

PHYS 130: Physics II
January 2014 - April 2014

Instructor: Prof. Michel Lefebvre
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Lectures: 13:30 - 14:20, Tuesday, Wednesday, Friday, in Elliott 168
First lecture: Tuesday 7 January 2014.

Course web: moodle.uvic.ca

Abstract: 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; radioactivity and principles of quantum mechanics. This is an enriched course intended for students considering a degree in Physics and Astronomy.

Text: University Physics, 13th edition, Young and Freedman (12th edition is acceptable). Both texts are in the Library Reserve:
13th edition: call number "pri 16288" (two copies)
12th edition: call number "pri 16289" (two copies)
You need to access www.masteringphysics.com to complete the regular assignments. The required course-ID is PHYS130LEFEBVRE2014

Labs: All lab sections are held in the Elliott Lab wing.
Labs start 6 January 2014.
If you have any questions regarding the labs, please contact
Dr. Alex van Netten, vannette@uvic.ca
Mr. Alex Wong, alexwong@uvic.ca

Office Hours: Elliott 205A
Tuesdays 14:30 - 16:30
Wednesdays 14:30 - 15:30

Course material

Course material will be distributed via the University's moodle.uvic.ca web site. This includes any slides shown in class, a detailed probable schedule of lectures and associated readings, and notes pointing to other useful resources.

Required courses

Prerequisites: PHYS 120
Pre- or corequisite: MATH 101 (which itself requires MATH 100 or equivalent)
If you do not satisfy these requirements, please contact the instructor.

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Keys to success

- Attend lectures and labs.
- Read the text.
- Do assignments and lab reports.
- Study.
- Ask for help if you find yourself falling behind.

Tours to local research institutions

This course may include tours to local physics research. This term we aim to visit at least two of the following three laboratories: 1) Vancouver Island Clinic of the B.C. Cancer Control Agency; 2) Dominion Astronomical Observatory, Herzberg Institute of Astrophysics; 3) Institute of Ocean Sciences and the Pacific Geoscience Centre.

Finding help

There are several places where you can get help, with Physics or with other issues:

- Physics Aid Service (drop-in Physics Q&A held in Elliott 038):
<http://www.uvic.ca/science/physics/current/undergraduate/pas/>
- Learning Commons (academic help with most sciences, in the Library);
- your instructors;
- Resource Centre for Students with a Disability (+1 250 472-4946);
- Counseling Services (+1 250 721-8341)
- Financial aid and funding:
<http://www.uvic.ca/graduatestudies/finances/financialaid/>
<http://www.uvic.ca/graduatestudies/finances/financialaid/loans/index.php>

Arrangements and Conduct

The instructor is willing to arrange reasonable accommodations for:

- missed exams due to illness or severe affliction;
- missed assignments or course deadlines due to illness or other affliction;
- conflicts between classes or examinations, and religious observances;
- issues documented through RCSD;
- other issues.

If you miss an exam for any reason, you are expected to contact the instructor as soon as possible after the exam. If you anticipate missing a course requirement, you are expected to contact the instructor a reasonable amount of time in advance.

Cheating, plagiarism, and other forms of academic fraud are taken very seriously by the University and by the instructor. Please familiarize yourself with the *Policy on Academic Integrity* which can be found in the Undergraduate Calendar on pages 32-34, or online: <http://web.uvic.ca/calendar2013/FACS/UnIn/UARe/PoAcl.html>

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Calculator

You may only use a non-programmable, non-graphing calculator for exams. Examples of acceptable calculators are the Sharp EL-510R or EL-510RNB; they can be bought in the UVic Bookstore for about \$10.

