


Introductory Mechanics and Thermodynamics

Physics 1003A Fall 2024

Course Instructor: Dr. Andrew Robinson  [Hear my name](#) **Office Location:** Herzberg Building HP3368

How to address me: Dr. Robinson or Andrew

[Click here for visual directions.](#)

Gender Pronouns: (he/him/his) ([learn more](#))

Class Location:

Email: andrew.robinson@Carleton.ca

[Click here for visual directions.](#)

Note: If you have a question or would like to talk with me, you can send an email, visit me during student hours (see below), or approach me after lecture.

Class Times: Wed and Fri, 2.35 pm – 3.55 pm

Prerequisites: See this outline

Phone: (613) 520-2600 ext. 8922

Preclusions: Additional credit for Phys 1001 or Phys 1007

Student Hours: TBA

Department/Unit Physics

What are 'Student Hours'?

Student hours are dedicated times through the week for the course instructor and TAs to meet with YOU. Pop in to introduce yourself, ask questions about the course, or discuss content from the course.

Physics PHYS 1003 Laboratory, Fall 2024

Location: room 4130 HP

Lab Supervisor: Jesse Lock

Email: JesseLock@cunet.carleton.ca

Note: If these times don't work for you, email me and we can arrange an alternate time to meet.

Welcome to Physics 1003A

Introduction

Physics 1003 is an overview of mechanics and discusses topics in mechanics, oscillations, waves, and thermodynamics, with an emphasis on applications of physics in various engineering and computing applications. The course is calculus-based. The course will be delivered in person. We will be doing a review of some material from high school but will be using a more advanced mathematical framework, allowing us to tackle more complex and realistic problems. In addition, we will be introducing some new concepts and topics, such as fluids, oscillations and waves.

Inclusive Teaching

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. Please email me if you have any comments or concerns.

Land Acknowledgement

We recognize the Algonquin peoples as the traditional custodians of the land in which the campus is located, and where the class is taught. We give respect to the host nation, the *Kitchissippi Omàmiwinini Anishinabeg* (Algonquin peoples of the big river, in the Algonquin language).

Assistance for Students

Career Services: <https://carleton.ca/career/>

Writing Services: <https://carleton.ca/csas/support/>

Peer Assisted Study Sessions (PASS): <https://carleton.ca/csas/group-support/pass/>

Math Tutorial Centre: <https://carleton.ca/math/math-tutorial-centre/>

Science Student Success Centre: <https://sssc.carleton.ca/>

Prerequisites

Students in this course must have GRADE 12 U in Physics and Calculus (or equivalents). You must either have passed MATH 1004 (or MATH 1007) or MATH 1002, or you must be registered in these courses concurrently with this course. Otherwise, students **must** check with Dr. Robinson and obtain permission from the Physics Department to remain in the course. The mathematical level of the course is high, and anyone without the necessary prerequisites will not be allowed to remain enrolled, unless there are very special circumstances.

Course level learning objectives

1. Analytical skills to determine which physical principles are applicable.
2. A sound knowledge base of basic physical principles.
3. Mathematical skills including applications of differential and integral calculus to practical problems.
4. Applications of physics in everyday applications.

Community Guidelines

The following values are fundamental to academic integrity and are adapted from the International Center for Academic Integrity*. In our course, we will seek to behave with these values in mind

	As students, we will...	As a teaching team, we will...
Honesty	<ul style="list-style-type: none"> Honestly demonstrate our knowledge and abilities on assignments and exams Communicate openly without using deception, including citing appropriate sources 	<ul style="list-style-type: none"> Give you honest feedback on your demonstration of knowledge and abilities on assignments and exams Communicate openly and honestly about the expectations and standards of the course through the syllabus, and with respect to assignments and exams
Responsibility	<ul style="list-style-type: none"> Complete assignments on time and in full preparation for class Show up to class on time, and be mentally/physically present Participate fully and contribute to team learning and activities 	<ul style="list-style-type: none"> Give you timely feedback on your assignments and exams Show up to class on time, and be mentally & physically present Create relevant assessments and class activities
Respect	<ul style="list-style-type: none"> Speak openly with one another, while respecting diverse viewpoints and perspectives Provide sufficient space for others to voice their ideas 	<ul style="list-style-type: none"> Respect your perspectives even while we challenge you to think more deeply and critically Help facilitate respectful exchange of ideas
Fairness	<ul style="list-style-type: none"> Contribute fully and equally to collaborative work, so that we are not freeloading off of others Not seek unfair advantage over fellow students in the course 	<ul style="list-style-type: none"> Create fair assignments and exams, and grade them in a fair, and timely manner Treat all students equitably
Trust	<ul style="list-style-type: none"> Not engage in personal affairs while on class time Be open and transparent about what we are doing in class Not distribute course materials to others without authorization 	<ul style="list-style-type: none"> Be available to all students when we say we will be Follow through on our promises Not modify the expectations or standards without communicating with everyone in the course

