PHYS 2903
PHYSICS BEHIND EVERYDAY LIFE

An on-line course based on the

Open Physics Education Module

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: Razieh Enjilela

How to address me: Razieh

Gender Pronouns: (she/her/hers)

Email: razieh.enjilela@Carleton.ca

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.

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

Student Hours: Please see D2L

Office Hours: Office hours will take place using the Zoom link, which is built into Brightspace

Class Location: PHYS 2903 is offered as an Asynchronous online Course.

Class Times: NA

Prerequisites: -

Preclusions: Precludes additional credit for PHYS2203

Department/Unit: Physics

Course TAs: Amir Jabbarpour

Note: Faculty of Science B.Sc. students may only take this course as a free elective, while students in Computer Science (BCS) may only take as a breadth elective.

OVERVIEW

This course is intended for students with little or no background in science. It introduces physics through a set of modules that are closely connected to our everyday life and future.
This course is only available online via Brightspace.

EQUITY, DIVERSITY AND INCLUSION STATEMENT

We are committed to creating a community that is as inclusive and diverse as the people that our professions serve. All students in the PHYS1902 class need to have a fundamental understanding of antiracism, decolonization, Indigenization, and EDI. EDI plays a significant role in what we do in our class and in our day-to-day lives. An environment where we understand and respect EDI is essential for each individual to fulfill their potential.

COURSE LEVEL LEARNING OUTCOMES

By the end of the course, students should be able to:

1. Explain physics-related phenomena using basic physics principles and terminology
2. Perform basic calculations/estimations to solve simple physics-related problems
3. Make correct judgments/decisions on physics-related issues in their daily life based on basic physics principles

CONTENT

The following thematic modules will be covered in this course. Each module will help you answer a series of questions listed below.

1. Sound and Music

In many ways, music might be viewed as one of the most human of inventions. What is the nature of sound, and what are the relationships between pitch, loudness, musical scales, and the fundamental properties of sounds? How are sounds generated from different types of instruments that create a musical performance?

2. Light and Colour

What is light exactly? What are radiation and electromagnetic waves? How do eyes and lenses work? How do we see colours? How do we communicate with EM waves?

3. Cell Phone

It has become commonplace, almost anywhere one travels in the world, to see people using cell phones for conversations, texting, accessing the internet, listening to music, and taking photos. What are the physics principles behind the manufacture and operation of cell phones?

4. The Solar System and Beyond

The nature of the universe beyond our planet has always fascinated humans. How do we use rockets to place satellites in orbit and send missions out into the solar system? What is the structure of our solar system…of our galaxy…of the universe?

5. Medical Physics

Medical physics is about using physical approaches to diagnose and treat diseases. What is an X-ray? How does it "see" through our body? What is an MRI? Why do doctors always order an MRI instead of an X-ray if you have joint pain? How does an ultrasound scan work?

6. Recent Advances

Some of the most interesting questions in science are being tackled by physicists around the world. What are dark matter and dark energy? What are gravitational waves? Why is the discovery of the Higgs particle important, and what does it tell us? What are neutrinos, and how do we observe them?

MODULE COMPLETION DATES AND PHYSICS TOPICS COVERED

Thematic Modules	**Expected completion dates of lecture videos**	**Physics topics covered**
1. Sound and Music	July. 2	Amplitude, velocity, wavelength, and frequency of sound waves, resonance, interference, harmonics, and standing waves
2. Light and Colour	July. 9	Radiation as a wave, electromagnetic wave, optical lenses and their application, human eyes, wavelength and colour, color perceptions, radio waves, and communication.
3. Cell Phone	July. 16	Semiconductors, diodes and transistors, basic logic gates and CPU, fabrication of integrated circuits, acceleration and accelerometer, rotation and gyroscope, light polarization, and LCD screen.
4. Solar System and Beyond	July. 23	Gravity, momentum, energy, circular motion, orbits, time dilation
5. Medical Physics	July 30	X-ray properties and production, X-ray diffraction and imaging, Ionizing radiation dose, radiation therapy, linear accelerators, accurate delivery of radiation, nuclear magnetic resonance, magnetic resonance imaging principle and safety, ultrasound

		and its production, reflection of US, B-mode US imaging.
6. Recent Advances	Aug 6	Neutrinos, Higgs particles, gravitational waves, dark energy, and dark matter

Please note that all the lecture videos are interactive with questions to be answered during the lecture. **You must achieve 75% or higher on the interactive video** before you can move on to the next lecture. The **skipping forward** on the video navigation bar **is disabled** in the first watch. Once you have completed the lecture, you can rewatch the videos without any limits.

EVALUATION

1. (50%) Module quizzes

At the end of each thematic module, there will be an online quiz of 15 multi-choice questions. **Quizzes will always open on Wednesdays and must be completed before Wednesday's midnight (11:59 pm).** Each quiz accounts for 8% of the final mark.

