PHYS 130: Physics II
January - April 2025

Instructor: Prof. Michel Lefebvre
Email: lefebvre@uvic.ca
Web: https://www.uvic.ca/science/physics/vispa/people/faculty/lefebvre.php
Office Hours: See Brightspace site.

Lectures: 13:30 - 14:20, Tuesdays, Wednesdays, and Fridays
First lecture: Tuesday 7 January 2025

Course Webpage: Brightspace

This course will be fully conducted in a synchronous teaching model — this means all lectures, labs, midterm exams, and the final exam will be at fixed times and in person. This is an enriched course intended for students considering a degree in Physics and Astronomy. Last day for dropping courses without penalty of failure is **Fri 28 Feb 2025**.

Abstract (from Academic Calendar)
Rotational and simple harmonic motion; wave motion and sinusoidal waves; reflection, refraction, and interference; optics; sound and the Doppler effect; de Broglie waves and the hydrogen atom; if time allows, radioactivity and principles of quantum mechanics.

Prerequisites: PHYS 120 - Physics I
Pre- or co-requisites: MATH 101 - Calculus II

Text: University Physics (OpenStax)
https://openstax.org/details/books/university-physics-volume-1
https://openstax.org/details/books/university-physics-volume-3

Assignments
Approximately 9 assignments, solutions to be uploaded on Brightspace.

Labs
Labs start the week of 6 January with an introduction. You will be given scheduling information at the first lab. There will be no labs during Reading Break (17-21 Feb).
Section B01, Mon 14:30 - 17:20: lab instructor: Adrienne Scott <adriennes@uvic.ca>
Section B02, Tue 14:30 - 17:20: lab instructor: Arash Azarakhshi <azarakhshi@uvic.ca>
Section B03, Wed 14:30 - 17:20: lab instructor: Alex Schmid <aschmid@uvic.ca>
Please do not hesitate to contact your lab instructor if you have any issues with the labs.

Midterm Exams
There will be two 50-minute midterm exams held during class time:
Midterm Exam 1: Friday 14 February
Midterm Exam 2: Friday 14 March
There are no supplemental or make-up midterms.

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Final Exam
The final exam will be 3 hour long and held 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.**

Topics covered in the course
University Physics Volume 1:
- Chapter 10: Fixed Angular Rotation
- Chapter 11: Angular Momentum
- Chapter 13: Gravitation
- Chapter 15: Oscillations
- Chapter 16: Waves
- Chapter 17: Sound

University Physics Volume 3:
- Chapter 1: The Nature of Light
- Chapter 2: Geometric Optics and Image Formation
- Chapter 6: Photons and Matter Waves
- Chapter 7: Quantum Mechanics
- Chapter 10: Nuclear Physics (if time permits)

More details below.

Assignments assessment
There will be approximately 9 assignments, **handwritten** solutions to be uploaded on Brightspace as **one** PDF file; these can be solutions written on paper and then scanned, or a file produced using a tablet computer. **Look at your PDF file before uploading it onto Brightspace** to ensure the scan quality is good, the pages are in the correct order, and questions are properly labelled.
Assignment Policy:
- You are allowed to collaborate on assignments, so long as your work and your solutions are your own.
- You are expected to treat your assignments with respect. Assignments that are disorganized or difficult to read will receive reduced marks at the marker's discretion.
- Late assignments are not accepted, the deadline will be strictly enforced.
- **The two lowest grade assignments will not be used towards your final grade**.

Labs assessment
To obtain credit for the course, you must complete **all labs** and receive an overall grade of at least 50% in the lab component. No lab reports will be accepted after 4 Apr 2025.

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Grading Scheme

To obtain credit in the course you must:

- have a satisfactory grade (usually at least 40%) on the final exam.
- complete all labs and have a final lab grade of at least 50%.
- have at least 50% on your final course grade, which is the highest one obtained from the following two grading schemes:

	I	II	
Assignments	10%	10%	approximately 9 assignments
Labs	20%	20%	final lab grade must be 50% or higher
Midterm 1	15%	10%	50 min exam, during class time, Fri 14 Feb
Midterm 2	15%	10%	50 min exam, during class time, Fri 14 Mar
Final exam	40%	50%	3 hour exam, April exam period.

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.

Notwithstanding the weighting and procedure explained above:

- "E" grade is not offered in this course.
- 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 assign an "N".
- If you have less than 50% on the labs you will be assign an "F".
- If you exhibit inadequate performance on the final exam you will be assign an "F".
- A maximum course grade of 49% will be assigned to "N" and "F" grades.

Note that "N" and "F" grades are failing grades and factor into the GPA as a value of 0.

Accommodation

Arrangement for reasonable accommodations for customarily accommodated issues (such as illness or family affliction) will be considered, however this is contingent on your active participation: if you miss a course requirement, you are expected to contact the instructor as soon as reasonably possible, and you are expected to give the instructor **advance warning** of issues that you could have reasonably foreseen. Familiarize yourself with UVic's Undergraduate requests for academic concession, academic concessions regulations and guidelines.

Missing one or both midterms for accommodated issues:

- If you miss one midterm, your other midterm will have a weight of 15% and your final exam will have a weight of 55%.
- If you miss both midterms, you will be given the opportunity to write an exam to replace one midterm with a weight of 10% near the end of the term, and your final exam will have a weight of 60%.

