PHYS 1108 Winter 2026

Introductory University Physics II

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

Course Instructor: Tong Xu

How to address me: Prof. Tong

Gender Pronouns: (he/him/his)

Email: txu@physics.carleton.ca

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

Best Ways to be in Touch: in class, via email, or during student hours

Student Hours:

Friday, 2-3pm, HP3318 (Tong Xu)

TBD HP2420 (Avery Berman, instructor of 1008A)

Students from either session can visit either Professor's student hours.

Tutorial coordinator: Tamara Rozina

Email: tamara.rozina@carleton.ca

Office Location: Room 3318, Herzberg Building

Class Location: Please check Carleton Central for the room location.

Class Times:

    PHYS 1108: Mon & Wed, 4:35pm-5:55pm

Prerequisites:

 PHYS 1001 or PHYS 1003 or PHYS 1007 or PHYS 1107

Students in this course must have PHYS 1107 or equivalent and are expected to have completed MATH 0107 or MATH 1007 or their equivalent. Otherwise, you must obtain permission of the Physics Department.

You must unenroll from this course if you have not passed one of the prerequisites (i.e., PHYS 1107 or equivalent).

Preclusions:

PHYS1002, PHYS1004, PHYS1008, BIT1007, BIT 1204

Department/Unit: Physics

If you are in the physics programs, you should take PHYS 1002, not PHYS 1108 or PHYS 1008.

Please feel free to contact me via email or in person to let me know about any experiences you have had related to this class that have made you feel uncomfortable.

I. Topics Covered and Learning Outcomes

This is the second part of a two-term physics course with an emphasis on essentials for scientists in other disciplines. This second part of the course covers electricity and magnetism, DC and AC circuits, properties of electromagnetic radiation and light, optics, elementary quantum physics with introductory concepts of atomic, nuclear, and sub-atomic particles. Applications to other scientific disciplines, particularly in the life sciences and real-world examples, will be used whenever possible

A detailed list of topics to be covered, including the **Lecture schedule** and **homework Due Dates** for each week, can be found at the **end of this document**.

Important dates and deadlines can be found here: https://calendar.carleton.ca/academicyear/, *including class suspension for fall and winter breaks, and statutory holidays.*

II. Assessments
The four types of assessments are related to the theory part of the course: in-class participation, tutorial tests, homework and final exam.

In-class participation

During every lecture, there will be live interactive questions. Students will answer questions through the **Wooclap** platform

The in-class participation account for 10% of the final marks:

- You will get half of the participation marks (5%) if you score 25% or higher in each of any **16 lectures (out of a total of 23 lectures)**. If fewer than 16 lectures, the 4% will be scaled accordingly.
- The remaining participation marks (5%) will be based on your performance (% of correct answers) in your top 16 lecture quizzes.

Team discussion is encouraged when working on these in-class questions.

Every Registered Carleton Student should have a Wooclap.com account. At the beginning of the lecture, **a Wooclap event link** will be given on the "In-class Wooclap quizzes" module on BrightSpace. **You must join the event through the BrightSpace link for your participation to be recorded.** To save time, I suggest you enter the Wooclap event as soon as you are settled in the classroom.

Tutorials
There is NO make-up for the tutorial tests.

There will be a tutorial on each alternating week with the labs (see lab and tutorial schedule below). All the sessions will be held **in-person** in room **HP 4160**.

The structure of the tutorial is as follows:

A set of tutorial problems will be posted on BrightSpace at least a week before the tutorial session. Students should attempt to solve these problems in order to prepare for the tutorial**. At the start of the tutorial session students will individually complete a multiple-choice (MC) quiz consisting of 4 questions.** The MC quizzes are open book and designed for a 15-minute completion time. Next, the TAs will demonstrate solving example problems and answering questions about the tutorial problem set. The last hour of the tutorial will be a close-book tutorial test consisting of two long-answer problems.

