

Elementary University Physics II

PHYS 1008 A /B

Winter 2023 Course Outline

1. Course calendar description and pre-requisites

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](#).

Pre-requisites: [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 2022 Fall term, you must leave the course.*

2. Instructors contact information

Instructor office hours will be posted on BrightSpace

Mustafa Bahran	PHYS 1008A lecturer	Mustafa.Bahran@carleton.ca Office: Herzberg 3412 Phone: 613-520-2600 EXT. 5094 mustafabahran@cunet.carleton.ca
Wafia Bensalem	PHYS 1008B lecturer	WafiaBensalem@cunet.carleton.ca
Tamara Rozina	Lab Supervisor	tamara.rozina@carleton.ca

In accordance with university policy, all communication with instructors must be via your Carleton email account. To get your Carleton Email you will need to activate your

MyCarletonOne account through Carleton Central. Once you have activated your MyCarletonOne account, log into the MyCarleton Portal.

To help resolve issues related to any missing term work, students must save all of their email correspondence with instructors until the course grades are finalized.

3. Course 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.

4. Course website

The course outline and other course information will be posted on BrightSpace. We reserve the right to amend the course outline on BrightSpace and will inform you if that version changes. In the event of any discrepancy between this document, and the version currently posted on the website, then the website version on BrightSpace will be taken as the definitive version.

If you are unable to access BrightSpace or need help with your computing account, please contact the ITS Service Desk at 613-520-3700 or email: its.service.desk@carleton.ca

In addition, there is a dedicated Brightspace website for the labs and tutorials. Please note that for this part of the course, students have been split in laboratory (same as tutorial) sections. Please, carefully identify to which group you have been assigned and follow the guidelines included below in the lab and tutorial sections.

5. Course modality

This course is in person course where there are a series of in person meetings (lectures, tutorials 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 one 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.

6. Lecture schedule

PHYS 1008A	Wednesdays and Fridays 11:35 am – 12:55 pm, room RB2200
PHYS 1008B	Tuesdays and Thursdays 4:05 pm – 5:25 pm, Online

* All timeslots are in the Eastern Time zone

7. Labs

Labs start the week of **January 16, 2023**.

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

Information about the labs can be found on the LAB Brightspace page:
Merge PHYS1008 L1-L7 University Physics II (LAB) Winter 2023.

It is imperative that all students attend the first lab. You may attend only the section that you are registered in. 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 **January 20, 2023**. Lab exemptions will be considered on a case-by-case basis at the discretion of the Lab Supervisor.

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. The penalty for a late lab report is **20% up to the End Date** specified on

Brightspace for every lab section 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	Week of	Weight (%)	Report Deadline
1	DC Circuits	January 16, 2023	10	1 week
2	Oscilloscope	January 30, 2023	15	1 week
3	Diffraction Grating	February 13, 2023	25	1 week
4	Ray Optics	March 6, 2023	25	1 week
5	Photoelectric Effect	March 20, 2023	25	1 week

8. Tutorials

There will be an **in person** tutorial on each alternating week with the labs (for details, please see lab and tutorial schedule below).

The structure of the tutorial is as follows:

A set of tutorial problems will be posted on the lab/tutorial Brightspace website at least a week before the tutorial session. Students should attempt to solve all these problems in order to prepare for the tutorial. At the start of the tutorial session students will individually complete a multiple-choice quiz consisting of 4 questions. This is open book and lasts for 15 minutes. Then the TAs will demonstrate solving example problems and answering questions about the tutorial problem set. During the last hour of the tutorial will be a closed-book test consisting of two long-answer problems. ***Closed book means that you can use the formula sheet and a scientific calculator. No other aids are permitted.***

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 four highest test grades will be used to determine the final Tutorial Test score.

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

Students must normally attend the tutorial only in the lab section to which they belong. To be able to attend a different section, students must obtain permission from the lab

coordinator Tamara Rozina (tamara.rozina@carleton.ca). Such permission will usually be granted only for emergencies or medical reasons. So, if you cannot attend your own lab section one week due to e.g., medical reasons, let us know AS SOON AS POSSIBLE so that you can be rescheduled to a different section.

Lab and Tutorial Schedule

Week of	Lab/Tutorial
January 9, 2023	NO Labs/Tutorials
January 16, 2023	DC Circuits
January 23, 2023	Tutorial 1
January 30, 2023	Oscilloscope
February 6, 2023	Tutorial 2
February 13, 2023	Diffraction Grating
February 20, 2023	Winter Break
February 27, 2023	Tutorial 3
March 6, 2023	Ray Optics
March 13, 2023	Tutorial 4
March 20, 2023	Photoelectric Effect
March 27, 2023	Tutorial 5
April 3, 2023	Review

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.

9. 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 1.60×10^{-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, 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 Some time you may see such mixed display, again, note that 10 ⁰ =1.0.	2.50x10 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.

10. Final Exam

There is no mid-term examination.

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.

11. Marking Scheme

HWs (Assignment Quizzes) (Best 10 out of 12)	20%
Tutorials (best 4 out of 5)	15%
Labs (5)	35%
Pre-Class Chapter Reading Quizzes (Best 10 out of 12)	10%
Final Exam	20%
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.

12. 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 ($\geq 26/65$ marks) **AND**

the Lab ($\geq 14/35$ 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, Tutorial Tests, 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.



