PHY 420: Classical Mechanics (Fall 2019, CRNs 90399 & 91197)

Instructor: Dr. Eric Edlund
SUNY Cortland, Physics Department

Course Meeting Times

Lecture: MWF 1:50 – 2:40

Contact Info
Email: eric.edlund@cortland.edu
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Office: Bowers 133

Preferred contact method is email.

Standing Office Hours

Monday	9:00 AM – 10:00 AM
Tuesday	11:00 AM – 12:00 PM
Wednesday	9:00 AM – 10:00 AM
	3:00 PM – 4:00 PM
Thursday	2:00 PM – 3:00 PM

Or by appointment:
If you are unable to attend these standing office hours or would like to speak privately, you are encouraged to make an appointment.

Course Description
The study of the motion of physical bodies at the macroscopic level. Topics include the dynamics of a particle, the harmonic oscillator, motion in three dimensions, central forces, systems of particles and rigid bodies.

Scope of Course
This course revisit and builds on the major themes of Physics 201, 202, & 203 using advanced analysis techniques. The subject matter of this course will be roughly divided into five sections, each of about three weeks in length:

Part I: Waves, oscillations, damping, and resonance
Part II: Motion in non-inertial reference frames
Part III: Universal law of gravitational, orbits, and docking maneuvers
Part IV: Lagrangian and Hamiltonian mechanics
Part V: Solid body rotation

Prerequisites
This course has official prerequisites of PHY 202 and MAT 237 (Calculus III). More importantly, this course requires a strong foundation in the basics of mechanics. If your background in these essentials is insufficient for this course you may need to invest extra work to come up to speed.

My Expectations
Classical Mechanics is a math-intensive course where you will be exposed to new ways of thinking about familiar problems. Success in this course will require an honest effort on your part, attendance in class, serious reading of the textbook, and perseverance. You may find that you have to attempt homework problems more than once to get it. I expect that you will need to invest at least 9 hours per week, outside of class, to master this material. If your background in some areas is weak then you may need to invest substantially more effort. You are encouraged to visit me in office hours if you would like to discuss any issues, past or present.

Required Materials

1. *Analytical Mechanics (7th edition)*, by Fowles and Cassiday, published by Brooks Cole.

2. A dedicated notebook for this course.

Grade Assessment

Homework	25%
Mini Exams (3)	45%
Final Exam	30%

Final grades will be awarded using the standard 10% per letter grade.

Note: The writing-intensive section of this course (CRN 91197) requires that you write a minimum of 15 pages of text. Specific guidelines will be presented in a separate document.

Course Policies

Attendance: Your attendance at lecture will be recorded. You are allowed one unexcused absence. Any unexcused absence beyond the first will result in a 2% penalty to your final grade. A late arrival to class will be counted as a 1% penalty if you bring this to my attention.

Homework: Problem sets will be assigned on Monday and due the following week. Each homework problem will be graded on a 0-2 scale for effort.

Mini-Exams: There will be three mini-exams, each consisting of two or three problems. These mini-exams will be closed book, closed notes. The first exam will cover section I, the second will cover sections II and III, and the last will cover section IV. At least one of the problems on each exam will be drawn from the homework and should be very familiar (assuming you have done the work). You can challenge a mini-exam grade through an assessment in a spoken exam where you work through problems at the chalkboard, in my office. No late exams will be permitted without a valid reason, as outlined in the university catalog.

Final Exam: The final exam will be comprehensive. Some of the problems will be drawn from your homework, others will be new. You may bring your textbook to the exam (no electronic versions, printed copies only), but otherwise no notes, calculators or other aids can be used. No late exams will be permitted without a valid reason, as outlined in the university catalog.

Important Dates (the dates of the mini-exams are subject to change)

Friday 8/30	End of the add/drop period
Friday 9/27	Mini-Exam #1
Friday 11/1	Mini-Exam #2
Monday 11/25	Mini-Exam #3
Friday 12/13	Final Exam, 11:00 AM – 1:00 PM

Course Schedule

This is a tentative schedule and is subject to change as necessary.