The grade for the tutorial test and the multiple-choice quiz will be combined to provide the final Tutorial Test grade for each of the 5 tutorial sessions this semester. **The 4 highest test** grades will be used to determine the final Tutorial Test score.

After your tutorial tests are returned, you are expected to keep them at least until the end of term. Please verify their marks entry on Brightspace and bring any clerical errors to our attention as soon as you can during the term.

Note that if you are late for the tutorial, you will miss the multiple-choice quiz, and forfeit marks. There are no retakes possible.

Students must attend the tutorial session only in the lab section they are registered in. **The final grade for tutorials is based on best 4 out of 5 tests**. If a student missed a session, then this session will automatically be dropped and the other 4 will count towards the final grade. **No makeup will be given for the tutorial tests.** If a student had to miss a second session, they must reach out to the Lab Coordinator, Ms. Tamara Rozina (tamara.rozina@carleton.ca) **immediately** to discuss possible options.

Tutorial schedule

Week of	Tutorial
January 5, 2026	**NO Labs/Tutorials**
January 19, 2026	Tutorial 1
February 2, 2026	Tutorial 2
February 16, 2025	**Winter Break**
February 23, 2025	Tutorial 3

March 9, 2025	Tutorial 4
March 23, 2025	Tutorial 5
March 31, 2025	Review (no test)

Homework

There are 12 weekly Homework (HW) which are online quizzes administered through Brightspace. These HWs will count as the HW grade in the final course grade. The HWs will be based on material studied during the lectures during that week. Each HW will become available every Wednesday of the week for the students to attempt. You will have 2 attempts during the week before the HW due the next Wednesday. All 12 HWs less the (2) lowest HWs will count toward the final grade of Homework. See the timetable for the lectures further in this document. Be vigilant and be sure to always check the due dates for the HWs. If there is any discrepancy between the marks posted in the Brightspace gradebook and your calculated values, please notify the instructor immediately.

Final Exam (In Person)

There is no mid-term examination. We regard the five tutorial tests as a way of providing feedback and guidance on your performance. If you do not perform to your own satisfaction on a tutorial test, it is imperative to discuss this with your lecturer during office hours or by email. Do not leave this consultation until the end of the course. Effective intervention and assistance are best applied at the beginning of term.

The final examination will be scheduled during the regular April examination period at the end of the term. It is the responsibility of the student to be present during this period; in particular, holiday travel arrangements must not be made before the examination schedule is known.

The final exam may include questions related to material contained within the lab portion of the course.

III. Grade Breakdown

In-class participation	10%
HWs (Homework Quizzes) (best 10 out of 12)	20%
Tutorial tests (best 4 out of 5)	35%
Final Exam	35%
Total	**100%**

If you miss a lab or homework for a reason that justified for accommodation, you need to let your instructor, or the lab supervisor know within 1 week from the deadline of the missing work. or you receive Zero mark for that missing work.

Passing Condition

To pass the course, students must meet the following conditions:

- An overall mark must be *greater than 50%*, <u>AND</u>
- **Final Exam must be attempted** to pass the course, even if you manage to achieve 50% overall mark without the final exam.

Deferred Exams: Deferred Exams are generally only granted to students who cannot take the regularly scheduled exam due to serious illness or death of a family member. Information on the deferral process is provided at https://carleton.ca/registrar/special-requests/deferral/ The Deferred Exam replaces only the Final Exam portion of the marks and students **must be eligible to pass the course by having completed satisfactory term work (at least 40% of the total grade excluding the final exam).**

V. Learning Material(s) and Other Course/Lab-Related Resources

Learning Material	Options for Purchasing	Approximate Cost
Physics, 2025 Evergreen Release, Alan Giambattista, McGraw Ryerson Ltd., ISBN: 9781266902505	[Carleton Book Store](#) (ISE new)	$119.95
	Carleton Book Store (digital, 180day)	$69.00
	Carleton Book Store (buy digital)	$99.00

Second-hand copy of the textbook or an older version is fine for this course.

