Carleton University Physics Department
PHYS 3802 - Advanced Dynamics
Fall 2025 Course Outline

Instructor: Prof. Daniel Stolarski (he/him)
How to Address Me: Professor Stolarski
Email: stolar@physics.carleton.ca
Office: HP3320

Schedule: Tuesday & Thursday, 1:05 - 2:25 P.M. Please check Carleton Central for location.

Course delivery: The course will consist of synchronous meetings that will follow an in person model where we will gather in our classroom. I will lead a discussion of the course material in a lecture style (chalk-and-talk). Students are encouraged to ask questions and engage with the material during the lecture. These sessions are the primary method of course delivery. Attendance is highly recommended, except in cases of emergency.

Calendar Description: Equations of motion for a single particle. Oscillatory Motion. Lagrangian and Hamiltonian formulations of mechanics. Central force motion. Motion of systems of particles and of rigid bodies.

Prerequisites: PHYS 2305 and MATH 2004, or permission of the Department.

Course webpage: See Brightspace

Teaching Assistant: William Rettie (he/him), WilliamRettie@cmail.carleton.ca.

Student Hours (formerly called office hours): Prof. Stolarski will have student hours on **Thursdays from 2:30-3:30 PM** in HP 3320. He is also available at other times by email appointment.

William will have student hours on **Mondays from 4-5 PM** on zoom in meeting 973 5802 7718. Note that you must be logged in to a Carleton zoom account to access this room. If you would like an in person meeting with William, please contact him by email.

You can ask either William or Prof. Stolarski questions about the material or assignment problems, but for questions about assignment marking, please contact William.

Required Textbook: Classical Dynamics of Particles and Systems [Fifth Edition] S. T. Thornton and J. B. Marion, Brooks/Cole, Cengage Learning - 2008. Older editions of this book are also acceptable. The approximate cost of the hardcover version of this book is $258, and the approximate cost of the digital version from the publisher is $78. You are welcome to find used or pdf versions of the book.

Inclusive teaching statement: Science is for everyone. I am committed to fostering an environment for learning that is inclusive for everyone regardless of gender identity, gender expression, sex, sexual orientation, race, ethnicity, ability, age, class, etc. All students in the class, the instructor, and any guests should be treated with respect during all interactions. It is my hope that our class will support diversity of experience, thought, and perspective. I will continually strive to create inclusive learning environments and would therefore appreciate your support and feedback. I welcome emails or in-person communications to let me know your preferred name or pronoun. Please

see the Faculty of Science Equity, Diversity, and Inclusion (EDI) statement.

Mental Health: Taking classes at university can be difficult and stressful. If you are struggling with your mental health, please do not hesitate to reach out. I can direct you to resources that might help. Remember that Carleton also offers an array of mental health and well-being resources, which can be found here.

Statement on AI Use: Artificial Intelligence and generative AI tools have become extremely sophisticated recently. While they can be useful for physics students, they can also interfere in the learning process. In this course, students may use AI tools for clarifying challenging concepts or to suggest additional reading. Other responsible ways to use AI include summarizing textbook passages, reviewing background math, and generating practice problems. Students should be aware that AI can give incorrect information and should not be relied on.

Use of AI to assist with assignment problems is **strictly forbidden** and considered academic misconduct. One of the main learning outcomes of this course is to teach you how to solve technically sophisticated problems, particularly in classical physics, and these skills can only be developed by solving (sometimes difficult) problems on your own. This AI policy reinforces my teaching philosophy that learning comes from hard work and struggle on problems. Furthermore, the practice acquired by solving problems independantly is *necessary* for success on the exams in this course.

I used ChatGPT 5 to copy edit this course outline.

