

Physics 321: “Intermediate Mechanics”, Syllabus - Spring 2025

Professor: Dr. Mark Henriksen

Office: Physics 414

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Class meets: Monday - Wednesday 2:00 – 3:15 in Information Technology 237

Office Hours: After class or by appointment.

Course Overview

The list of topics covered include: Newtonian, Lagrangian, and Hamiltonian mechanics and their application to oscillators, central-force motion, and the dynamics of rigid bodies. New mathematical techniques will be introduced that will provide the foundation of intermediate classical mechanics. Our goal is that you will be able to work with these new methods and understand their applications by the end of the semester. Most of the first section of the textbook (through Chapter 11) will be covered in this course. A schedule of the topics covered is found later in the syllabus. During lectures there will be time for discussion. We will also examine some of the homework problems in detail during class.

Textbook: “Classical Mechanics” by John R. Taylor

Grading

There will be two midterm exams, each will be worth 25% of your final grade. The final exam will also be 25% of your final grade. Homework is 25% of your grade. There is balance in the grading to stress the importance of homework and reduce stress related to exams.

Homework

Homework is posted Wednesdays on Blackboard and is due the following Wednesday. Classical mechanics is challenging so start early so you have enough time to complete sometimes lengthy problems. Provide a narration of the steps in your homework solutions as this is good preparation for writing up research projects. Solutions must be reasonably neat so that I can follow what you are doing. Consider working out the solutions and then copying them over neatly for submission. This gives you a review of the material right after you have worked on it, one of the methods for learning material that has proven to be effective. Note that I have no problem with students working out the solutions together or using other sources.

Schedule

Math Review	Jan 27 : Jan 29
Forces and Momentum (1.1-3.5)	Feb 3 : Feb 12
Energy (4.1-4.8)	Feb 17 : Feb 24
Linear Oscillators & Green’s Functions (5.1-5.9)	Feb 26 : Mar 5

First Exam	March 10
Lagrangian Mechanics (6.1-7.6)	Mar 12: March 31
Spring Break	Mar 17 : Mar 19
Coupled Oscillators (11.1-11.7)	Apr 2 : Apr 7
Central Forces (8.1-8.7, 14.1-14.6)	Apr 9 : Apr 16
Non-Inertial Reference Frames (9.1-9.2)	Apr 21
Second Exam	Wed Apr 23
Rotating Reference Frames (9.3-9.9)	Apr 28 : April 30
Rigid Body Motion (10.1-10.10)	May 5 : May 12
Final Exam	May 16 1:00-3:00

Achieving Course Goals and Meeting Academic Expectations

Attending class, completing all homework assignments, and reviewing sample problems in the lectures will ensure that you do very well in the course. Please keep in mind that **I'm here to help you do well in Classical Mechanics**. The concepts introduced in this course have applicability to other areas of physics so it is important to get a firm foundation in classical mechanics.

Policy on Academic Integrity

“Academic integrity is an important value at UMBC. 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.”

Student Support /Disability Services

“UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA) of 1990, the ADAAA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow for students to have equal access and inclusion in all courses, programs, and activities at the University”