Academic Accommodations and Regulations

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 (https://students.carleton.ca/course-outline/).

AI and Chat GPT are NOT allowed for solving HW question

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that 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.

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.

Avery Berman (1008A) *Tong Xu (1008B)* (Your Professor)	*Dr. Alain Bellerive* undergrad-advisor@.carleton.ca (Physics Undergraduate Chair)	*Dr. Kevin Graham* PhysChair@physics.carleton.ca (Department Chair)	Office of the Dean of Science (ODScience@carleton.ca)

For the Lecture and homework schedule please see next page...

Lecture and homework schedule:

Week	Date of lecture	Lecture #	Text Section	Topic	Deadline HW due every Thursday
1	Mon Jan 5	1	–	Course Introduction and Math Concepts	
			16.1	Electric Charge	
			16.2	Conductors and Insulators	
			16.3	Coulomb's Law	
	Wed Jan 7	2	16.3	Coulomb's Law (continued)	
			16.4	Electric Field	
			–	–	
2 (Lab 1)	Mon Jan 12	3	16.5	Motion of Charge in **E** field	
			16.6	Conductors in electrostatic equilibrium	
			16.7	Gauss' Law for electric fields	
	Wed Jan 14	4	17.1	Potential Energy	HW1, Intro & Ch 16 is due Thur. Jan 15
			17.2	Potential	
			–	–	
3 (Tutorial Ch16)	Mon Jan 19	5	17.3	Field and Potential	
			17.4	Conservation of Energy; moving charges	
			17.5	Capacitors	
			–	–	
	Wed Jan 21	6	17.6	Dielectrics	HW2, Ch 16 is due Thur Jan 22
			17.7	Energy in a Capacitor	
			18.1	Current	
			18.2	EMF & Circuits	
4 (Lab 2)	Mon Jan 26	7	18.4	Resistance & Resistivity	.
			18.5	Kirchhoff's Rules	
			18.6	Series and Parallel Circuits	
	Wed Jan 28	8	18.8	Power and Energy in Circuits	HW3, Ch 17 is due Thur Jan 29
			18.10	RC Circuits	
			18.11	Electrical Safety	
5 (Tut 2 Ch17,18)	Mon Feb 2	9	19.1	Magnetic Fields	
			19.2	Magnetic Force on a point charge	
			19.3	Charged particle moving perp to a uniform **B** field	
	Wed Feb 4	10	19.4	Charged particle in a uniform magnetic field	HW4, Ch 18 is due Thur Feb 5
			19.5	Charged particle in crossed **E** and **B** fields	
			19.8	Magnetic field due to an electric current	
6 (Lab 3)	Mon Feb 9	11	20.3	Faraday's Law	
			20.4	Lenz's Law	
			20.9	Inductance	
	Wed Feb 11	12	21.1	AC currents and voltages, with resistors	HW5, Ch 19 is due Thur Feb 12
			21.3	Capacitors in AC	
			21.4	Inductors in AC	
7	**Week of February 16-20 - Winter Study Break (no classes or tests)**				

Continued on next page...

