Introductory Mechanics and Thermodynamics

Physics 1003A

Course Instructor: Dr. Andrew Robinsc Hear my name

How to address me: Andrew

Gender Pronouns: (he/him/his)

Email: andrew.robinson@Carleton.ca

Note: If you have or question or would like to talk with me, you can send an email, or talk to me during student hours.

Phone: x8922

Student Hours: To Be Determined

What are 'Student Hours'?
Student hours are dedicated times through the week for the course instructor to meet with YOU. This will be via Zoom this semester. Introduce yourself, ask questions about the course, or discuss content from the course. Note: If these times don't work for you, email me and we can arrange an alternate time to meet.

Office Location: Herzberg Building HP3368

Class Location:

Class Times: Tuesdays and Thursdays 1305-1425

Prerequisites: See this outline.

Physics PHYS 1003 Laboratory, Fall 2023
Location: room 4130 HP
Lab Supervisor: Jesse Lock

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 unless the situation requires us to move online. In this case we will either use online synchronous lectures, or lecture recordings from last year. We will be doing a review of some material from high school but will be using a more advanced mathematical framework.

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 Omàmiwininì Anishinabeg* (*Algonquin peoples of the big river,* in the Algonquin language).

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	• Honestly demonstrate our knowledge and abilities on assignments and exams • Communicate openly without using deception, including citing appropriate sources	• 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	• 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	• 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	• Speak openly with one another, while respecting diverse viewpoints and perspectives • Provide sufficient space for others to voice their ideas	• Respect your perspectives even while we challenge you to think more deeply and critically • Help facilitate respectful exchange of ideas
Fairness	• Contribute fully and equally to collaborative work, so that we are not freeloading from others • Not seek unfair advantage over fellow students in the course	• Create fair assignments and exams, and grade them in a fair, and timely manner • Treat all students equitably
Trust	• 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	• 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	• 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	• 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

In addition, I am available to discuss any issues with work, mental and physical health and other factors which might impact your performance on the course. We recognise that we need to accommodate outside events, and we will gladly do so on request. Please do not worry about asking for deadline extensions to academic work in this course. These will come up, and we will help. Please direct requests for extensions for laboratory work to the Laboratory Supervisor, and for classroom work or tutorial tests, to Dr. Robinson

Learning Materials

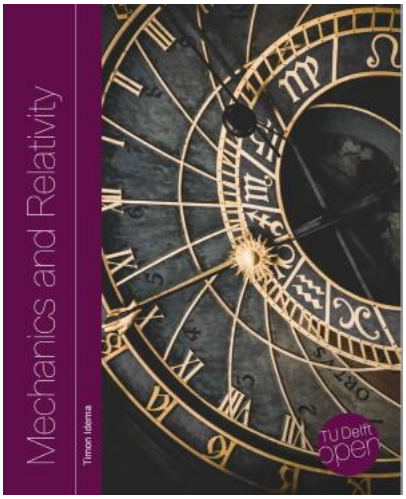
Textbooks

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!

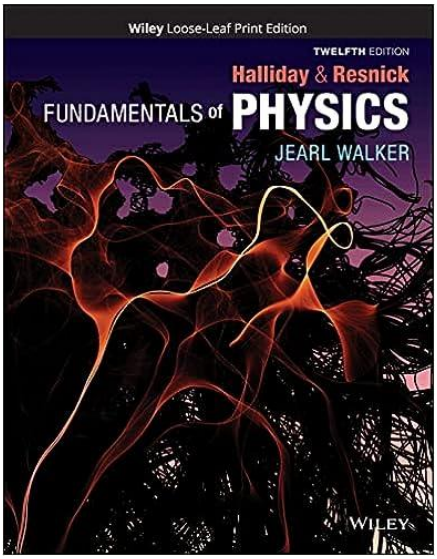
The book can be downloaded from this site, as a PDF file:

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 **will** 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

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 try to reduce unintentional bias in grading by, for example and when possible, grading assignments one question at a time (grading all of question 1 before grading any of question 2), grading anonymously, and using rubrics.

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)

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Course Organisation

Lectures

Tuesdays and Thursdays in Tory Building 360 from 1305- 1425h. Attendance is not mandatory but is strongly recommended. 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 Poll Everywhere 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 10 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 ten scores will be dropped.

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 Mr. Lock if you have any questions.

Lab Section	Day	Time
A3	Tuesday	0835-1125
A4	Wednesday	1305-1555

Tutorial Tests

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

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.

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 are likely to 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)

Public Health

It is important to remember that COVID is still present in Ottawa. The situation can change at any time and the risks of new variants and outbreaks are very real. There are a number of actions you can take to lower your risk and the risk you pose to those around you including being vaccinated, wearing a mask, staying home when you're sick, washing your hands and maintaining proper respiratory and cough etiquette.

Masks: Masks are not required on campus. However, in line with other health care facilities, Health Services and the Sports Medicine Clinic may continue to require masks. Personal preferences regarding optional mask use will vary, and we ask that everyone show respect for the choices of others.

All members of the Carleton community are required to follow requirements and guidelines regarding health and safety which may change from time to time. For the most recent information about Carleton's COVID-19 response and health and safety requirements please see the University's COVID-19 website and review the Frequently Asked Questions (FAQs).

Should you have additional questions after reviewing, please contact covidinfo@carleton.ca.

For Physics 1003, please do not attend classes, laboratory, or tutorial sessions if you are sick. We will accommodate your absence with no grade penalties. If possible, we will offer extra sessions to do labs and reschedule tests. Lectures will be recorded and available for view online. If you will be absent for an extended time, please contact Dr. Robinson so that we can work out a customized academic accommodation for you.