Marking and Grades

To obtain credit in the course you must:

- have at least a 50% mark on the final exam;
- complete all labs and have satisfactory standing in the labs;
- have at least 50% on your final mark, which is the highest one obtained from the two following marking schemes:

	I	II	
Assignments	10%	10%	approximately 10 assignments
Labs	20%	20%	must be passed, all must be completed
Quizzes	10%	15%	approximately 4 in-class 15 min quizzes
Midterm	10%	15%	50 min exam, Wed 19 Feb 2014
Final exam	50%	40%	3 hour exam, April Exam Period

The final letter grade follows the UVic standardized conversion of numerical scores to letter grades:

A+	90-100	B+	77-79	C+	65-69	E	0-49
A	85-89	B	73-76	C	60-64	F	0-49
A-	80-84	B-	70-72	D	50-59	N	Not Complete

If the application of this scheme would result in grades that are judged by the instructor to be inconsistent with the University's grading guidelines (to be found on page 37 of the current Undergraduate Calendar), then the instructor will use the University guidelines.

The instructor will review all lab marks prior to assigning a final grade.

The grade E is a failing grade and permits the possibility of a supplemental final exam if you are eligible; an E will be assigned if you do not have a passing grade on the final exam but would otherwise pass the course. The grade N is a failing grade that indicates that you did not complete the required course work; an N will be assigned if you do not write the final exam. An F will be assigned if you otherwise fail the course.

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Tentative Lecture Schedule (last update 31 Mar 2014)

Date	Lecture Title	Text Reference
Jan 7	Outline and Basic review	Ch. 1 to 8
Jan 8	Basic review	Ch. 1 to 8
Jan 10	Rotation of Rigid Bodies (review)	9.1 - 9.6
Jan 14	Rotation of Rigid Bodies (review)	9.1 - 9.6
Jan 15	Rotation of Rigid Bodies (review)	9.1 - 9.6
Jan 17	Dynamics of Rotational Motion (review)	10.1 - 10.6
Jan 21	Dynamics of Rotational Motion (review)	10.1 - 10.6
Jan 22	Gravitation	13.1 - 13.5
Jan 24	Gravitation, Quiz#1	13.1 - 13.5
Jan 28	Gravitation	13.1 - 13.5
Jan 29	Simple Harmonic Motion I	14.1 - 14.4
Jan 31	Simple Harmonic Motion II	14.1 - 14.4
Feb 4	Simple Pendulum, Physical Pendulum	14.5 - 14.6
Feb 5	Oscillations of Complicated Systems	14.7 - 14.8
Feb 7	Waves, Periodic Waves, Quiz#2	15.1 - 15.2
Feb 11	Reading Break	
Feb 12	Reading Break	
Feb 14	Reading Break	
Feb 18	Sinusoidal Waves	15.3
Feb 19	MIDTERM EXAM	
Feb 21	Waves on a String and Energy Transport	15.4 - 15.5
Feb 25	Standing Waves on a String, Normal modes	15.6 - 15.8
Feb 26	Sound Waves and Sound Intensity	16.1 - 16.3
Feb 28	Standing Sound Waves, Resonances	16.4
Mar 4	Beats, Doppler Effect	16.5 - 16.8
Mar 5	Electromagnetic Waves, Two-Slit Interference	32.3, 35.1 - 35.3
Mar 7	Diffraction, Quiz#3	36.2 - 36.3
Mar 11	Reflection and Refraction	33.1 - 33.3
Mar 12	Geometric Optics I	34.1 - 34.4
Mar 14	Geometric Optics II	34.1 - 34.4
Mar 18	Geometric Optics III	34.1 - 34.4
Mar 19	Photoelectric Effect	38.1
Mar 21	Relativistic E and p, X-Ray Production, Quiz#4	38.2
Mar 25	Compton Scattering, e+e- production, annihilation	38.3
Mar 26	de Broglie Wavelength	39.1
Mar 28	The Nuclear Atom and Atomic Spectra	39.2
Apr 1	Bohr's Model, The Uncertainty Principle	39.3, 39.6
Apr 2	Schrödinger Equation, Particle in a box	40.1 - 40.2
Apr 4	Potential wells and barriers, Tunneling	40.2 - 40.5

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University Physics, 13th edition, Young and Freedman

Sections relevant to the lectures.

