PHYS215: Introductory Quantum Mechanics

January - April 2026

Territory Acknowledgement: We acknowledge and respect the Lək̓ʷəŋən (Songhees and Xʷsepsəm/Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ 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:
Pre-booked: Mondays, 13:00 - 15:00 in [see brightspace] or via zoom. Please book a time slot here: https://calendly.com/hrussell_p215.
Drop-in: Fridays, 14:00 - 15:00 in [see brightspace] (tentative)

Lectures: Tuesdays, Wednesdays, and Fridays at 10:30 – 11:20, in person, in **[see brightspace]**.
First lecture: Tuesday, 6 January 2026 @ 10:30

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

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

Intended learning outcomes:

Upon completion of this course, students should be able to:

1. Motivate quantum mechanics with experimental results
2. Convince people that quantum mechanics is real and useful
3. Recognize and understand the paradigm shift in physics that was necessary to advance our understanding of the natural world
4. Accept non-intuitive quantum mechanical ideas
5. See quantum mechanics in the natural world

Assessment:

Assignments	15%
Project	25%
Midterm 1	10%
Midterm 2	10%
Final Exam	40%

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 have an excused absence for a midterm exam the weight will be moved to the final exam
- If you do not write the final exam you will be assigned an "N"
- If you do not complete the project you will be assigned an "N"
- If you obtain less than 50% on both the final exam and the average of the two midterm exams you will be assigned an "F"
- A maximum course grade of 49% will be assigned to "N" and "F" grades

Academic integrity

UVic's Policy on Academic Integrity is found in the university calendar. It is every student's responsibility to be aware of this policy, including policies on cheating, plagiarism, unauthorized use of an editor, multiple submission, and aiding others to cheat. If you have any questions or doubts, please talk to me. Additionally, the Academic Skills Centre (https://www.uvic.ca/learningandteaching/cac/) can provide assistance.

Use of AI

Please be advised that in order to successfully complete course activities, generative AI is not required nor welcomed. Students should not make any use of generative AI tools for content generation or editing including but not limited to ChatGPT, Grammarly, and Gemini.

Assignments:

There will be approximately eight 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.

Only the best 7 / 8 assignments will count towards your final grade. **Please only contact me about missed assignments if circumstances mean you will miss more than one assignment.** Late assignments will generally not be accepted without express permission.

Working together and discussing assignments is strongly encouraged. However, all work must still be individual. Do not be tempted to copy solutions from your classmates or a generative AI.

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 to generate content for the project will result in a 1-1 interview about your project to ensure that your work is your own.

Examinations:

There will be two midterm exams held during class time: **Tuesday, 10 February 2026 and Tuesday, 17 March 2026.**

Note that the last day for withdrawing from first term courses without penalty of failure is Friday, 28 February 2026. You will have the results of the first midterm before the drop date.

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.

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

Changes due to unforeseen circumstances

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances. In the event of significant changes, a revised outline will be posted/circulated.

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/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. Student Resources:
    1. POSITIVITY AND SAFETY: The University of Victoria is committed to promoting, providing, and protecting a positive and safe learning and working environment for all its members. Student Groups & Resources
    2. ACADEMIC RESOURCES:

1. The UVic Library offers many services and resources for undergraduate and graduate students: uvic.ca/students/academics/library-services
2. UVic Learn Anywhere is the primary learning resource for students and offers many learning workshops and resources to help students with academics and learning strategies: onlineacademiccommunity.uvic.ca/uviclearn/
3. The Centre for Academic Communication offers online and in-person one-on-one tutorials, workshops, and more: uvic.ca/learningandteaching/cac

7. 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:

    1. The UVic Student Wellness Centre provides cost-free and confidential mental health serivces to help you manage personal challenges that impact your emotional or academic well-being: https://www.uvic.ca/student-wellness/

    2. 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/student-wellness/wellness-resources/mental-health/index.php

    3. University Health Services provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives: https://www.uvic.ca/student-wellness/

8. Advising: For academic advising-related questions, students in the Department of Physics & Astronomy are also encouraged to meet with the Undergraduate Advisors (phast_advising@uvic.ca) as well as an academic advisor in the Academic Advising Centre early in their studies to help map out a plan to declare a major and complete university program requirements.
    1. Academic advice and support is currently available at the Academic Advising Centre by phone, email and virtual or in-person appointments: uvic.ca/services/advising
    2. The ombuds office is an independent, impartial, and confidential resource for undergraduate and graduate students and other members of the University of Victoria community. The ombudsperson helps resolve student problems or disputes fairly. uvicombudsperson.ca
9. Academic Concession: You can request an academic concession if your course requirements are affected by unexpected and unavoidable circumstances, or conflicting responsibilities. Concession requests can be for an in-course extension, deferral, withdrawal under extenuating circumstances, or an aegrotat. Please speak to an advisor at the Academic Advising Centre if you have questions on how requesting a concession will affect your academic program.
   Further details and forms can be found here: uvic.ca/students/academics/academic-concessions-accommodations
10. Equity and Human Rights: EQHR is a resource for students, staff, and faculty who have experienced sexualized violence, discrimination, and/or harassment and are looking for informal and/or formal resolution options as well as advice, coaching,

and/or education. They are available for confidential consultations so that you can ask questions and learn your options.
    1. EQHR – By email at eqhr01@uvic.ca or in-person (Sedgewick C115). uvic.ca/equity
    2. Sexualized Violence Resource Office – If you have been directly or indirectly impacted by sexualized violence, reach out to the SVRO for information, advice, and resolution options (restorative and disciplinary) as well as support options and referrals. The SVRO is both survivor-centred and trauma-informed in their approach. You can reach us by phone at 250-721-8021 or by email at eqhr01@uvic.ca to book either an in-person (Sedgewick C119) or online appointment. uvic.ca/sexualizedviolence
11. Resources for International Students:
    1. International Centre for Students - The primary office supporting international students on campus at the university-wide level. uvic.ca/international-experiences
    2. UVic Global Community Initiative - Provides various supportive programming, including a Mentorship Program and Conversation Partner Program. uvic.ca/international-experiences/get-involved/uvic-global-community
12. Resources for Indigenous Students:
    1. Indigenous Student Support - UVic offers holistic services to Indigenous students throughout their academic journey. uvic.ca/students/info-for/indigenous-students
    2. Elders in Residence - The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty, and administration in Indigenous ways of knowing and being. uvic.ca/iace/
13. Department of Physics and Astronomy Information
    - Department Website: uvic.ca/science/physics/index.php
    - Department General Office: physgen@uvic.ca
    - Department Undergraduate Advisor: phast_advising@uvic.ca
    - Department Graduate Advisor: pkovtun@uvic.ca
    - Department Graduate Program Assistant: physgrad@uvic.ca
14. University statements and policies
    - Academic Calendar: Information for All Students
    - Creating a respectful, inclusive, and productive learning environment
    - Accommodation of Religious Observance
    - Accommodation and Access for Students with Disabilities
    - Student Conduct
    - Non-academic Student Misconduct
    - Accessibility
    - Diversity / EDI
    - Equity Statement
    - Sexualized Violence Prevention and Response
    - Discrimination and Harassment Policy