

UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF PHYSICS AND ASTRONOMY  
COURSE OUTLINE

**1. Course:** PHYSICS 369, Acoustics, Optics and Radiation (for students in Engineering)

Instructor: Dr. D. Knudsen | [knudsen@ucalgary.ca](mailto:knudsen@ucalgary.ca) | SB 638 | 403-220-8651 | Office Hours: will be posted on D2L  
Lecture Sections: L01: TuTh, 12:30-13:45, ST 140

**Phys 369 Course coordinator:** Dr. M. Kastyak-Ibrahim Office SB 507 Tel. 220-8073 [phasulc@ucalgary.ca](mailto:phasulc@ucalgary.ca) **Phys 369 Course records:** Mr. P. Van der Pol Office ST 017 Tel. 220-8641 [dppvan@ucalgary.ca](mailto:dppvan@ucalgary.ca)

Course website (all lecture sections) will be on Desire2Learn  
Departmental Office: SB 605, 403-220-5385, [phasugrd@ucalgary.ca](mailto:phasugrd@ucalgary.ca)

**2. Prerequisites:** Applied Mathematics 219 or [Mathematics 277](#); and [Physics 259](#).

Note: In Physics 369, we follow the policy of the Schulich School of Engineering regarding prerequisite courses. A student may not register in Physics 369 unless a grade of at least “D” has been obtained in each prerequisite course, and the student’s previous GPA is at least 2.00. It is the responsibility of students to ensure that their registrations are in order.

**3. Grading:** The University policy on grading and related matters is described sections [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Electronic response/clickers	3%
Assignments (Mastering Physics)	15%
Laboratory experiments (5)	20% (Beginning week of Sept 14 for even-numbered labs; Sept 21 for odd-numbered labs.)
Common Midterm test	22% (Thu Oct. 29, evening, 7:00–8:30 pm, rooms TBA)
Final Examination	40% (To be scheduled by the Registrar)

Percentage grades will be given for all elements of term work and examinations in Physics 369. A weighted course percentage will be calculated for each student after the final exam is written.

Percentage to letter grade conversion scale:

>= 93 %	A +	>= 75 %	B +	>= 60 %	C +	>= 47 %	D +
>= 85 %	A	>= 70 %	B	>= 55 %	C	>= 45 %	D
>= 80 %	A -	>= 65 %	B -	>= 50 %	C -	< 40 %	F

**4. Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar

**Missed labs**

Students are NOT allowed to come to a different than their own section of the lab. A make-up lab session will be scheduled in the 13th week of classes (Nov 30- Dec 4). You can make up one lab.

Priority for scheduling a make-up lab will be given to students who missed a lab for a legitimate reason. A note from a physician/counselor should be provided. Others will be allowed to do a make-up lab only if spaces are still available. Please contact Dr. Kastyak-Ibrahim, the Undergraduate Learning Coordinator at phasulc@ucalgary.ca in order to arrange for a make-up lab as soon as you know that you might need one.

#### Missed assignments:

Please contact Dr. Kastyak-Ibrahim, the Undergraduate Learning Coordinator at phasulc@ucalgary.ca if you have a legitimate reason for missing a deadline for an assignment. Sleeping in, forgetting about the deadline etc. is NOT considered a legitimate reason.

5. **Scheduled out-of-class activities:** The **common midterm test** for all four lecture sections will be on Thursday evening, October 29, 7:00 pm – 8:30 p.m.; rooms to be announced.

**REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.** If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Examination Policy:** The midterm and final examinations in Physics 369 are closed-book exams, although a formula sheet will be provided with the question paper. You are required to use the Schulich School of Engineering approved calculator in these examinations. Students should also read the Calendar, [Section G](#), on Examinations.