Courage	<ul style="list-style-type: none"> • Say or do something when we see actions that undermine any of the above values • Accept a lower or failing grade or other consequences of upholding and protecting the above values 	<ul style="list-style-type: none"> • Say or do something when we see actions that undermine any of the above values • Accept the consequences (e.g., lower teaching evaluations) of upholding and protecting the above values
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* This class statement of values is adapted from Tricia Bertram Gallant, Ph.D.

Online Community Expectations for Social Platforms

With the growing use of social platforms (e.g., Discord) on campuses, it is important to keep in mind that university codes of conduct still apply to the behaviours of students online. Please be considerate and respectful while engaging with peers and remember that we are all humans, and that your words matter. If any student witnesses or experiences harassment, I encourage you to reach out to me. Alternatively, you can contact [Ombuds Services](#) or [Carleton Equity and Inclusive Communities](#).

Online communities can be highly beneficial to students and can help to facilitate learning within the course. I encourage people to ask questions, learn from one another, and have open discussions about class material. That said, any acts of academic misconduct (i.e., cheating) will not be tolerated and will result in serious consequences ranging from a grade reduction to expulsion (*see [academic integrity violations](#)*).

- Examples of appropriate peer-to-peer sharing/learning vary from course to course. In this course appropriate peer-to-peer sharing includes: identifying the proper formula to use, identifying an incorrect or missing step in a person's work, brainstorming potential reasons behind a concept, suggesting helpful sites and videos for learning a concept, posting your own work showing only a specific step or process for illustrative purposes (note: this is very different from posting your work and solution for others to simply copy)
- Examples of unacceptable peer-to-peer sharing: Posting or sharing the answers, indicating which answers are correct on assignments, sharing links to solutions, posting your own complete work for a question/solution

Textbooks

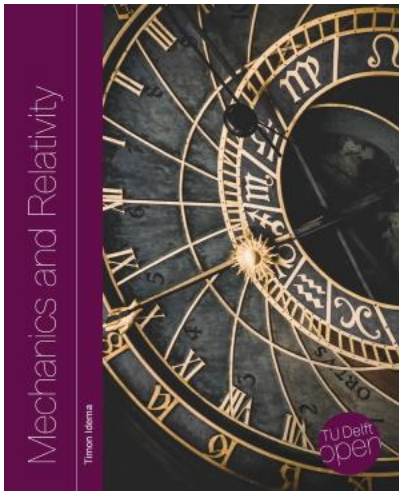
For this course, I am recommending two textbooks. The first is a free online textbook from the Technical University of Delft, in the Netherlands. We will use this for the first half of the

course, as I believe it gives a more rigorous and interesting introduction to forces and motion than any introductory textbook on the North American market. And it's free.

The book is *Mechanics and Relativity*, by Timon Idema. Don't worry by the advanced mathematics in some parts of the textbook. By the time you have finished your degree you will have covered it all!

The book can be downloaded from this site, as a PDF file:

<https://open.umn.edu/opentextbooks/textbooks/mechanics-and-relativity>



Did I mention that it's free?

The other textbook for Physics 1003A is *Fundamentals of Physics*, 12th edition by Halliday, Resnick and Walker. Unfortunately, this one is not free! It is also used for Physics 1004 in the Winter term. If you have already taken Physics 1004, then you may have this, although the version specially printed for Physics 1004 (only) has several missing chapters. If you can find a second-hand copy, of either the 9th, 10th or 11th editions, then this will do for this course.

