UNIVERSITY OF CALGARY
DEPARTMENT OF PHYSICS and ASTRONOMY
**COURSE OUTLINE**

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

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|---|---|---|---|---|---|---|
| **L01:** | TuTh, 12:30-13:45, ICT 121 | **Instructor,** | **Dr. A. Louro** | Office SB 642 | Tel. 220-8769 | louro@ucalgary.ca |
| **L02:** | TuTh, 12:30-13:45, ICT 122 | **Instructor,** | **Dr. R.B. Hicks** | Office SB 634 | Tel. 220-3443 | hicks@ucalgary.ca |
| **L03:** | TuTh, 12:30-13:45, ST 140 | **Instructor,** | **Dr. D. Knudsen** | Office SB 638 | Tel. 220-8651 | knudsen@ucalgary.ca |
| **L04:** | TuTh, 12:30-13:45, ST 140 | **Instructor,** | **Dr. D. Knudsen** | Office SB 638 | Tel. 220-8651 | knudsen@ucalgary.ca |

*L03 and L04 are combined in same room

**OFFICE HOURS:** Dr. Hicks: T/TH 9:30-10:30, SB634; Dr. Louro: See Blackboard; Dr. Knudsen: See Blackboard

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| **Phys 369 Course coordinator:** | **Dr. D. Knudsen** | Office SB 639 | Tel. 220-8651 | knudsen@ucalgary.ca |
| **Phys 369 Course records:** | **Mr. P. Van der Pol** | Office ST 017 | Tel. 220-8641 | dppvan@ucalgary.ca |

Course BLACKBOARD site (all lecture sections) **PHYS 369 ALL - (Fall 2011) – Acoustics, Optics, Radiation**

Physics departmental Office: SB 605, Tel. 220-5385. Web Site: http://phas.ucalgary.ca/

**2**. **PREREQUISITES:** Applied Mathematics 217, 219, 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:

| | | |
|---|---|---|
| Clickers | 2% | |
| Assignments (8) | 18% | |
| Laboratory experiments (5) | 20% | |
| Common Midterm test | 20% | (Thu Oct. 27, 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. A table of conversion from final course percentage to final course letter grade will be published on the Phys 369 Blackboard site later in the term.

**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: **http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html**.
It is the student's responsibility to familiarize himself/herself with these regulations. See also **http://www.ucalgary.ca/pubs/calendar/current/e-3.html**.

**5.** **Dates and times of class exercises held outside of class hours:** The **common midterm test** for all four lecture sections will be on Thursday evening, October 27, 7:00 pm – 8:30 p.m.; rooms TBA.

**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.** **TEXTBOOK**: ***"University Physics"*, 12th Edition, Volume II, by Young and Freedman**, Addison-Wesley (Note that this was the text used in Physics 259 for first-year Engineering students at U of C. You will need Chapters 13, 15, 16 also; these should be bundled with the Volume II as sold in the U of C bookstore.) **NOTE**: An extensive set of Extra Notes to supplement the textbook is posted on Blackboard for students to download.

**7.** **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: **http://www.ucalgary.ca/pubs/calendar/current/g.html**.

**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 K. Student Misconduct (**http://www.ucalgary.ca/pubs/calendar/current/k.html**) 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 at http://www.ucalgary.ca/emergencyplan/assemblypoints**.

**(c) ACADEMIC ACCOMMODATION POLICY.** Students with documentable disabilities are referred to the following links:
Calendar entry on students with disabilities: **http://www.ucalgary.ca/pubs/calendar/current/b-1.html**
Disability Resource Centre: **http://www.ucalgary.ca/drc/**

**(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 will be 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
SU Faculty Rep. **Phone:** 220-3913 **Email:** sciencerep@su.ucalgary.ca
Website `http://www.su.ucalgary.ca`
Student Ombudsman: **http://www.ucalgary.ca/provost/students/ombuds**

**(g) INTERNET and ELECTRONIC COMMUNICATION DEVICE Information.** You can assume that in all classes that you attend, **your cell phone should be turned off**. 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.

**BE SURE TO DOWNLOAD the Phys 369 ADDITIONALCOURSE INFORMATION DOCUMENT** on Blackboard. (Contains more info on LABS, ASSIGNMENTS, etc. plus a 3-page detailed lecture-by-lecture COURSE OUTLINE and SCHEDULE.)

