dates:

Last Day for Course Withdrawal: 10/25!!!!

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Take-Home Final Exam: due at 12pm on 12/12

Class Policies:

Attendance Policy: Attendance is not mandatory for lectures. However, students are solely responsible for learning the materials covered and the announcements made in the missed classes.

Class Etiquette: You are expected to conduct yourself in a respectful manner to your fellow classmates and the instructor. The instructor may ask you to leave the classroom/lab if your behavior is disturbing to the instructor or other students.

Honor Code: You are bound by the Mercer honor code. The College's academic misconduct policy will be followed. All work, for which a grade is received, must be the **original** work of the **student** without aid or assistance of another party, or any printed and or electronic data/information. Academic misconduct cases will be referred to the honor council and the student will automatically receive a grade of incomplete (IC) pending a ruling by the honor council.

Cell Phone and Laptop Usage: Out of courtesy for all those participating in the learning experience, all cell phones must be **kept in your pocket/backpack with power/ringer off** before entering any classroom, lab, or formal academic or performance event.

Laptops may be used in class to assist individual's learning (e.g. to access on-line supplemental materials, to view provided class presentation and take note, etc.). However, using laptops for activities unrelated to the class is prohibited.

Warning will be given for the first-time violation. One semester credit will be taken for each following violation up to three times. If a student keeps violating the policy, one may be asked to leave the room by the instructor.

No cell phones/laptops are allowed during exam times.

Documented Disability Statement: *"Students requiring accommodations for a disability should inform the instructor at the close of the first class meeting or as soon as possible. The instructor will refer you to the ACCESS and Accommodation Office to document your disability, determine eligibility for accommodations under the ADA/Section 504 and to request a Faculty Accommodation Form. Disability accommodations or status will not be indicated on academic transcripts. In order to receive accommodations in a class, students with sensory, learning, psychological, physical or medical disabilities must provide their instructor with a Faculty Accommodation Form to sign. Students must return the signed form to the ACCESS Coordinator. A new form must be requested each semester. Students with a history of a disability, perceived as having a disability or with a current disability who do not wish to use academic accommodations are also strongly encouraged to register with the ACCESS and Accommodation Office and request a Faculty Accommodation Form each semester. For further information, please contact Carole Burrowbridge, Director and ADA/504 Coordinator, at 301-2778 or visit the ACCESS and Accommodation Office website at <http://www.mercer.edu/disabilityservices..>*