Evaluation:

The marks for this course will be assigned as:

- Assignments - 30%
- Midterms - 40%
- Final - 30%

Assignments:

Assignments will be given approximately once per week and will be due on Mondays at 11:59 PM. They will be posted on and submitted to Brightspace. Students can hand write their solutions and scan or photograph them to upload to the website. **Please upload a single pdf file.**

As noted above, working through problems is an essential part of developing a deep understanding of the subject as this material is heavily math based. **Students are permitted to discuss concepts and strategies related to solving the homework assignments; however, the work handed in must be their own.** Viewing or searching for solutions in any form before your assignment is submitted is forbidden and will be considered academic misconduct. This includes solution manuals, worked problems on the internet, solutions written by other students or course instructors, or solutions written by AI tools.

Late assignments will not be accepted without a legitimate reason, such as illness.

Students who are having significant difficulties with the material are encouraged to schedule an appointment for student hours. Please email me with sufficient notice as last minute requests will not be accommodated.

Midterm Exams:

There will be two 80-minute midterms administered in class on **October 2** and **November 6**. The midterms will be closed-book and closed-notes, and calculators cannot be used. Students will be allowed to prepare their own formula sheet on one 8.5"x11" (letter size) piece of paper. Use of both sides is allowed. The formula sheet can contain only formulas, without problems or worked out solutions. The formula sheet will be handed in with the exam to verify that it meets these criteria.

In the case of an exam deferral for legitimate reasons, please inform me within 24 hours of the regularly scheduled midterm to arrange a time to write the deferred exam.

Final Exam:

The final exam will be held in person during the final exam period in December, and will be 3 hours long. Students will again be allowed to write their own formula sheet, with the same criteria as for the midterm exam.

In the event that a deferred exam is necessary, that exam will replace only the final exam component of the course mark, and will only be granted if adequate term work has been completed. Inadequate term work constitutes earning fewer than 20 of the 70 possible term marks.

Course Schedule

Below is a rough schedule of the course, but it may change to fit the pace needed.

Dates	**Textbook**	**Topic Description**
Sep 4, 9	Chap. 1 (not 1.17)	Introduction and Math Preliminaries
Sep 11, 16, 18	Chap. 2	Newtonian Mechanics – Single Particle
Sep 23, 25, 30	Chap. 6	Calculus of Variations
Oct 2		**First Midterm**
Oct 7, 9, 14, 16	Chap. 7 (not 7.12-13)	Hamilton's Principle
Oct 21 & 23	Fall Break	No classes
Oct 28	Chap. 5 (not 5.3, 5.4)	Gravitation
Oct 30, Nov 4	Chap. 8 (not 8.8 - 8.10)	Central Force Motion
Nov 6		**Second Midterm**
Nov 11, 13	Chap. 3	Oscillations
Nov 18, 20	Chap. 12	Coupled Oscillations
Nov 25, 27	Chap. 9	System of Particles
Dec 2, 4	Chap. 11	Rigid Bodies

Statement on Academic Integrity: Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here. Additional details about this process can be found on the Faculty of Science Academic Integrity website. Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights Responsibilities: Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Grade Definition: In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	A = 85-89	A- = 80-84
B+ = 77-79	B = 73-76	B- = 70-72
C+ = 67-69	C = 63-66	C- = 60-62
D+ = 57-59	D = 53-56	D- = 50-52
F < 50	WDN = Withdrawn from the course	
ABS = Student absent from final exam		DEF = Deferred

Academic Accommodations for Students with Disabilities: If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the Paul Menton Centre website.

Addressing Human Rights Concerns: The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca.

Religious Obligations: Please contact me with any requests for academic accommodation during

the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation.

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the Sexual Violence Prevention and Survivor Support website.

For Pregnancy: Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation.

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the Senate Policy on Accommodation for Student Activities.

Course Copyright: Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s). Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

Assistance for Students:

- Paul Menton Centre
- Academic Advising Centre (AAC)
- Centre for Student Academic Support (CSAS)
- Math Tutorial Centre
- Science Student Success Centre
- Health and Counselling Services
- Equity and Inclusivity Communities