PHYS 1008, Summer 2025

Elementary University Physics II
Information and Course Outline

(0.500 Credit)

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: Mustafa Bahran

How to address me: Professor Bahran

Gender Pronouns: (he/him)

Email: mustafabahran@cunet.carleton.ca

Note: If you have or 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.

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

Student Hours: To be announced in Brightspace announcements section.

Lab Supervisors:

Tamara Rozina
e-mail: tamara.rozina@carleton.ca

Office Location: Herzberg 3412

Class Times: M, W, 06:05 pm-8:55 pm

Prerequisites:

PHYS 1001 or PHYS 1003 or PHYS 1007. Students in this course must have PHYS 1007 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. *If you have failed Physics 1007 in the 2024 Fall term, you must leave the course.*

Department/Unit: Physics

Class Web Page:
We will use Brightspace which you can access from https://brighspace.carleton.ca

Important dates and deadlines can be found here:
https://carleton.ca/registrar/registration/dates/academic-dates/, including class suspension for winter break, and statutory holidays.

1. Course Description:

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. Precludes additional credit for BIT 1003 (no longer offered), BIT 1007, BIT 1204, PHYS 1002, PHYS 1004.

2. TEXTBOOK:

'Physics', Fifth Edition (International Student Edition), Giambattista, McGraw Ryerson Ltd,

ISBN: 9781260570052 (hardcover), 9781260486964 (e-text), 9781260327762 (hardcover + e-text)

These can be purchased from the Carleton University Bookstore in the University Centre

(https://www.bkstr.com/carletonstore)
The previous version of the textbook (3rd edition, ISBN 9780073512150) is also sufficient. We will not be using the Publisher's website for assignments, so no access code is required. Please note that the equation numbering in the 3rd edition is different than the current edition used.

Giambattista - Physical - $117.50 eBook – 180-day term $ 69.00 or eBook lifetime purchase $ 99.00

3. A Few Words About Physics

Some students believe that if they can follow the lectures class, then they have learned physics. This is usually not true. Learning physics is not a spectator sport. To learn physics, a student must do work outside of class thinking about, and interacting with, the course material. *No one ever learns physics by simply reading about it or listening to someone talk about it. You learn it by making the effort to understand the material and by solving problems using the principles learned.* The standard requirement in a college class is that you spend two hours outside of class for every hour in class. There is no substitute for spending time learning the material.

More broadly, Physics is an ideal place to learn the art of quantitative thinking: to learn how to turn a concept in words into something that one can calculate and measure. In order to solve a problem, you must critically examine the information available in a given situation; determine an effective method to approach the problem, and carry through to the solution, including a critical examination of the final answer to see if it is reasonable. These skills will serve you throughout your future careers, indeed throughout your life. This course is a good step towards that end. The goal of physics is to understand the physical universe and be able to accurately describe and predict what is observed. Physics is based on critical thinking and hence helps develop independence and free thinking. An understanding of physics may help you perceive the world around you in a more comprehensible, enjoyable, and fascinating way.

Finally, learning physics is a highly active process! Everyone can do it with some effort. You all can do it. You will need to take the lead in this effort. Ask questions whenever you need help! Watching someone else "do physics" does not often do much for you!

4. Course Modality

This course is in person course where there are a series of in person meetings (lectures, and labs). HomeWorks (HWs) and pre-class reading quizzes (RQs) will be online in Brightspace. The final exam will be in person. The specific dates and activities are described further on in this course outline. Students are expected to remain up to date with the deadlines and due dates provided by the instructor.

It must be said, learning physics is a very active process! Everyone can do it with some effort. You all can do it. You will need to take the lead in this effort. Ask questions whenever you need help! Watching someone else "do physics" does not often do much for you! Once you realize that PHYSICS is really fun as you see it in every day's life then you will know that you have understood it.

5. Lectures and Assignments:

In-person lectures:

The lectures will be given in person at the assigned time slots every week according to the schedule in Section 6 of this course outline. It is important that the students attend the lectures as they are given to derive the greatest benefit from the course. In addition to the lecture, there will be in person office hours session. In Section 14 of the course outline is a schedule for the topics that will be covered each week and the corresponding lectures. Students should read the necessary chapter material prior to attending the synchronous lecture sessions.

Pre-Class Reading Quiz:

Each week will contain 1, 2 or more "Pre-Class Reading Quiz" (RQ), to allow the student to check on their understanding of the material prior to starting the work in the chapter which means students need to scan-read the chapter prior to coming to class. **Please note that the RQ covers only the sections that will be covered in class as indicated in section 14**. There will be 12 RQs in total. Doing these RQs will count as a participation grade in the final course grade. These quizzes are to ensure that you have read the designated chapter(s) prior to taking the class. There will only be one attempt at these RQs and all RQs less the (2) lowest quiz will count toward the final grade (time allocated will be 45 to 60 minutes). The questions will be conceptually based in general and sometimes calculations will be needed to complete an individual question. The first RQ is particularly more difficult in order to test if you are ready for the course.