Week	Date	#	Sec	Topic	Homework
8 (Tut 3 Ch19,20)	Mon Feb 23	13	22.1	Maxwell's Equations and Electromagnetic Waves	
			22.3	EM spectrum	
			22.4	Speed of EM waves	
	Wed Feb 25	14	22.5	Travelling EM waves in a vacuum	HW6, Ch 20, 21 is due Thur Feb 26
			22.6	Intensity (part of section)	
			22.7	Polarization	
9 (Lab 4)	Mon Mar 2	15	23.1	Wavefronts and Rays	
			23.2	Reflection	
			23.3	Refraction	
			23.4	Total Internal Reflection (TIR)	
			23.9	Thin lenses	
	Wed Mar 4	16	23.9	Thin lenses (cont.)	HW7, Ch 21, 22 is due Thur Mar 5.
			24.1	Lenses in combination	
			24.3	The Human Eye	
10 (Tut 4 Ch 21,22,23)	Mon Mar 9	17	24.4	Simple magnifier	
			24.5	Compound microscopes (qualitative only)	
			25.1	Constructive and destructive interference	
	Wed Mar 11	18	25.4	Young's Double Slit	HW8, Ch 23 is due Thur . Mar 12
			25.5	Gratings	
			25.8	Resolution of optical instruments	
11 (Lab 5)	Mon Mar 16	19	27.2	Blackbody radiation	
			27.3	Photoelectric effect	
			27.6	Spectroscopy	
			27.7	Bohr model: atomic electron energy levels, transitions	
	Wed Mar 18	20	27.7	Atomic Structure	HW9, Ch 24, 25 is due Thur Mar 19
			28.1	Wave particle	
			28.2	Matter waves (de Broglie)	
			28.3	Electron microscope	
			28.4	Uncertainty Principle	
12 (Tut 5 Ch 24,25,27)	Mon Mar 23	21	28.5	Wave functions: confined particle	
			28.6	Hydrogen Atom	
			28.7	Exclusion Principle	
			28.9	Lasers	
			28.10	Tunneling	
	Wed Mar 25	22	29.1	Nuclear structure	HW10, Chs25-27 is due Thur . Mar 26
			29.2	Binding Energy	
			29.3	Radioactivity	
13 (Ch28, 29, & Review , no test)	Mon Mar 30	23	29.3	Radioactivity(cont.)	
			29.4	Decay rates and half life	
			29.5	Biological effects of ionizing radiation	
			–	–	
	Wed Apr 1	24	29.7	Nuclear Fission	HW11, Ch 27-28 is Thur Apr 2
			29.8	Nuclear Fusion	
14	Mon Apr 6	25		Review	HW12 Ch 28-29 is due Wed Apr 8

Additional tips:

Numerical Answers in HW quizzes

In answering the assignment calculation questions, you will encounter the situation where you must enter a numerical value as the response. Please enter the answer when appropriate in scientific notation with the correct number of significant figures. By default, THREE sig. fig. is required, unless specified otherwise in the question. For example, if your answer is 1.60 x 10⁻¹⁹ C. You will input your answer as

Your Answer:

| 1.60 | x10 | -19 | C |

Answer   units

You are allowed a 5% variance between your answer and the one calculated within Brightspace to account for rounding errors. If you do not give your answer with three significant figures, your answer may be outside of this 5% threshold and will therefore be marked as incorrect. Answers of this sort will not be eligible for re-assessment by the professor. In some question you will be asked to use a specific number of decimal points instead of using sig. figs. You need to abide by the stated-required digital precision.

Be sure always to take careful note of the units for your answer. Some questions will ask you to input units of your answer, while some others will only ask for the numerical result. Typically, it is expected that the answer will follow SI units (m, s, J, V, A, etc.) however there are occasions in which non-standard units will be required for the specific question. Generally, these instances will be noted in the question itself, e.g. "Express your answer in km". Also, units are not to be entered with the numerical answer for these assignments! If required, please input the unit in the specified box.

Scientific notations in the question text

Due to the limitation of BrightSpace's capability of displaying scientific notations, you may see the following in the questions text.

BrightSpace display in the question text	Actual value
2.50x10^-5	2.50×10^{-5}
2.50x10^0 Unfortunately, BS still displays the exponent term even it is 10 to the power of zero. So just treat 10^0 =1.0	2.50
(2.50x10^0)x10² , or (2.50x10^0)E2, or (2.50x10^0)x10^2 Some time you may see such mixed display, again, note that 10^0 =1.0.	2.50×10^{2}

Scientific Calculators:

It is highly recommended that you use and understand the functionality of a reliable scientific calculator for all calculations on assignments and tests. It is good practice to fully understand how to use the scientific notation functionality that all scientific calculators will have available. This will save a great deal of time in all your calculations and greatly reduces mistakes.