Thematic Module	**Module quiz due date**
1. Sound and Music	July 8, 11:59 pm
2. Light and Colour	July. 15, 11:59 pm
3. Cell Phone	July. 22, 11:59 pm
4. Solar System and Beyond	July. 29, 11:59 pm
5. Medical Physics	Aug. 5, 11:59 pm
6. Recent Advances	Aug. 12, 11:59 pm

2. (32%) Two writing projects

Each thematic module has suggested essay topics and/or a lab you can perform using materials or devices that are available in your home.

You are required to write one essay and one lab report on two of the five topics of your choice. The lab must be chosen from the first two thematic Modules (Sound and Music or Light and Colour). The essay must be chosen from the four modules (Cell Phone, Medical Physics, Solar System and Beyond, or Recent Advances).

The due dates are listed in this table:

	Thematic Modules	**Module essay or lab report due dates**
Lab Must pick one of the two topics	1. Sound and Music	The Lab report is **due on July 18,** 11:59 pm
	2. Light and Colour	
Essay	3. Cell Phone	

Must pick one of the four topics	4. Solar System and Beyond	The Essay is **due on Aug 3**, 11:59 pm
	5. Medical Physics	
	6. Recent Advances	

For the lab report, a write-up template will be provided. Please include all of your calculations. The essay has to be **800-1000 words**. Both the essay and lab reports must be written using word processing software. **Handwritten essays will NOT be accepted and will be given a zero mark.** Essays or lab reports should be uploaded via Brightspace.

3. (20%) Final online quiz

During the final exam period, there will be an online quiz of multiple-choice questions that covers all the content of the course.

Late and Missed Work Policies

Late Work

Students are expected to complete all assignments and class activities within the time frames and by the dates indicated in this outline. Exemption or deferral of assignments and activities is only permitted for a medical or personal emergency or due to religious observance (request must be received within the first two weeks of the course). I (course instructor) must be notified by e-mail prior to the due date or as soon as possible after the date, and the appropriate documentation must be submitted. **Late submissions will be graded with 10% per day penalty up to a maximum of 50%.**

Missed Work

Short-term (5 days or less): If you missed work, please fill out the form below and contact me. **Please note that you can only use this form once during the semester.**

Academic Consideration for Coursework Form - Registrar's Office

Long-term (> 5 days): Kindly reach out to me regarding any long-term missed work. Please refer to the link provided below for additional information.

Long Term Academic Consideration Form - Registrar

COPYING, PLAGIARISM AND OTHER FORMS OF CHEATING

The attention of all students is drawn to section E.12 of the Academic Regulations of the University: https://carleton.ca/registrar/academic-integrity/

Such offences will normally result in a mark of zero on the cheated work. In addition, a report will be sent to the Dean of the students' Faculty for possible further disciplinary action. **Learning Material(s) and Other Course/Lab-Related Resources.** Ancillary fees associated with this course, e.g., text, learning material, lab manuals, fieldwork, online resources or links required for

the course, along with their associated cost. Estimated costs can be acquired based on current bookstore offerings, Amazon, etc.

Learning Material	Options for Purchasing *(e.g. Bookstore, Used, etc.)*	Approximate Cost
Physics Beyond the Comfort Zone by Peter Watson.	This textbook has a number of relevant sections relating to material for this course, but does not cover some areas. The lectures and supplementary materials are intended to cover the course with this textbook as a useful but optional additional aid. Please see the below link: https://itunes.apple.com/us/book/physics-beyond-comfort-zone/id902018641?mt=13&uo=4%22%20target=%22itunes_store%22%3EPhysics%20Beyond%20the%20Comfort%20Zone%20-%20Watson,%20Peter%3C/a%3E	$9.99

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 Course Outline - Current Students:Current Students). **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 continues 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 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

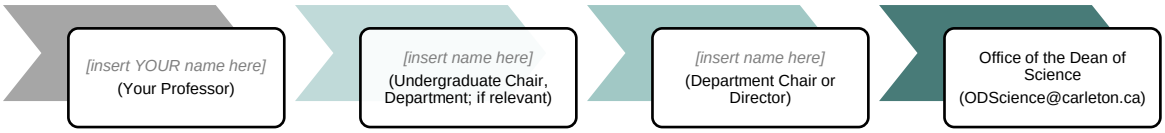
Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and member 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 Dates

SUMMER 2026

July 1	Statutory holiday. University Closed.
July 2	Late summer classes begin, and full summer classes resume.
July 8	Last day for registration and course changes in early summer courses.
July 17-219	Early summer term deferred examinations will be written.
July 19	Last day for graduate students to submit their supervisor-approved thesis, in examinable form, to the department.
August 1	Last day for academic withdrawal from full and late summer courses.
August 1	Last day to request formal exam accommodations for April examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
August 3	Statutory Holiday. The university closed.
August 7	Last day for summative tests or examinations - or for formative and/or practical tests or examinations totaling more than 15% of the final grade - before the official examination period (see Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
August 14	Last day of late summer term classes.
	Last day for take-home examinations to be assigned, with the exception of those conforming to the Examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.

	Last day for academic withdrawal from early summer term courses.
	Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for fall/winter and winter term courses.
August 15-16	No classes or examinations take place.
August 17-23	Final Examinations. Exams are normally held on all seven days of the week.
September 18–20	Late summer and full summer term deferred final examinations to be