#### 7. Course Materials:

- 1) Textbook: Sears and Zemansky's *"University Physics with Modern Technology Update"*, Custom Edition for the **University of Calgary** by Young & Freedman (same as used in Physics 259 for first-year Engineering students.) Please note that the Bookstore is no longer organizing textbooks by course number, but instead alphabetically by author, please look under "Y" for Young and Freedman

An e-version of the text (all chapters) can be purchased along with a Mastering Physics license.

- 2) Mastering Physics license, included with the printed text package, or available for purchase at the Bookstore (to be confirmed), or online. Licenses are valid for two years, so if you purchased one for PHYS259 you will not need another. Licenses can also be obtained free of charge for use with computers in TFDL (to be confirmed); contact the course coordinator. Free licenses do not allow access to practice problems and other supplementary materials.
- 3) A Top Hat license (free for UC students at tophat.com) and a response device such as a phone, laptop or tablet.
- 4) An extensive set of supplemental Extra Notes will be posted on D2L (free of charge).

#### 8. Other Important Information for Students:

- (a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Academic Accommodation Policy:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at <http://www.ucalgary.ca/policies/files/policies/procedure-for->

[accommodations-for-students-with-disabilities\\_0.pdf](#). Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Physics and Astronomy, Dr. Michael Wieser, by email ([mwieser@ucalgary.ca](mailto:mwieser@ucalgary.ca)) or by phone (403.220.3641).

- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep. Phone: 220-3913 Email: <https://www.su.ucalgary.ca/contact/>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **USRI:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

**Laboratories begin Monday, September 14, 2015.** Check the timetable below for the dates of your labs. Labs take place in ST 036 and ST 038, as indicated in your Student Centre.

Week Beginning:	Even-numbered lab sections:	Odd-numbered lab sections:
Sept. 14	Uncertainties	---
Sept. 21	---	Uncertainties
Sept. 28	Simple Harmonic Oscillations	---
Oct. 5	---	Simple Harmonic Oscillations
Oct. 12	Standing Waves on a Wire	---
	Monday: No lab on Thanksgiving Day	
Oct. 19	---	Standing Waves on a Wire
Oct. 26	Concave Mirrors	---
Nov. 2	---	Concave Mirrors
Nov. 9	READING DAYS – No Lab this week	READING DAYS – No Lab this week
Nov. 16	Thin Lenses & Optical Instruments	---
Nov. 23	---	Thin Lenses & Optical Instruments
Nov. 30	Even-numbered Monday Lab Sections make up waves on the Wire lab at their usual lab time on Monday Nov 30.	No lab
MAKE-UP labs will be scheduled from Nov 30 - Dec 3		

**Lab Manuals:** Lab Manuals are prepared by the Department of Physics and Astronomy and will be posted on Desire2Learn. Each student should download his/her own copy of each lab.

**Before you come to your first lab session** (see the schedule, above) make sure you have read the relevant sections of the Manual and completed any Preliminary Work for the Uncertainty lab. Lab preliminary work is to be submitted individually by each lab group member. Loose sheets stapled together and identified by the student's name and ID number may be used for preliminary work. Preliminary work must be checked by the lab TA before the group can begin experimental work for the session.

**Lab Group work.** When you come to the first lab session, your lab section will be organized into groups of 2 or 3 (3 is preferred). Your group will remain the same during the term. The group will work as a team, sharing tasks such as setting up apparatus, taking measurement data, and keeping a running record of the experiment. No group member should be an idle "third wheel" during the session. The intention is to finish the data taking in the 3-hour period, and also move ahead as much as possible with a **single write-up** for the group.

**Raw Lab Notes.** According to good laboratory practice, all data and any other relevant notes and observations should be recorded as the lab proceeds. In PHYS369, these can be recorded on clean, loose-leaf lined or graph paper (NO torn or spiral-bound pages). Title these notes with the course number, lab section, and names of all group members. Write the lab section number and date on each page. Please write **in pen**, and leave margins for corrections and comments from your lab instructor. If there is a problem with any set of measurements, they can be crossed out (**but not erased**) and new measurements recorded. These pages will be checked by the lab TA at the end of the lab, and should be scanned or photographed and attached to the final lab report.