This textbook is available at the University Bookstore

Textbook Title: *Fundamentals of Physics*

Textbook Edition: 12th (Loose leaf version)

Textbook Author: Halliday, Resnick and Walker

Textbook Publisher: Wiley

The ISBN number: 978-1119801146

An electronic version of the textbook is also available for download, is much cheaper than the print copy, and is perfectly acceptable.

We use the same textbook for Physics 1004 in the winter term. You will not need the access code to the online material for Physics 1003, but you **may** need it for Physics 1004.

Intellectual Property

Classroom teaching and learning activities, including lectures, discussions, presentations, quiz questions and solutions 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).

i.e. Please don't upload notes, quiz questions or solutions to Chegg or other external sites

Technology Checklist:

- An internet-enabled computer (laptop/desktop)
- Zoom software installed on computer (can also install on phone as backup!)
- Access to reliable internet
- Webcam
- Headset with microphone

Note: these facilities are available in the library on campus, and if you need to purchase them, then financial aid is available.

Assessment in this Course

Research about learning strongly suggests that the most important factor in learning is doing the work of reading, writing, recalling, practicing, synthesizing, and analyzing. Learning happens best when people actively engage material on a consistent basis, and that is why

we have high standards in this course. We are confident that, with appropriate effort, you **all** can meet those standards.

We also make an effort to reduce unintentional bias in grading by using methods such as grading assignments one question at a time (i.e., grading all of question 1 before grading any of question 2), grading anonymously, and using rubrics.

Course Organisation

Lectures

The lectures are on Wednesdays and Fridays. Attendance is not mandatory but is strongly recommended. Educational research shows that performance in university is strongly correlated with attendance in class. Lectures will be recorded, so you will have the opportunity to review the material. However, the recordings are a pale shadow of the full theatrical experience! We will be using the Wooclap interactive response system to respond to questions. There is an app to download on your cellphone to transmit your responses to me. The app is found in both the Android and iPhone app stores. I recommend that you install it before classes start.

Weekly Online Quizzes

There are 11 weekly online quizzes in the course to be completed on Brightspace. You will have two attempts. Questions are randomized from a question bank pool, so they will be different in each attempt. The best attempt is used for the course grade calculation, and the lowest two of your scores will be dropped. The dates are in the Brightspace Calendar. It is my custom to allow flexibility on due dates for this part of the course. If you need an extension to complete a quiz, then please email me, with an estimate of when you can complete it by. I will grant all reasonable requests. Do note that it in your best interests to try and keep to the course schedule as far as possible.

Laboratory

The laboratory sessions will be held in the Herzberg Building, room HP4130. Laboratory sessions have their own Brightspace site, and you should consult this site, and the laboratory supervisor if you have any questions.

Lab Section	Day	Time
A1	Monday	1305-1555
A2	Tuesday	0835-1125

Tutorial Tests

Tutorials are held on alternate weeks from the laboratory sessions, at the same time and in the same room (HP4130).

The first tutorial session will be a lab introduction, and review of important mathematical concepts used in both the lectures and lab parts of the course. Attendance is mandatory. There will be four tests which are taken during tutorial sessions. These take the place of midterm exams in this course. There will be two components of the tutorial test:

1. A 15-minute multiple choice quiz at the beginning of the tutorial session. This is open book, and a formula sheet is provided. If you are late for the tutorial, you will not have an opportunity to retake this.
2. A 45-minute test at the end of the tutorial session. This is closed book, but the official formula sheet may be used. University exam conditions are in effect, and you may not communicate with other students during this test. Students with PMC accommodations for extra time will sit this test in the McIntyre Centre.

The lowest score of the four tests will be dropped, and the mean value of the other three tests will be used to calculate your final grade. The tutorial tests are worth 20% of your final grade. We use the tutorial tests to provide you with feedback on your progress with the course. If you do not perform well on a test, analyse where your issues are and discuss it with me. These tests take the place of a mid-term exam.

Student Hours

I will be available for student hours sessions every week when there are classes. We will determine the times during the first lectures, as this needs to be based on student schedules. These will be online Zoom sessions (as my room is small and badly ventilated). I will also be available by email but note that I do not monitor my Carleton email continuously. I try to respond within one business day. I am also happy to chat after lectures.