Chapter 3: Motion in Two or Three Dimensions

3.4: Motion in a Circle

Chapter 5: Applying's Newton's Laws

5.4: Dynamics of Circular Motion

Chapter 9: Rotation of Rigid Bodies

9.1: Angular Velocity and Acceleration

9.2: Rotation with Constant Angular Acceleration

9.3: Relating Linear and Angular Kinematics

9.4: Energy in Rotational Motion

9.5: Parallel-Axis Theorem

9.6: Moment-of-Inertia Calculations

Chapter 10: Dynamics of Rotational Motion

10.1: Torque

10.2: Torque and Angular Acceleration for a Rigid Body

10.3: Rigid-Body Rotation About a Moving Axis

10.4: Work and Power in Rotational Motion

10.5: Angular Momentum

10.6: Conservation of Angular Momentum

Chapter 13: Gravitation

13.1: Newton's Law of Gravitation

13.2: Weight

13.3: Gravitational Potential Energy

13.4: The Motion of Satellites

13.5: Kepler's Laws and the Motion of Planets

Chapter 14: Periodic Motion

14.1: Describing Oscillation

14.2: Simple Harmonic Motion

14.3: Energy in Simple Harmonic Motion

14.4: Applications of Simple Harmonic Motion

14.5: The Simple Pendulum

14.6: The Physical Pendulum

14.7: Damped Oscillations

14.8: Forced Oscillations and Resonance

Chapter 15: Mechanical Waves

15.1: Types of Mechanical Waves

15.2: Periodic Waves

15.3: Mathematical Description of a Wave

15.4: Speed of a Transverse Wave

15.5: Energy in Wave Motion

15.6: Wave Interference, Boundary Conditions, and Superposition

15.7: Standing Waves on a String

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- 15.8: Normal Modes of a String
- Chapter 16: Sound and Hearing
 - 16.1: Sound Waves
 - 16.2: Speed of Sound Waves
 - 16.3: Sound Intensity
 - 16.4: Standing Sound Waves and Normal Modes
 - 16.5: Resonance and Sound
 - 16.6: Interference of Waves
 - 16.7: Beats
 - 16.8: The Doppler Effect
- Chapter 35: Interference
 - 35.1: Interference and Coherent Sources
 - 32.1-32.3: Electromagnetic Waves
 - 35.2: Two-Source Interference of Light
 - 35.3: Intensity in Interference Patterns
- Chapter 36: Diffraction
 - 36.2: Diffraction from a Single Slit
 - 36.3: Intensity in the Single-Slit Pattern
- Chapter 33: The Nature and Propagation of Light
 - 33.1: The Nature of Light
 - 33.2: Reflection and Refraction
 - 33.3: Total Internal Reflection
- Chapter 34: Geometric Optics
 - 34.1: Reflection and Refraction at a Plane Surface
 - 34.2: Reflection at a Spherical Surface
 - 34.3: Refraction at a Spherical Surface
 - 34.4: Thin Lenses
- Chapter 38: Photons: Light Waves Behaving as Particles
 - 38.1: Light Absorbed as Photons: The Photoelectric Effect
 - 38.2: Light Emitted as Photons: X-Ray Production
 - 38.3: Light Scattered as Photons: Compton Scattering and Pair Production
- Chapter 39: Particles Behaving as Waves
 - 39.1: Electron Waves
 - 39.2: The Nuclear Atom and Atomic Spectra
 - 39.3: Energy Levels and the Bohr Model of the Atom
 - 39.6: The Uncertainty Principle (and 38.4)
- Chapter 40: Quantum Mechanics
 - 40.1: Wave Functions and the One-Dimensional Schrödinger Equation
 - 40.2: Particle in a Box
 - 40.3: Potential Well
 - 40.4: Potential Barriers and Tunneling
 - 40.5: The Harmonic Oscillator
- Chapter 43: Nuclear Physics
- Chapter 44: Particle Physics and Cosmology