

Classical Mechanics
01:750:381
Fall 2020

Instructor: Professor Weida Wu

Summary: An intermediate level course in classical mechanics aimed at students majoring in physics or astrophysics. Topics include projectile motion, rockets, central forces and angular momentum, simple harmonic motion, driven oscillations, Euler-Lagrange equations, Lagrange equations, rotating frames.

It is required for the professional and astrophysics options.

Pre-requisites: 01:750:124 or 01:750:271, Calc2 (01:640:152 preferred, 01:640:135 accepted) B or better strongly suggested for all courses. Students in the general option, or with a weaker background in physics and mathematics should consider 01:750:323.

Co-requisites: Calc3, 01:640:251, strongly recommended

Meeting times: Two 80 minute lectures per week.

Lecture: M-Th 2 (10:20-11:40 am)

Recitations: None

Text: Classical Mechanics, J. Taylor, 5th Edition

LMS: Canvas

Provisional Plans for Remote Instruction:

1. Recorded lectures, lecture notes, homework assignments, homework solutions will be provide asynchronously.
2. Lectures will be given during assigned lecture times and will be recorded for asynchronous access.
3. Homework assignments will be given on Canvas. Students are expected to write down solutions, submit the scanned PDFs via Canvas. Submitted homework will be graded manually by grader.
4. Exams will be open book, take-home style. Students will need to finish the exam within fixed exam time (80 minutes for midterm, 180 minutes for final).
5. Office hours will be given at fixed times (typically twice a week). On-demand office hours can be scheduled individually.

Technology requirements: internet access, personal computer (either PC or MAC) with mic and speaker are required for participating the activities. Webcam is optional but desired.

Class participation: 20%

Homework: 30%

Mid-term: 20%

Final Exam: 30%

Schedule (provisional):

Week	Topic
1	Vector algebra, polar coordinates
2	Projectiles and charged particles
3	Rockets and center of mass, angular momentum
4	Kinetic energy, work, potential energy, force, curl of force
5	Time dependent potential energy, central forces, spherical coordinates
6	Simple harmonic motion, driven damped oscillations, resonance
7	Review and exam
8	Resonance, Fourier series, Parseval's theorem, Euler-Lagrange equations
9	Euler-Lagrange equations, Lagrange equations
10	Conservation laws, Lagrange multipliers and constraint forces
11	Two body central force problems, orbits
12	Bounded and unbounded orbits, acceleration without rotation
13	Newton's laws in a rotating frame, Coriolis force, free fall, Foucault pendulum
14	Review

Academic Integrity:

Students are expected to maintain the highest level of academic integrity. You should be familiar with the university policy on academic integrity:

<http://academicintegrity.rutgers.edu/academic-integrity-policy/> Violations will be reported and enforced according to this policy.

Use of external sources to obtain solutions to homework assignments or exams is cheating and a violation of the University Academic Integrity policy. Cheating in the course may result in penalties ranging from a zero on an assignment to an F for the course, or expulsion from the University. Posting of homework assignments, exams, recorded lectures, or other lecture materials to external sites without the permission of the instructor is a violation of copyright and constitutes a facilitation of dishonesty, which may result in the same penalties as explicit cheating.

Not only does the use of such sites violate the University's policy on Academic Integrity, using such sites interferes with your achievement of the learning you are paying tuition for.

Assignments, quizzes, and exams are given not simply to assign grades, but to promote the active learning that occurs through completing assignments on your own. Getting the right answer is

much less important than learning how to get the right answer. This learning is critical to your success in subsequent courses and your careers.

Student wellness Services

Student Counseling, ADAP & Psychiatric Services (CAPS) wellness for non-emergency psychological health issues services (848) 932-7884, 17 Senior Street, New Brunswick, NJ 08901 <http://health.rutgers.edu/medical-counseling-services/counseling/>

Violence Prevention & Victim Assistance (VPVA), (848) 932-1181, 3 Bartlett Street, New Brunswick, NJ 08901, <http://www.vpva.rutgers.edu/>

Office of Disability Services (848) 445-6800, Lucy Stone Hall, Suite A145, Livingston, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854, <https://ods.rutgers.edu/>

Scarlet Listeners for confidential peer counseling and referral hotline, (732) 247-5555, <http://www.scarletlisteners.com>