Note About 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.

Course Schedule

Week Beginning	Lecture	Lecture Date	Topic	Tutorial	Labs
Monday 4th Sept	1	Thurs 5th Sept	Introduction	No labs or tutorials	
	2	Tues 12th Sept	Mathematical Skills/Motion		
Monday 11th Sept	3	Thurs 14th Sept	Motion	No labs or tutorials	
	4	Tues 19th Sept	Forces 1		
Monday 18th Sept	5	Thurs 21st Sept	Forces 2	Lab Briefing	
	6	Tues 26th Sept	Work and Energy 1		
Monday 25th Sept	7	Thurs 28th Sept	Work and Energy 2		Lab 1 (Reaction Time)
	8	Tues 3rd Oct	Power and Centres of Mass		
Monday 2nd Oct	9	Thurs 5th Oct	Centres of Mass	Tutorial 1	
Mon 9th Oct	10	Tues 10th Oct	Momentum		
(Thanksgiving)	11	Thurs 12th Oct	Collisions		Lab 2 (Motion on Inclined Plane)
	12	Tues 17th Oct	Rotational Motion 1		
Monday 16th Oct	13	Thurs 19th Oct	Rotational Motion 2	Tutorial 2	
Monday 23rd Oct	Fall Break				
	14	Tues 31st Oct	Rotational Motion 3		
Monday 30th Oct	15	Thurs 2nd Nov	Oscillations 1		Lab 3 (Atwood's Machine)
	16	Tues 7th Nov	Oscillations 2		
Monday 6th Nov	17	Thurs 9th Nov	Fluids 1	Tutorial 3	
	18	Tues 14th Nov	Fluids 2		
Monday 13th Nov	19	Thurs 16th Nov	Waves 1		Lab 4 (Spring Constant)
	20	Tues 21st Nov	Waves 2		
Monday 20th Nov	21	Thurs 23rd Nov	Heat 1	Tutorial 4	
	22	Tues 28th Nov	Heat 2		
Monday 27th Nov	23	Thurs 30th Nov	Heat 3		Lab 5 (Thermocouple)
	24	Tues 5th Dec	Properties of Solid Materials		
Monday 4th Dec	25	Thurs 7th Dec	Review		Make-up Labs
Exam Period 10th Dec - 22nd Dec					

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
ABS = Student absent from final exam
DEF = Deferred
FND = (Failed, no Deferred) = student could not pass even with 100% on final exam

Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University. More information can be found at: https://students.carleton.ca/course-outline/

University rules regarding registration, withdrawal, appealing marks, and almost anything else you might need to know can be found on the university's website, here:

https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/

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 (PDF, 2.1 MB).

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: https://carleton.ca/sexual-violence-support/

Accommodations for Missed Work

Carleton has put into place a protocol for students to apply for accommodations using a self-declaration form in the event of missed work. You do not need a note from a physician. The form can be found at: https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf

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 (PDF, 2.1 MB).

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 (PDF, 25KB).

Assistance for Students

Academic and Career Development Services: http://carleton.ca/sacds/

Writing Services: http://www.carleton.ca/csas/writing-services/

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/

Academic Integrity

Academic misconduct undermines the values of honesty, trust, respect, fairness, and responsibility that we expect in this class. 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 tests or exams.
- Using Artificial Intelligence (AI) systems such as ChatGPT to generate answers.

Sanctions for not abiding by Carleton's Academic Integrity Policy

A student who has not adhered to Carleton's Academic Integrity Policy may be subject to one of several sanctions:

1. If you take full responsibility for your actions, and it is the first time you have violated the policy, you will receive zero on the assessment. If you are found to have violated the policy but do not take responsibility, an additional grade deduction will be applied (e.g. an A- will become a B+)
2. Subsequent violations of the policy may result in more severe sanctions such as failing the course, suspension from all studies and/or expulsion.

Process of an Academic Misconduct Investigation

Step 1: The instructor believes misconduct has occurred and submits documentation to the Dean of the Faculty of Science.

Step 2: The Dean reviews documentation and can proceed with or dismiss the allegation.

Step 3: If sufficient evidence, the student receives an allegation statement by email. Ombuds services is copied on the email.

Step 4: The student provides a written response to the evidence provided.

Step 5: Either party may request a meeting between student, dean, and the ombudsperson.

Step 6: Dean informs the student of the decision.

Appeal: Student has the right to appeal the decision.

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.

Physics 1003: Note that instructors, laboratory supervisors and TAs have a mandatory requirement to report academic misconduct.

Plagiarism

Plagiarism is the passing off of someone else's work as your own and is a serious academic offence. For the details of what constitutes plagiarism, refer the Faculty of Science Academic Integrity website. To further understand Academic Integrity, consider attending the Learning and Support Academic Integrity Workshop.

What are the Penalties for Plagiarism?

A student found to have plagiarized an assignment may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; and/or a reprimand; a refusal of permission to continue or to register in a specific degree program; academic probation; award of an FNS, Fail, or an ABS.

What are the Procedures?

1. All allegations of plagiarism are reported to the Dean of Faculty of Science. Documentation is prepared by instructors and/or departmental chairs.
2. The Dean writes to the student and the University Ombudsperson about the alleged plagiarism.
3. The Dean reviews the allegation. If it is not resolved at this level, then it is referred to a tribunal appointed by the Senate.

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.

Important University Dates and Deadlines

Please familiarise yourself with the Academic Calendar here:

https://calendar.carleton.ca/academicyear/