Week	Dates			Topic	Chapter	P-set
1	8/26	to	8/30	Review of Newtonian mechanics	2	
2	9/2	to	9/6	(Labor Day) Drag forces	2	#1 (I)
3	9/9	to	9/13	Introduction to oscillations	3	#2 (I)
4	9/16	to	9/20	Damping, resonance	3	#3 (I)
5	9/23	to	9/27	Fourier series, **Mini-Exam #1**	3	
6	9/30	to	10/4	Non-inertial ref. frames	5	#4 (I)
7	10/7	to	10/11	Non-inertial ref. frames	5	
8	10/14	to	10/18	Gravitation & Central Forces	6	#5 (II)
9	10/21	to	10/25	(Fall break) Gravitation	6	#6 (III)
10	10/28	to	11/1	Orbital dynamics, **Mini-Exam #2**	6	#7 (III)
11	11/4	to	11/8	Lagrangian Dynamics	10	
12	11/11	to	11/15	Lagrangian Dynamics	10	#8 (IV)
13	11/18	to	11/22	Lagrangian Dynamics	10	
14	11/25	to	11/29	**Mini-Exam #3** (Thanksgiving)	8	#9 (IV)
15	12/2	to	12/6	Motion in 3D	9	#10 (V)
16	12/9	to	12/13	**Final Exam** on Dec. 13 @ 11:00 AM		

Note: Chapters 1, 4 and 7 will not be explicitly covered in this course. You are encouraged to study Chapter 1 (a review of mathematical methods) as soon as possible. Chapter 4 concerns potential functions in 3 dimensions. Elements of chapter 7 (systems of particles, including momentum conservation and scattering) will be incorporated as time permits.

This course covers 7 chapters from the textbook. You will be expected to do an average of 5 problems per week, some of which may be fairly involved and complex. You will need to read the textbook and seriously practice the concepts in application to problems discussed in class and in the homework. This is a lot of material to cover and your regular attendance at class and attention to the readings is essential to your success in this course.

SUNY Cortland Policies and Statements

Academic Integrity Statement: All students are expected to uphold academic integrity standards. Plagiarism is defined as taking the ideas of others and using them as one's own without due credit. Students who cheat in examinations, course assignments, or plagiarize in this course may be disciplined in accordance with university rules and regulations. SUNY Cortland College Handbook, Chapter 340.

Disability Statement: As part of SUNY Cortland's commitment to a diverse, equitable, and inclusive environment, we strive to provide students with equal access to all courses. If you believe you will require accommodations in this course, please place a request with the Disability Resources Office at disability.resources@cortland.edu or call 607-753-2967. Please note that accommodations are generally not provided retroactively so timely contact with the Disability Resources Office is important. All students should consider meeting with their course instructor who may be helpful in other ways. SUNY Cortland College Handbook, Chapter 745.

Diversity Statement: SUNY Cortland is dedicated to the premise that every individual is important in a unique way and contributes to the overall quality of the institution. We define diversity broadly to include all aspects of human difference. The College is committed to inclusion, equity, and access and thus committed to creating and sustaining a climate that is equitable, respectful and free from prejudice for students, faculty and staff. We value diversity in the learning environment and know that it enhances our ability to inspire students to learn, lead and serve in a changing world. We are committed to promoting a diverse and inclusive campus through the recruitment and retention of faculty, staff and students. As a community, we hold important the democracy of ideas, tempered by a commitment to free speech and the standards of inquiry and debate. To this end, we are dedicated to developing and sustaining a learning environment where it is safe to explore our differences and celebrate the richness inherent in our pluralistic society. SUNY Cortland College Handbook, Chapter 130.

Inclusive Learning Environment Statement: SUNY Cortland is committed to a diverse, equitable and inclusive environment. The course instructor honors this commitment and respects and values differences. All students enrolled in this course are expected to be considerate of others, promote a collaborative and supportive educational environment, and demonstrate respect for individuals with regard to ability or disability, age, ethnicity, gender, gender identity/expression, race, religion, sex, sexual orientation, socio-economic status or other aspects of identity. In an environment that fosters inclusion, students have the opportunity to bring their various identities into conversation as they find helpful, but are not expected to represent or speak for an entire group of people who share aspects of an identity. If you have any questions or concerns about this statement, contact the Institutional Equity and Inclusion Office at 607-753-2263. http://www2.cortland.edu/about/diversity/

Title IX Statement: Title IX, when combined with New York Human Rights Law and the New York Education Law 129-B, prohibits discrimination, harassment and violence based on sex, gender, gender identity/expression, and/or sexual orientation in the education setting. The federal Clery Act and NY Education Law 129-B provide certain rights and responsibilities after an incident of sexual or interpersonal violence. When a violation occurs, victims and survivors are eligible for campus and community resources. Where the College has jurisdiction, it may investigate and take action in accordance with College policy. If you or someone you know wishes to report discrimination based in sex, gender, gender identity/expression, and/or sexual orientation, or wishes to report sexual harassment, sexual violence, stalking or relationship violence, please contact the Title IX Coordinator at 607-753-4550, or visit http://www2.cortland.edu/titleix to learn about all reporting options and resources.
Updated by SUNY Legal on February 1, 2018.