Missing assignments for accommodated issues:

- If you miss more than two assignments for issues that can be accommodated, contact the instructor to discuss possible accommodation.

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Centre for Accessible Learning
The University of Victoria is committed to creating a learning experience that is as accessible as possible. If you are registered with the Centre for Accessible Learning (CAL) and anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with the instructor. If you are a student with a disability or chronic health condition, you can meet with a CAL advisor to discuss access and accommodations.

Conduct
Attendance of lectures is not required, but very strongly recommended. In Physics, a discipline norm is that **mastery** combines very good **comprehension** with the ability to **demonstrate** that comprehension under time pressure, such as in a timed exam situation. **Full engagement** with course activities includes attending lectures, submitting all lab reports, and submitting essentially all assignments.

University Regulations on Academic Integrity
Cheating, plagiarism, and other form of academic fraud are taken very seriously by the University and by the instructor. Please familiarize yourself with the University Policy on Academic Integrity and with the Student Code of Conduct. Note that it is an academic integrity violation and a violation of UVic policies about information technology to post material from this class to any online "homework help" site.
Academic integrity requires commitment to the values of honesty, trust, fairness, respect, and responsibility. Any action that contravenes this standard, including misrepresentation, falsification or deception, undermines the intention and worth of scholarly work and violates the fundamental academic rights of members of our community.

Topics covered in the course — details
The course aims at covering the following content, from
University Physics Volume 1 and
University Physics Volume 3.
Items in red will be covered only if time permits.

Review: topics from V1 Chapters 1-9 and V3 Chapter 3

V1 Chapter 10: Fixed Angular Rotation
- 10.1 Rotational Variables
- 10.2 Rotation with Constant Angular Acceleration
- 10.3 Relating Angular and Translational Quantities
- 10.4 Moment of Inertia and Rotational Kinetic Energy
- 10.5 Calculating Moments of Inertia
- 10.6 Torque
- 10.7 Newton's Second Law for Rotation
- 10.8 Work and Power for Rotational Motion

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- V1 Chapter 11: Angular Momentum
  - 11.1 Rolling Motion
  - 11.2 Angular Momentum
  - 11.3 Conservation of Angular Momentum
  - 11.4 Precession of a Gyroscope
- V1 Chapter 13: Gravitation
  - 13.1 Newton's Law of Universal Gravitation
  - 13.2 Gravitation Near Earth's Surface
  - 13.3 Gravitational Potential Energy and Total Energy
  - 13.4 Satellite Orbits and Energy
  - 13.5 Kepler's Laws of Planetary Motion
  - 13.6 Tidal Forces
  - 13.7 Einstein's Theory of Gravity
- V1 Chapter 15: Oscillations
  - 15.1 Simple Harmonic Motion
  - 15.2 Energy in Simple Harmonic Motion
  - 15.3 Comparing Simple Harmonic Motion and Circular Motion
  - 15.4 Pendulums
  - 15.5 Damped Oscillations
  - 15.6 Forced Oscillations
- V1 Chapter 16: Waves
  - 16.1 Traveling Waves
  - 16.2 Mathematics of Waves
  - 16.3 Wave Speed on a Stretched String
  - 16.4 Energy and Power of a Wave
  - 16.5 Interference of Waves
  - 16.6 Standing Waves and Resonance
- V1 Chapter 17: Sound
  - 17.1 Sound Waves
  - 17.2 Speed of Sound
  - 17.3 Sound Intensity
  - 17.4 Normal Modes of a Standing Sound Wave
  - 17.5 Sources of Musical Sound
  - 17.6 Beats
  - 17.7 The Doppler Effect
  - 17.8 Shock Waves

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V3 Chapter 1: The Nature of Light
- 1.1 The Propagation of Light
- 1.2 The Law of Reflection
- 1.3 Refraction
- 1.4 Total Internal Reflection
- 1.5 Dispersion
- 1.6 Huygens's Principle
- 1.7 Polarization

V3 Chapter 2: Geometric Optics and Image Formation
- 2.1 Images Formed by Plane Mirrors
- 2.2 Spherical Mirrors
- 2.3 Images Formed by Refraction
- 2.4 Thin Lenses

V3 Chapter 3: Interference
- 3.1 Young's Double-Slit Interference
- 3.2 Mathematics of Interference

V3 Chapter 4: Diffraction
- 4.1 Single-Slit Diffraction
- 4.2 Intensity in Single-Slit Diffraction

V3 Chapter 6: Photons and Matter Waves
- 6.1 Blackbody Radiation
- 6.2 Photoelectric Effect
- 6.3 The Compton Effect
- 6.4 Bohr's Model of the Hydrogen Atom
- 6.5 De Broglie's Matter Waves
- 6.6 Wave-Particle Duality

V3 Chapter 7: Quantum Mechanics
- 7.1 Wave Functions
- 7.2 The Heisenberg Uncertainty Principle
- 7.3 The Schrödinger Equation
- 7.4 The Quantum Particle in a Box
- 7.5 The Quantum Harmonic Oscillator
- 7.6 The Quantum Tunneling of Particles through Potential Barriers

V3 Chapter 10: Nuclear Physics **(if time permits)**
- 10.1 Properties of Nuclei
- 10.2 Nuclear Binding Energy
- 10.3 Radioactive Decay
- 10.4 Nuclear Reactions
- 10.5 Fission
- 10.6 Nuclear Fusion