

PHYS215: Introductory Quantum Mechanics

January - April 2025

Territory Acknowledgement: We acknowledge and respect the $l\acute{a}k^{w\acute{o}}\eta\eta\acute{a}n$ peoples on whose traditional territory the university stands, and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

Instructor: Dr. Heather Russell

Email: hrussell@uvic.ca

Office: see brightspace

Course webpage: We will use brightspace

Office Hours: Fridays, 13:30 - 14:30 in (see brightspace)

Lectures: Tuesdays, Wednesdays, and Fridays at 10:30 – 11:20, in person, in **(see brightspace)**.

First lecture: Tuesday, 7 January 2025 @ 10:30

Communication: If you send me an email, please start the subject with "PHYS215".

Appointments outside office hours: I will be available Tuesday afternoons for pre-booked appointments if you would like to meet outside office hours. Please book a time slot here: https://calendly.com/hrussell_p215. These meetings can be in person or over zoom.

Prerequisites: PHYS110 and PHYS111 **or** PHYS120 and PHYS130

Pre- or Co-requisites: MATH204

Textbook: *Modern Physics for Scientists and Engineers*, Thornton & Rex. Any edition is OK.

Additional resources that might be helpful:

- *University Physics with Modern Physics*, Young & Freedman (this one is great if you want a different but also very good explanation of our material)
- *University Physics, Vol 3* - OpenStax (at a lower level, but free!)
<https://openstax.org/details/books/university-physics-volume-3>
- *Modern Physics*, Felder & Felder (this will likely become the recommended text in the future - way more modern than Thornton & Rex, and I'll be evaluating as we go through the course this year. Covers all the course material.)
- *Quantum Mechanics*, Alastair I. M. Rae

We will work our way through the following topics:

- Special relativity and relativistic kinematics
- EM waves, x-rays, and cathode rays
- Light as a particle
- Atomic structure
- The Bohr model
- Wave properties of matter and wavefunctions
- The Schrodinger equation

- Barriers and tunneling
- The Hydrogen atom

Assessment:

Assignments	15%
Labs	20%
Project	15%
Midterm	15%
Final Exam	35%

Assignment of final grades will follow the [official grading system](#). Note that if the application of this scheme would result in grades that are judged by the instructor to be inconsistent with the University's grading descriptions, then the instructor will assign percentages consistent with them.

In addition to the above assessment criteria, the following apply:

- If you do not write the final exam you will be assigned an "N"
- If you have not submitted all lab reports you will be assigned an "N"
- If you do not complete the project you will be assigned an "N"
- If you do not pass the lab component you will be assigned an "F" and, as per regulations, not permitted to write the final exam
- If you obtain less than 50% on both of the exams (the midterm exam and final exam), you will be assigned an "F"
- A maximum course grade of 49% will be assigned to "N" and "F" grades

Assignments:

There will be approximately seven assignments spaced throughout the semester. You will have approximately one week to complete them after all material has been covered in class. Assignments will generally be due Tuesdays or Fridays at 18:00, though if we fall behind schedule, the assignments will be delayed accordingly.

Late assignments will generally not be accepted without express permission so as to not create too much back and forth for the TA.

Only the best 6 / 7 assignments will count towards your final grade. **Please only contact me about missed assignments if circumstances mean you will miss more than one assignment.**

Working together and discussing assignments is strongly encouraged. However, all work must still be individual. Do not be tempted to copy solutions!

On your assignments, all answers must be presented with full explanations. We will discuss what this looks like in class, and I will remind you on each assignment.

Project:

You will be required to produce an 11"x14" sized informational poster on a topic related to the course, targeted at the level of high school physics students. Details will follow

later in the semester. The project will be due in late March.

Suspected use of generative AI or an LLM (chatGPT, gemini, bard, etc.) on the project will result in a 1-1 interview on the project to ensure that your work is your own.

Midterm Exam:

There will be one midterm exam held in class during class time: **Tuesday, 25 February 2025.**

*Note that the last day for withdrawing from first term courses without penalty of failure is Friday, 28 February 2025. You **will** have your midterm results before the drop date.*

Final Exam:

There will a cumulative final exam during the April exam period. The date is centrally scheduled, and normally finalized in late February. You must write the final exam to obtain credit for this course, and you must exhibit adequate performance in the final exam to get credit for this course.

Note on Exams For the Midterm and Final exams:

You will be allowed to bring one page of notes, handwritten on both sides, and a calculator. The only acceptable calculator is the Sharp EL-510R, as per department policy.

Labs:

All lab sections are held in the Elliott Lab wing room 139. Labs start the week of 6 January. You must attend this first lab. Obtain your lab manual and lab notebook at the bookstore. If you cannot attend the section you are registered in, please attend another lab section during the week of 6 January.

If you cannot attend, please contact your lab instructor. **To obtain credit for the course, you must complete all labs and receive an overall passing grade in the lab component.** You will be given scheduling information at the first lab.

The due date for any experiment report is normally in the lab period one week after the experiment has been completed.

Section B01, Monday 14:30 - 17:20

Section B02, Tuesday 14:30 - 17:20

Section B03, Thursday 14:30 - 17:20

Course Policies and Information for Students

1. Student Code of Conduct: You are expected to behave in a manner compatible with the student code of conduct: <https://www.uvic.ca/services/advising/assets/docs/tri-fac-student-code-of-conduct.pdf>
2. Inclusive Learning Environment: The best learning environment is one in which all members feel respected while being productively challenged. At UVic, we are dedicated to fostering an inclusive atmosphere, in which all participants can contribute, explore, and challenge their own ideas as well as those of others. Every participant has an active responsibility to foster a climate of intellectual stimulation,

openness, and respect for diverse perspectives, questions, personal backgrounds, abilities, and experiences, and instructors bear the primary responsibility for its maintenance. A range of resources is available if you perceive an issue related to our learning environment. If possible, I encourage you to come to me with any suggestions or concerns you have regarding a particular situation or instructional space. Alternatively, you may take concerns to another trusted advisor or administrator (such as an academic advisor, mentor, department chair, or dean).

3. Academic Integrity: Ethical behaviour is an essential component of learning and scholarship. You are expected to understand, and adhere to UVic's [academic integrity policy](#). If you have any doubts about what constitutes a violation of the Academic Integrity policy, or any other issue related to academic integrity, please ask your instructor. Some examples of appropriate ethical scholarship include:
 - a. Always citing your sources when you present ideas and/or language that you have not developed yourself, including material from class lectures and discussions.
 - b. Not using online or unapproved resources for assignment answers (no asking ChatGPT to do your homework for you!)
 - c. Being civil, respectful, and supportive of an inclusive learning environment for all students.
 - d. Bringing issues of ethical or inclusivity concerns, for yourself or another student, to me, the department chair, or a trusted advisor.
4. Illness: If you are feeling sick, please do not come to class. Lectures will be recorded. If you must come to class while sick, we would all appreciate it if you would wear a well-fitting mask.
5. Accessible Learning: The University of Victoria is committed to creating a learning experience that is as accessible as possible. If you anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me. If you have a disability or chronic health condition, or think you may have a disability, you may also want to meet with an advisor at the [Centre for Accessible Learning \(CAL\)](#).
6. Mental Health: A note to remind you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. The following resources are available to you:
 - a. The UVic Student Wellness Centre provides cost-free and confidential mental health services to help you manage personal challenges that impact your emotional or academic well-being: <https://www.uvic.ca/student-wellness/>
 - b. Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students: <https://www.uvic.ca/services/counselling/>

- c. University Health Services provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives:
<http://www.uvic.ca/services/health/>