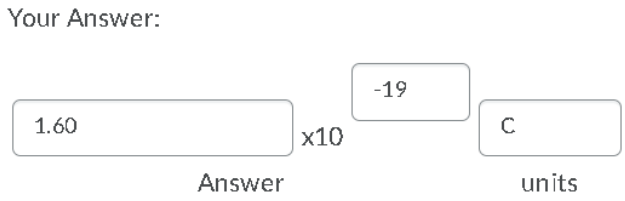
HomeWorks:

In addition to the RQs, there are 12 HomeWorks (HWs) which are assignment 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. You will have 2 attempts per each HW. All 12 HWs less the (2) lowest HWs will

count toward the final grade of the HW. See the timetable 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.

Numerical Answers:

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



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, 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	$2.50x10^{-5}$
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)x10^2 , or (2.50x10^0)E2, or (2.50x10^0)x10^2	$2.50x10^2$

Some time you may see such mixed display, again, note that 10^0 =1.0.	

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.

6 Final Exam, Marking Scheme and Passing Condition

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; that is to say: students must attend the final exam.

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

Marking Scheme

HWs (Assignment Quizzes), (**Best 10 out of 12**)	25%
Labs (5)	35%
Pre-Class Chapter Reading Quizzes, (**Best 10 out of 12**)	10%
Final Exam	30%
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

In order to pass the course, students must meet the following conditions:

An overall mark must be ***greater than 50%***, AND

Must achieve ***40% or above*** on *BOTH* the Theory (≥ 26/65 marks) *AND* the Lab (≥ 14/35 marks) components of the course. Achieving more the 40% but less than 50% in either Lab or Theory while achieving 50% or more overall will translate into a grade of D-.

(**NOTE:** Theory includes Assignments, Reading Quizzes, and the Final Exam)

Final Exam must be attempted to pass the course, even if you manage to achieve 50% overall mark without the final exam

7 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/).

Statement on Chat GPT/Generative AI usage (See the *Sample Syllabus Statements for AI use in Courses* document for examples)

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

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 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.

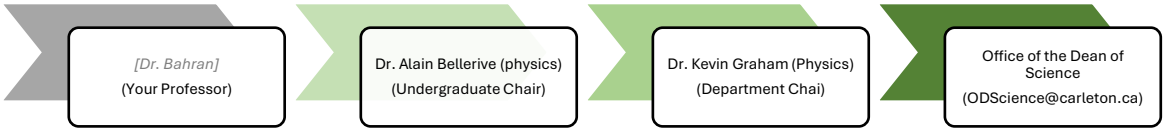
Student Rights & Responsibilities

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.



8 Outline Changes

The professor may occasionally make changes or corrections to the content of this outline. All changes or corrections will be announced on the class web page.

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9 Lecture schedule:

Lecture # and date	Text Section	Topic	Deadline
1 July 2		Course Introduction and Math Concepts	**RQ1 Ch 16** is due **Wed. July 2**
	16.1	Electric Charge	
	16.2	Conductors and Insulators	
	16.3	Coulomb's Law	
	16.3	Coulomb's Law (continued)	
	16.4	Electric Field	
	16.5	Motion of Charge in **E** field	
2 July 7	16.6	Conductors in electrostatic equilibrium	**RQ2 Ch 17** is due **Mon. July 7** **HW1, Intro & Ch 16** is due **Mon. July 7**
	16.7	Gauss' Law for electric fields	
	17.1	Potential Energy	
	17.2	Potential	
	17.3	Field and Potential	
	17.4	Conservation of Energy; moving charges	
3 July 9	17.4	Conservation of Energy; moving charges (cont.)	**RQ3 Ch 18** due **Wed. July 9** **HW2, Ch 16** is due **Wed. July 9**
	17.5	Capacitors	
	17.6	Dielectrics	
	17.7	Energy in a Capacitor	
	18.1	Current	
	18.2	EMF & Circuits	
	18.4	Resistance & Resistivity	
	18.5	Kirchhoff's Rules	
4 July 14	18.6	Series and Parallel Circuits	**RQ4 Ch 19** is due **Mon. July 14** **HW3, Ch 17** is due **Mon. July 14**
	18.8	Power and Energy in Circuits	
	18.10	RC Circuits	
	18.11	Electrical Safety	
	19.1	Magnetic Fields	
	19.2	Magnetic Force on a point charge	
	19.3	Charged particle moving perp to a uniform **B** field	
5 July 16	19.4	Charged particle in a uniform magnetic field	**RQ5 Chs 20, 21** is due **Wed. July 16** **HW4, Ch 18** is due **Fri. Wed. July 16**
	19.5	Charged particle in crossed **E** and **B** fields	
	19.8	Magnetic field due to an electric current	
	20.3	Faraday's Law	
	20.4	Lenz's Law	
	20.4	Lenz's Law (continued)	
	20.9	Inductance	
	21.1	AC currents and voltages, with resistors	