14. Lecture schedule:

Lecture # and date	Text Section	Topic	Deadline
1 Jan 11-13		Course Introduction and Math Concepts	RQ1 Ch 16 is due Wed. Jan. 11
	16.1	Electric Charge	
	16.2	Conductors and Insulators	
	16.3	Coulomb's Law	
	16.3	Coulomb's Law (continued)	
	16.4	Electric Field	
2 Jan 18-20	16.5	Motion of Charge in E field	RQ2 Ch 17 is due Wed. Jan 18 HW1, Intro & Ch 16 is due Wed. Jan 18
	16.6	Conductors in electrostatic equilibrium	
	16.7	Gauss' Law for electric fields	
	17.1	Potential Energy	
	17.2	Potential	
3 Jan 25-27	17.3	Field and Potential	RQ3 Ch 18 due Wed. Jan 25 HW2, Ch 16 is due Wed. Jan 25
	17.4	Conservation of Energy; moving charges	
	17.4	Conservation of Energy; moving charges (cont.)	
	17.5	Capacitors	
	17.6	Dielectrics	
	17.7	Energy in a Capacitor	
	18.1	Current	
4 Feb 1-3	18.2	EMF & Circuits	RQ4 Ch 19 is due Wed. Feb. 1 HW3, Ch 17 is due Wed. Feb. 1
	18.4	Resistance & Resistivity	
	18.5	Kirchhoff's Rules	
	18.6	Series and Parallel Circuits	
	18.8	Power and Energy in Circuits	
	18.10	RC Circuits	
5 Feb 8-9	18.11	Electrical Safety	RQ5 Chs 20, 21 is due Wed. Feb. 8 HW4, Ch 18 is due Fri. Wed. 8
	19.1	Magnetic Fields	
	19.2	Magnetic Force on a point charge	
	19.3	Charged particle moving perp to a uniform B field	
	19.4	Charged particle in a uniform magnetic field	
	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		
	Lenz's Law (continued)		
	20.9		Inductance
21.1	AC currents and voltages, with resistors		



6 Feb 15-17 Feb 20-24 Winter break	21.3	Capacitors in AC	RQ6 Ch 22 is due Wed. Feb. 15 HW5, Ch 19 is due Wed. Feb. 15
	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 March 1-3	23.1	Wavefronts and Rays	RQ7 Ch 23 is due Wed. Mar. 1 HW6, Chs 20, 21 is due Wed. Mar. 1
	23.2	Reflection	
	23.3	Refraction	
	23.4	Total Internal Reflection (TIR)	
	23.9	Thin lenses	
8 March 8-10	23.9	Thin lenses (cont.)	RQ8 Chs 24, 25 is due Wed. Mar. 8 HW7, Chs 21, 22 is due Wed. Mar. 8
	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 March 15-17	27.2	Blackbody radiation	RQ9 Ch 27 is due Wed. Mar. 15 HW8, Ch 23 is due Wed. Mar. 15
	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 March 22-24	28.2	Matter waves (de Broglie)	RQ10 Ch 28 is due Wed. Mar. 22 HW9, Chs 24-25 is due Wed. Mar. 22
	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 March 29-31	29.1	Nuclear structure	RQ 11 Ch 29 is due Wed. Mar.29 HW10, Chs 25-27 is due Wed. Mar. 29
	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 April 5-7	30.2	Fundamental Interactions	RQ 12 Ch 30 is due Wed. Apr. 5 HW11, Chs 27-28 is due Wed. Apr. 5
	30.3	Beyond the Standard Model	
	30.4	Particle Accelerators	
		Review	
		Review	



Last day of Winter semester			HW12 Chs 28-29 is due Wed. Apr. 12
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15. University Policies

Grade Definition:

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

A+ = 90-100 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 (See above)

Academic Regulations, Accommodations, Plagiarism, Etc.:

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

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Academic Accommodations for Students with Disabilities:

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation.

If you are already registered with the PMC, contact your PMC coordinator to send your *Letter of Accommodation* at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*).

<https://carleton.ca/pmc/>

*The deadlines for contacting the Paul Menton Centre regarding accommodation for final exams for the Winter exam period is **March 16, 2022**.

For Religious Obligations:

Students requesting academic accommodations on the basis of religious obligation should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event.

Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student.

Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance.

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

For Pregnancy:

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Plagiarism:

Plagiarism is the passing off someone else's work as your own and is a serious academic offence. For the details of what constitutes plagiarism, the potential penalties and the procedures refer to the section on Instructional Offences in the Undergraduate Calendar.

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?

All allegations of plagiarism are reported to the Dean of Faculty of Science. Documentation is prepared by instructors and/or departmental chairs.

The Dean writes to the student and the University Ombudsperson about the alleged plagiarism.

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 (see

<https://carleton.ca/registrar/academic-integrity/integrity/>). The Policy is strictly enforced and is binding on all students.

Plagiarism and cheating – presenting another’s ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the undergraduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

Assistance for Students:

Academic and Career Development Services: <https://carleton.ca/career>

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/>

Important Information:

- Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments, and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).
- Students must always retain a hard copy of all work that is submitted.
- 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.
- Carleton University is committed to protecting the privacy of those who study or work here (currently and formerly). To that end, Carleton’s Privacy Office seeks to encourage the implementation of the privacy provisions of Ontario’s Freedom of Information and Protection of Privacy Act (FIPPA) within the university.

Important Dates for 2021/2022 academic year:

<https://carleton.ca/registrar/registration/dates/academic-dates/>