**FAQs (Frequently asked questions):**

1. **Where do I get the textbook**? Most students will have taken Phys 259 and will already have the textbook for the course, which is Part II (plus chapters 13, 15, 16) of Young and Freedman, *University Physics*, 12th ed. If you don't have the text, it is sold in the U of C Bookstore. There are also Extra Notes to supplement the text (see point 3 below).
2. **What do we cover in this course**? See **Detailed Course Outline**, pp. 4-6 of Additional Course Information Document posted on Blackboard.
3. **Where do I get the Supplementary Notes**? Download them in small chunks from the course BLACKBOARD site (free). These 275 pages of notes deal with material included in the course but not covered in sufficient depth in the textbook.
4. **When do labs start**? Week of Monday, Sep 19 for even-numbered lab sections (This is in the second week of lectures in the course.) Week of Monday Sep 26 for odd-numbered sections. See detailed **LAB SCHEDULE** in the **Phys 369 additional course information on BLACKBOARD.**
5. **Where do I get my lab manual?** Lab Manuals are prepared by the Department of Physics and Astronomy and will be sold in ST039 from 10:00am-3:00pm T-F Sept. 13-16 for $6, and by ESS (Engineering Students Society) starting Monday, Sep 12 (to be confirmed). Get your Lab Manual early and PREPARE for the first lab by reading pages 1-16 well in advance.
6. **Where do I get assignment 1**? Download it from Course Documents/Assignments area on BLACKBOARD.
7. **Where do I hand in my Labs and Assignments**? In Lab TA drop boxes in the Physics Junior Labs area in Science Theatres basement (opposite ST 042). Due dates are discussed in the **Phys 369 additional course information on BLACKBOARD.**
8. **Where do I pick up my marked Labs and Assignments**? At the next meeting of your lab section.
9. **Where can I check my term work grades?**
Click on the Phys 369 marks link in Blackboard.
10. **My instructor said he posted his lecture notes…where is that?** Each instructor has a folder in the Course Documents area of Blackboard for his own posts.
11. **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 e-mail to the course coordinator at knudsen@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 2011

| Day and Date | Text Reference | Topics | Assignment Due Dates |
|---|---|---|---|
| | YF=Young and Freedman<br>EN=Extra Notes (Hicks and Wilson)…downloadable from BLACKBOARD | | |
| | | ***Geometrical Optics*** | |
| T Sept 13 | --- | Introduction to Physics 369 | |
| | YF33.1 | Nature of light | |
| | YF33.1 | Wavefronts, ray approximation | |
| | YF33.2 | Laws of reflection and refraction, index of refraction | |
| R Sept 15 | YF33.3 | Total internal reflection | |
| | YF33.3 | Fibre optics and waveguides | |
| | YF34.1–34.2 | Imaging by reflection at a spherical surface | |
| T Sept 20 | YF34.2 | Graphical methods for spherical mirrors | |
| | YF34.1– 34.2 | Lateral magnification | |
| | --- | Longitudinal magnification | |
| | YF34.3 | Imaging by refraction at a spherical interface | |
| R Sept 22 | --- | Multi-surface problems; virtual object | |
| | YF34.4 | Derivation of thin lens equation | |
| | YF34.4 | Graphical methods for thin lenses | |
| T Sept 27 | YF34.5 – 34.8 | Multi-lens systems, optical instruments | **Assignment #1: Noon on Mon. Sept. 26** |
| | | ***Simple Harmonic Oscillations*** | |
| R Sept 29 | EN1.1, YF13.1–13.2 | SHM of systems obeying Hooke's law | |
| | EN1.2–1.8, YF13.2 | Differential equation of simple harmonic motion | |
| T Oct 4 | EN1.9-1.10 | Superposition of SHMs of the same frequency | **Assignment #2: Noon on Mon. Oct 3** |
| | EN1.11, YF13.2 | Phasors, phasor addition; phasor diagrams | |
| | EN1.12 | Phasors as complex quantities | |
| | | ***Waves*** | |
| R Oct 6 | EN2.0–2.2 | Travelling wave pulse: mathematical description, particle motion | |
| | EN2.3-2.4 YF15.3 | Partial derivatives; harmonic wave equation | |
| T Oct 11 | EN2.4, YF15.6 | Principle of wave superposition | **Assignment #3: Noon on Tues. Oct. 11** |
| | EN3.1-3.5, YF15.3 | Harmonic (sinusoidal) waves: Mathematical description, particle motion, phase differences | |
| | EN3.6–3.8 | Complex representation of a traveling harmonic wave | |
| R Oct 13 | EN 4.0–4.1, YF15.3 | Speed of waves in real media: stretched string | |
| | EN4.2, YF16.1 | Sound waves as longitudinal waves in solids, liquids, and gases | |
| | EN4.3, YF16.2 | Speed of sound waves | |

