

# PHY 215: Classical Mechanics

Spring 2018

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Time and Location:

Tuesday & Thursday 10:45 AM-12:00 PM and Wednesday 8:10 AM - 9:00 AM, Lewis Lab 512

Office hours: Thursdays 3-4 PM in Lewis 416.

## Description

Text: Classical Mechanics, John R. Taylor, University Science Books

An additional useful reference: Mathematical Tables, such as Schaum's or CRC.

We will cover the following topics:

- Chapter 1. Newton's Laws of Motion.
- Chapter 2. Projectiles and Charged Particles.
- Chapter 3. Momentum and Angular Momentum.
- Chapter 4. Energy.
- Chapter 5. Oscillations.
- Chapter 6. Calculus of Variations.
- Chapter 7. Lagrange's Equations.
- Chapter 8. Two-Body Central-Force Problems.
- Chapter 9. Mechanics in Noninertial Frames.
- Chapter 10. Rotational Motion of Rigid Bodies.
- Chapter 11. Coupled Oscillators and Normal Modes.

And if time permits,

- Chapter 12. Nonlinear Mechanics and Chaos.
- Chapter 13. Hamiltonian Mechanics.
- Chapter 14. Collision Theory.
- Chapter 15. Special Relativity.

## Grading

Homework will be assigned each Friday, and is due one week after it is posted (by 5 PM). Homework will be graded and returned as quickly as possible. It is your responsibility to make sure you understand how to do the homework problems. I encourage you to work together to complete the homework, but also make sure that you are able to complete the problems on your own.

There will be two midterm exams, one during week 5 (Feb 20th) and one during week 10 (April 3rd).

Grades will be computed as follows:

Homework: 30%

Quizzes/in class problems: 10%

Midterm 1: 15%

Midterm 2: 15%

Final exam: 30%

If you notify me *in advance* that you will miss a quiz or exam, I will schedule an alternative time for you to take it. After the due date, you may turn in a homework assignment or take a quiz or exam for 50% of the possible points. The final exam will be comprehensive and consist of three sections. You will have the opportunity to replace your lowest midterm exam score with your score from the corresponding section of the final exam.

## Initial Competencies

Prerequisites for this course are Physics 013, 021 or 023. Students should either already have taken Math 205, or be taking it concurrently.

## Final Competencies

1. At the end of this course, students will be able to use Newton's second law to construct differential equations of motion to solve more complex problems than those encountered in freshman physics, including damped and driven oscillating systems. They will be able to use vector operations and multiple coordinate systems to solve advanced problems using conservation of energy, linear momentum, and angular momentum. Students will be familiar with the use of and relationships between Newton's second law, Hamilton's principle, Lagrange's equations, and Hamilton's equations. They will develop equations of motion for a variety of systems using both Lagrangian and Hamiltonian dynamics.

# Lehigh Community

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community ([http://www.lehigh.edu/inprv/initiatives/PrinciplesEquity\\_Sheet\\_v2\\_032212.pdf](http://www.lehigh.edu/inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf)). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

The University strongly encourages (and, depending upon the circumstances, may require) students, faculty, staff or visitors who experience or witness harassment or discrimination, or have information about harassment or discrimination in University programs or activities, to immediately report such conduct.

Reports or inquiries should be made to: Karen A. Salvemini, Equal Opportunity Compliance Coordinator, Alumni Memorial Building / 610.758.3535 / [eocc@lehigh.edu](mailto:eocc@lehigh.edu)

In the event that the conduct involves the Equal Opportunity Compliance Coordinator, reports should be made to: Judy A. Zavalydriga, Human Resources Investigator, 428 Brodhead Avenue / 610.758.3897 / [jaz308@lehigh.edu](mailto:jaz308@lehigh.edu)

## Resources for students:

Counseling office:

Counseling and Psychological Services

36 University Drive

Johnson Hall, 4th Floor

Bethlehem, PA 18015

Phone: (610) 758-3880

Fax: (610) 758-6207

Hours: M-F, 8:00 AM - 5:00 PM

<http://studentaffairs.lehigh.edu/content/counseling-psychological-services-ucps>

Gender violence:

University Center C112 and C108

Phone: 610-758-1303

Fax: 610-758-6164

E-mail: [ingves@lehigh.edu](mailto:ingves@lehigh.edu)

<http://studentaffairs.lehigh.edu/content/gender-violence-education-support>