**Final Laboratory reports are due at 4:00 p.m.**, one week after the date of lab completion. Group members will meet during that week, perhaps electronically, to accomplish this. (It is possible for students to book group study space in the TFDL or EEEL.). Use a word processor to write your lab report and attach a scan of your raw lab notes to your write-up. Save the lab report as a PDF.

Your group's report saved as a PDF should be submitted to D2L Dropbox by each member of the group individually. Your TA will download it and submit the feedback via D2L. Each member of the group will receive the same mark.

**A caution: Teamwork within a single lab group is expected. However, your group should work independently of other lab groups.** Unduly similar reports received from different groups could result in charges of academic misconduct against the students involved.

**LAB EXEMPTION:** Students repeating Physics 369 may be exempted from the laboratory. This requires the student to have fully completed the labs in a previous attempt at the course. Their previous lab percentage will be used in calculating the final grade for the course in Fall, 2014. **Such students should notify Mr. Van der Pol by email** ([dppvan@ucalgary.ca](mailto:dppvan@ucalgary.ca)) **of their wish to use a previous year's lab grade.**

As your term work items (labs, electronic response scores and midterm test) accumulate, your marks will be posted on the Physics 369 grades website. Check this posting regularly by going to the Phys 369 D2L site and clicking the link to [Physics 369 Marks](#). **Missing or incorrectly posted term work scores should be reported by e-mail to [dppvan@ucalgary.ca](mailto:dppvan@ucalgary.ca)**

. You should be prepared to produce the original work to verify the requested correction.

**FAQs (Frequently asked questions):**

1. **What do we cover in this course?** See Detailed Course Outline below..
2. **Where do I get the Extra Notes?** Download them in small chunks from the course Desire2Learn site (free). These notes deal with material included in the course but not covered in sufficient depth in the textbook.
3. **When do labs start?** Week starting Monday, Sep 14 for EVEN-numbered lab sections (This is in the second week of lectures in the course.) Week starting Monday Sep 21 for ODD-numbered sections. See detailed **LAB SCHEDULE** at <http://pjl.ucalgary.ca/courses/physics369.html>

4. **Where do I get my lab manual?** Lab Manuals are posted at <http://pjl.ucalgary.ca/courses/physics369.html>. You must read the labs and answer pre-lab questions before coming to each lab.
5. **Where do I get assignment 1?** Information for accessing Mastering Physics will be posted on Desire2Learn during the first week of classes.
6. **My instructor said he posted his lecture notes...where is that?** Your instructor will post lecture notes in the Content section on Desire2Learn.
7. **Who do I call if something is wrong with my grades, or I have any other problem with the course?** For an incorrectly entered lab grade, talk to your own lab TA at your next scheduled lab. For all other enquiries, send an e-mail to the course coordinator, Dr. Kastyak-Ibrahim at [phasulc@ucalgary.ca](mailto:phasulc@ucalgary.ca). IMPORTANT: include the course number, your name and ID number in the subject line. Keep messages brief and to the point.