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| Day and Date | Text Reference | Topics | Assignment Due Dates |
|---|---|---|---|
| | | | **Assignment #4: Noon on Mon. Oct. 16** |
| T Oct 17 | EN5.0–5.2 YF15.5 | Energy transport by a harmonic wave; mechanical impedance | |
| | EN5.3 | Mechanical impedance of a stretched string; power transported by a wave | |
| | EN5.4 | Acoustical impedance | |
| | EN5.5, YF16.3 | Sound intensity and sound intensity level (dB) | |
| R Oct 20 | EN5.6-5.7 YF15.5 | Sound field around point and line sources; inverse square law | |
| | EN5.8 YF16.3 | Acoustical attenuation | |
| | EN6.0–6.2 YF15.6 | Reflections at boundaries between two media; boundary conditions | |
| T Oct 25 | EN 6.4–6.5 | Amplitude reflection and transmission coefficients at a junction | **Assignment #5: Noon on Mon. Oct. 24** |
| | EN 6.6–6.7 | Energy reflection and transmission coefficients | |
| R Oct 27 | EN 6.10 | Standing wave ratio | |
| | EN 7.1–7.5 YF15.7–8 | Standing waves on a stretched string of fixed length: normal modes | |
| | EN 8.1–8.5 YF16.4 | Acoustical standing waves: vibrations of air columns, normal modes | |
| ********* Thursday, Oct 27 MIDTERM TEST 7:00 – 8:30 pm (90 minutes) Rooms TBA ********* | | | |
| T Nov 1 | EN 9.1 YF16.5 | Resonance | **No assignment due** |
| | EN 10.1–8, Y16.8 | Doppler effect | **week of Oct 31** |
| R Nov 3 | EN 11.12, YF16.7 | Superposition of two harmonic waves of different frequencies: beats | |
| | EN 11.4 | Dispersion | |
| | EN 11.5–11.6 | Superposition of two harmonic waves of different frequencies in a dispersive medium: phase and group velocities | |
| | | ***Physical Optics: Polarization*** | |
| T Nov 8 | EN12.1 YF33.5 | Light as a transverse electromagnetic wave | **Assignment #6** |
| | EN 12.3 YF33.5 | Plane polarization | Noon on Mon. Nov 7 |
| R Nov 10 | | ****** ***READING BREAK: No lecture.*** ****** | |
| T Nov 15 | YF33.5 | Elliptical and circular polarization | No assignment due |
| | YF33.5 | Malus' Law | week of Nov 15 |
| R Nov 17 | YF33.5 | Polarization by reflection: Brewster's angle | |
| | EN 12.5-6 | Fresnel equations | |
| T Nov 22 | --- | Doubly refracting materials | **Assignment #7: Noon on Mon. Nov 21** |
| | YF33.5 | Optical stress analysis | |
| | | ***Physical Optics: Interference and Diffraction*** | |
| | YF33-7 | Huygens' Principle: Interference effects in light | |

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| Day and Date | Text Reference | Topics | Assignment Due Dates |
|---|---|---|---|
| R Nov 24 | YF16.6, YF35.1 | Coherent and incoherent sources | |
| | YF35.1–35.2 | Two slit interference | |
| T Nov 29 | YF35.4 | Thin film interference | **No assignment due week of Nov. 28** |
| | EN14 | Multiple reflections in a thin film | |
| R Dec 1 | YF36.1–36.2 | Diffraction pattern of single slit | |
| | YF36.7 | Circular aperture | |
| T Dec 6 | YF36.7 | Resolving power | **Assignment #8: Noon on Mon. Dec 5** |
| | | ***Illumination and thermal radiation*** | |
| | EN15.1-3 | Irradiance | |
| | EN16.1-5 | Radiometric quantities; solid angle; point sources | |
| | EN16.6 | Irradiance due to an extended source: Lambert's law | |
| R Dec 8 | EN16.7 | Plane source surfaces; radiance | |
| | EN17.1–17.3 | Absorptance, reflectance; thermal equilibrium | |
| | EN17.4,YF38.8 | Blackbody radiation, Planck Law | |
| | EN17.5–17.6,YF38.8 | Stefan-Boltzmann law; emissivity; heat transfer | |
| | YF38.8 | Wien displacement law | **Assignment #9 (Practice)** |

**The last day of lectures for Fall, 2011, is Friday, December 9.**