Other Assistance

The Physics department runs a Physics Drop-In Centre, staffed by experienced tutors for all first-year students. Details of this will be announced at the start of the semester.

The Faculty of Engineering also runs the Elsie MacGill Learning Centre, which provides similar services for all engineering students.

[Elsie MacGill Learning Centre - Academic Support for Engineering Students | Faculty of Engineering and Design \(carleton.ca\)](https://www.carleton.ca/engineering/academic-support/)

Grade Breakdown

This course marking scheme will be used to evaluate the performance of all students. Requests to deviate from this scheme will be denied, unless there are special circumstances, such as illness. Requests to increase the weighting on the final exam to compensate for poor performance on work during the term will be denied unless there are exceptional circumstances.

You will not be allowed to pass the course unless you write the final exam. If you do not attend the exam, then you will be given a maximum of 49% for your final grade, regardless of your score on the other components. There is no minimum grade requirement in the final exam. If you are unable to write the final exam, then you must follow the university procedure and apply for a deferred exam.

You must also obtain a passing grade (50%) in the laboratory work to pass the course. If you do not, then you will automatically receive a failing grade, F, regardless of your performance in the other course components.

Component	Grade Value
Weekly Online Quizzes (BEST 8 of 10)	20%
Tutorial Tests (best 3 of 4)	20%
LABORATORY	35% (must pass with minimum 50% to pass course)
Final Exam	25% (must take the final exam to pass the course)

Final Exams

The final exam will take place during the final examination period. The exact time is determined by the University Exam Scheduling Service, which I have no control over! Please do not schedule any travel arrangements before the university releases the examinations

timetable. The Physics exam will be an online exam, of two hours duration, which must be taken during a 24-hour period.

Extra Credit

We will be participating in a survey being undertaken by science education researchers at Carleton University and the University of British Columbia. This will involve completing two online surveys (hosted on Brightspace). These are anonymous and nobody can associate your name with your responses. We will offer 0.5% extra credit for each of the surveys you participate in. You can opt to not allow your responses to be used in the overall study, without losing your extra credit for participation.

Feeling Sick?

If you feel very sick (e.g., fever, chills, stomach upset) do not come to class or campus. All lectures are recorded, so you can review them later. Please contact the **lab supervisor** if you are unable to attend a tutorial or laboratory session. We will offer makeup labs at the end of the semester, and we drop the lowest tutorial test, to allow for such eventualities.

Mental Health

If you are struggling, please do not hesitate to reach out. I am happy to listen, and/or direct you to resources that might help. In terms of class, if you need extra help or missed a lesson, don't stress! Email me and we will set a time to meet. I'll work with you, I promise. Remember that Carleton also offers an array of mental health and well-being resources, which can be found [here](#).

University Policies

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

Statement on Chat GPT/Generative AI usage

AI Use in this course: Students may use AI tools for basic word processing and formatting functions, including:

- Grammar and spell checking (e.g., Grammarly, Microsoft Word Editor)
- Basic formatting and design suggestions (e.g., Microsoft Word’s formatting tools, PowerPoint Design editor)

Documenting AI Use: It is not necessary to document the use of AI for the permitted purposes listed above. If you have questions about a specific use of AI that isn’t listed above, please consult your instructor.

Why have I adopted this policy? This policy ensures that student voices and ideas are prioritized and authentically represented, maintaining the integrity of the work produced by students while allowing basic support to enhance clarity, correctness, layout, and flow of ideas. The Large Language Models (LLMs) which go under the general “AI” umbrella do not understand mathematics and numbers and cannot be relied upon to generate correct answers. Once you understand the basic principles, and can do them yourself, you will be able to correctly identify suitable use-cases for LLMs and be able to spot when they are incorrect. We are at the “understand the basic principles” part of the educational process.

Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (students.carleton.ca/course-outline)

- **Deferred/missed term work for short-term accommodation (5 days or less):**
[stipulate the process by which the student may gain informal accommodation for short term incapacitation (i.e., via submitting a [self-declaration form](#), a written email to the professor, TA, etc.), and the appropriate accommodation (e.g., extension, alternate assignment, etc.).]
- **Deferred/missed term work for longer term incapacitation (5 days or longer);**
[It would be helpful to include a statement to indicate to the student to email you (the instructor) for guidance. The student will need to go to the Registrar’s

Office for support, but it is important that the instructor is apprised of the long-term accommodation needs.] If you require accommodations for this course that are longer than the 5-day (short-term) period, please email me to discuss how/whether accommodation needs could be met for this course.

Academic Integrity

Academic Integrity is upholding the values of honesty, trust, respect, fairness, responsibility, and courage that are fundamental to the educational experience. Carleton University provides supports such as academic integrity workshops to ensure, as far as possible, that all students understand the norms and standards of academic integrity that we expect you to uphold. Your teaching team has a responsibility to ensure that their application of the Academic Integrity Policy upholds the university's collective commitments to fairness, equity, and integrity.

(Adapted from [Carleton University's Academic Integrity Policy](#), 2021).

Examples of actions that do not adhere to Carleton's Academic Integrity Policy include:

- Plagiarism
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams
- Using artificial intelligence tools such as ChatGPT when your assessment instructions say that it is not permitted

Please review the checklist [linked here](#) to ensure you understand your responsibilities as a student with respect to academic integrity and this course.

Sanctions for Not Abiding by Carleton's Academic Integrity Policy

A student who has not upheld their responsibilities under Carleton's Academic Integrity Policy may be subject to one of several sanctions. A list of standard sanctions in 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 follow the [Carleton University Student Academic Integrity Policy](#). The Policy is strictly enforced and is binding on all students.

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.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me:** Email or drop in during student hours and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):



Note: You can also bring your concerns to [Ombuds services](#).

Important University Dates and Deadlines

Please familiarise yourself with the Academic Calendar here:

[The Academic Year \(Graduate and Undergraduate Studies\) < Carleton University](#)

Course Schedule

Week Beginning	Lecture	Lecture Date	Topic	Tutorial	Labs
Monday 2nd Sept	1	Wed 4th Sept	Introduction	No labs or tutorials	
	2	Friday 6th Sept	Mathematical Skills		
Monday 9th Sept	3	Wed 11th Sept	Motion 1	Tutorial 1 Intro/Review	
	4	Fri 13th Sept	Motion 2		
Monday 16th Sept	5	Wed 18th Sept	Forces 1		Lab 1 Reaction Time
	6	Fri 20th Sept	Forces 2		
Monday 23rd Sept	7	Wed 25th Sept	Work and Energy	Tutorial 2 (Test 1)	
	8	Fri 27th Sept	Potential Energy		
Monday 30th Sept	9	Wed 2nd Oct	Centre of Mass 1		Lab 2 (Motion on Incline)
	10	Fr 4th Oct	Centre of Mass 2		
Mon 7th Oct	11	Wed 9th Oct	Collisions	Tutorial 3 (Test 2)	
	12	Fri 11th Oct	Rotational Motion 1		
Oct (Thanksgiving)	13	Wed 16th Oct	Rotational Motion 2	No labs or tutorials	
	14	Fri 18th Oct	Rotational Motion 3		
Monday 21st Oct	Fall Break				
Monday 28th Oct	15	Wed 30th Oct	Oscillations 1		Lab 3 (Attwood's Machine)
	16	Fri 1st Nov	Oscillations 2		
Monday 4th Nov	17	Wed 6th Nov	Fluids 1	Tutorial 4 (Test 3)	
	18	Fri 8th Nov	Fluids 2		
Monday 11th Nov	19	Wed 13th Nov	Waves 1		Lab 4 (Spring Constant)
	20	Fri 15th Nov	Waves 2		
Monday 18th Nov	21	Wed 20th Nov	Waves 3/Thermo 1	Tutorial 5 (Test 4)	
	22	Fri 22nd Nov	Thermodynamics 2		
Monday 25th Nov	23	Wed 27th Nov	Thermodynamics 3		Lab 5 (Thermocouple)
	24	Fri 29th Nov	Thermodynamics 4		
Monday 2nd Dec	25	Wed 4th Nov	Exam Review		Make Up Labs
		No class (Monday Schedule)			
Exam Period 9th Dec - 21st Dec					