### Physics 369 Lecture-by-lecture Course Schedule, Fall 2015

Day and Date	Text Reference	Topics
	SZ=Course Textbook: Sears and Zemansky's University Physics, 13 <sup>th</sup> Edition by Young and Freedman (under "Y" in the Bookstore) EN=Extra Notes (by Dr. A. Louro), downloadable from Desire2Learn.	
<i>Simple Harmonic Oscillations</i>		
T Sep 8	EN1, SZ14.1 EN1, SZ14.2	Introduction to PHYS369 SHM of systems obeying Hooke's law Differential equation of simple harmonic motion
R Sep 10	EN1 EN1 EN1	Superposition of SHMs of the same frequency Phasors, phasor addition; phasor diagrams Phasors as complex quantities
<i>Waves</i>		
T Sep 15	EN2, SZ15.1-15.3 EN2, SZ15.3	Travelling wave pulse: mathematical description, particle motion Partial derivatives; harmonic wave equation
R Sep 17	EN2 EN2 EN2 EN2	Principle of wave superposition Harmonic (sinusoidal) waves Mathematical description, particle motion, phase differences Complex representation of a traveling harmonic wave
T Sep 22	EN3, SZ15.4 EN3, SZ16.1 EN3, SZ16.2	Speed of waves in real media: stretched string Sound waves as longitudinal waves in solids, liquids, and gases Speed of sound waves
R Sep 24	EN4 SZ15.5 EN4 EN4 EN4, SZ16.3	Energy transport by a harmonic wave Mechanical impedance; Power transported by a wave Acoustical impedance Sound intensity and sound intensity level (dB)
T Sep 29	EN4, SZ15.5 EN4 EN5 SZ15.6	Sound field around point and line sources; inverse square law Acoustical attenuation Reflections at boundaries between two media; boundary conditions
R Oct 1	EN5 SZ15.6	Amplitude reflection and transmission coefficients at a junction

	EN5	Energy reflection and transmission coefficients
T Oct 6	EN6, SZ15.7–8 EN6, SZ16.4	Standing waves on a stretched string of fixed length: normal modes Acoustical standing waves: vibrations of air columns, normal modes Standing wave ratio; Resonance
R Oct 8	EN7, Y16.8 SZ16.7	Doppler effect Superposition of two harmonic waves of different frequencies: beats
T Oct 13	SZ16.6, SZ35.1 SZ35.1–35.2	Coherent and incoherent sources Two-slit interference
R Oct 15	SZ35.4	Thin film interference; Multiple reflections in a thin film
T Oct 20	SZ36.1–36.2 SZ36.7	Diffraction pattern of a single slit Circular aperture, resolving power
R Oct 22		Review

### *Geometrical Optics*

T Oct 27	SZ33.1 SZ33.1 SZ33.2	Nature of light Wavefronts, ray approximation Laws of reflection and refraction, index of refraction
R Oct 29	SZ33.3 SZ33.3 SZ34.1–34.2	Total internal reflection Fibre optics and waveguides Imaging by reflection at a spherical surface

\*\*\*\*\* Thursday, Oct 29 MIDTERM TEST 7:00 – 8:30 pm (90 minutes); Rooms to be announced \*\*\*\*\*

T Nov 3	SZ34.2 SZ34.1– 34.2 SZ34.3	Graphical methods for spherical mirrors Lateral magnification Imaging by refraction at a spherical interface
R Nov 5	--- SZ34.4 SZ34.4	Multi-surface problems; virtual object Derivation of thin lens equation Graphical methods for thin lenses
T Nov 10		***** <b>READING BREAK: No lecture.</b> *****
R Nov 12	SZ34.5 – 34.6	Multi-lens systems, cameras, the eye
T Nov 17	SZ34.7 – 34.8	Magnifiers, microscopes, telescopes
R Nov 19	EN, SZ33.5 EN, SZ33.5	Light as a transverse electromagnetic wave Plane and circular polarization; Malus' Law
T Nov 24	To be announced	Elliptical and Circular Polarization Polarization by Reflection: Brewster's Angle Fresnel Equations
R Nov 26	To be announced	Doubly Refracting Materials Optical Stress Analysis Huygen's Principle

*Illumination and thermal radiation*

T Dec 1	EN9	Resolving Power. Irradiance
	EN9	Radiometric quantities; solid angle; point sources
	EN9	Irradiance due to an extended source: Lambert's law
R Dec 3	EN9	Plane source surfaces; radiance
	EN9	Absorptance, reflectance; thermal equilibrium
	EN9, SZ38.8	Blackbody radiation, Planck's Law
	EN9, SZ38.8	Stefan-Boltzmann law; emissivity; heat transfer
	SZ38.8	Wien displacement law

Department Approval \_\_\_\_\_ Date \_\_\_\_\_