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6 July 21	21.3	Capacitors in AC	**RQ6 Ch 22** is due **Mon. July 21** **HW5, Ch 19** is due **Mon. July 21**
	21.4	Inductors in AC	
	22.3	EM spectrum	
	22.4	Speed of EM waves	
	22.5	Travelling EM waves in a vacuum	
	22.6	Intensity (part of section)	
	22.7	Polarization	
7 July 23	23.1	Wavefronts and Rays	**RQ7 Ch 23** is due **Wed. July 23** **HW6, Chs 20, 21** is due **Wed. July 23**
	23.2	Reflection	
	23.3	Refraction	
	23.4	Total Internal Reflection (TIR)	
	23.9	Thin lenses	
8 July 28	23.9	Thin lenses (cont.)	**RQ8 Chs 24, 25** is due **Mon. July 28** **HW7, Chs 21, 22** is due **Mon. July 28**
	24.1	Lenses in combination	
	24.3	The Human Eye	
	24.4	Simple magnifier	
	24.5	Compound microscopes (qualitative only)	
	25.1	Constructive and destructive interference	
	25.4	Young's Double Slit	
	25.5	Gratings	
	25.8	Resolution of optical instruments	
9 July 30	27.2	Blackbody radiation	**RQ9 Ch 27** is due **Wed. July 30** **HW8, Ch 23** is due **Wed. July 30**
	27.3	Photoelectric effect	
	27.6	Spectroscopy	
	27.7	Bohr model: atomic electron energy levels, transitions	
	27.7	Atomic Structure	
	28.1	Wave particle duality	
10 Aug. 6	28.2	Matter waves (de Broglie)	**RQ10 Ch 28** is due **Wed. Aug. 6** **HW9, Chs 24-25** is due **Wed. Aug. 6**
	28.3	Electron microscope	
	28.4	Uncertainty Principle	
	28.5	Wave functions: confined particle	
	28.6	Hydrogen Atom	
	28.7	Exclusion Principle	
	28.9	Lasers	
	28.10	Tunneling	
11 Aug. 11	29.1	Nuclear structure	**RQ 11 Ch 29** is due **Mon. Aug 11** **HW10, Chs 25-27** is due **Mon. Aug. 11**
	29.2	Binding Energy	
	29.3	Radioactivity	
	29.4	Decay rates and half life	
	29.5	Biological effects of ionizing radiation	
	29.7	Nuclear Fission	
	29.8	Nuclear Fusion	
	30.1	Fundamental Particles	
12 Aug. 13	30.2	Fundamental Interactions	**RQ 12 Ch 30** is due **Wed. Aug. 13** **HW11, Chs 27-28** is due **Wed. Aug. 13**
	30.3	Beyond the Standard Model	
	30.4	Particle Accelerators	
		Review	
Aug 14 Follows Monday schedule		Review	
			HW12 Chs 28-29 is due **Mon. Aug. 18**

10 Laboratories

Labs start on **July 8, 2025**.

All the experiments will be held **in person** in **HP 4160**.

Information about the labs can be found on the LAB Brightspace page:
PHYS1008A1 University Physics II (LAB) Summer 2025

It is imperative that all students attend the first lab. All changes (exemptions, etc.) must be arranged with the Lab Coordinator, Ms. Tamara Rozina, as soon as possible. If you have a documented reason for missing a laboratory session, you must contact Ms. Rozina (tamara.rozina@carleton.ca) **immediately**. A make-up session may be arranged at the end of term in these cases. If you do not have documentation, you will not be permitted to take a makeup session, and you will receive a mark of zero for that experiment.

Students who are repeating the course might be exempt from the Lab. You are not automatically given a lab exemption – you must apply for it no later than **July 11, 2025**. Lab exemptions will be considered on a case-by-case basis at the discretion of the Lab Coordinator.

The grade for every lab will be based on a **report**. All reports count toward your total lab grade for the course. **No grade will be dropped.**

All reports must be submitted by the appointed time: **1 week** after the start of the lab session for **Labs 1- 4** and **24 hours** for **Lab 5.** The penalty for a late lab report is **20% up to the End Date** specified on Brightspace for every report submission. It is the student's responsibility to check when the End Date is for each report. **No reports will be accepted for grading past their End Date.**

Lab Schedule

Lab #	Title	Due	Weight (%)	Date
1	DC Circuits	1 week	10	July 8, 2025
2	Oscilloscope	1 week	15	July 15, 2025
3	Diffraction Grating	1 week	25	July 22, 2025
4	Ray Optics	1 week	25	July 29, 2025
5	Photoelectric Effect	24 hours	25	August 5, 2025