



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

1. **Course:** Physics 375, Intro to Optics and Waves Fall 2017

Instructor: Dr. Wolfgang Tittel | SB 315 | (403) 220-4760 | wtittel@ucalgary.ca | Office Hours: W 10:00-11:00am, or by appointment.

Lecture Section: L01: TR | 12:30 - 1:45 | MS 527

Course Website: d2l.ucalgary.ca

Departmental Office: SB 605, 403-220-5385, phasugrd@ucalgary.ca

2. **Prerequisites:** Physics 255; and one of Applied Mathematics 219 or Mathematics 253 or 267 or 277 or 283.
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:

Assignments	25%
Laboratory experiments	25%
Midterm test (1)	20% (In class, Nov. 2, subject to change)
Final Examination	30% (To be scheduled by the Registrar)

If the student obtains less than 50% on the combined mid-term and final exams, then the final grade will at most be a D+.

A weighted course percentage will be calculated for each student after the final exam is written. Conversion from final course percentage to final course letter grade is as follows:

>= 95 %	A +	>= 80 %	B +	>= 65 %	C +	>= 50 %	D +
>= 90 %	A	>= 75 %	B	>= 60 %	C	>= 45 %	D
>= 85 %	A -	>= 70 %	B -	>= 55 %	C -	< 45 %	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
5. **Scheduled out-of-class activities:** none

6. **Course Materials:** *Optics* (4th or 5th Edition), Eugene Hecht, Addison-Wesley (Required). Lecture notes will be made available on D2L.

7. **Examination Policy:** Exams will be closed book, closed notes, but a (non-programmable) calculator will be allowed. Students should also read the Calendar, [Section G](#), on Examinations.

8. **Course fees:** none

9. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

10. **Human studies statement:** Students in this course are not expected to participate as subjects or researchers. See also [Section E.5](#) of the University Calendar.

11. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) **Academic Misconduct:** 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) **Student Accommodations:** 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 fulfill 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. David Feder, by email (dfeder@ucalgary.ca) or by phone (403.220.3638).

(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.
SU Faculty Rep: Phone: 220-3913
Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca
Student Ombuds Office: 403 220-6420
Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>

- (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) **U.S.R.I.:** 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). Your responses make a difference - please participate in USRI Surveys.

12. OTHER COURSE RELATED INFORMATION:

(a) Course Description

Geometrical Optics (reflection, refraction, components, simple devices, ray-tracing), wave optics (waves, polarization, interference, diffraction), interaction between light and matter, modern optics (principles of lasers, quantum communication, depending on time)

(b) Course Learning Outcomes

Learn about optics and how it is part of the world in which we live, and the technologies we create.

(c) Course Learning Incomes

Students in PHYS 375 need prior knowledge of Physics 255; and one of Applied Mathematics 219 or Mathematics 253 or 267 or 277 or 283.

(d) Syllabus

1. Geometrical optics

- Ray optics: Reflection, refraction, dispersion
- Mirrors and lenses
- Optical instruments: eye, eyeglasses, magnifying glass, microscope, telescope, camera, spectrometer,

2. Interference and diffraction

- Optical waves, phase and group velocities.
- Superposition of waves, interference
- Simple interferometers
- Coherence theory (coherence time, width, length) (time permitting)
- Fraunhofer diffraction. Single slit, two slits, Diffraction grating
- Resolution of optical instruments
- Fourier Optics (time permitting)

3. Polarization

- Fresnel equations
- Birefringence
- Polarizers, waveplates, Stokes/Jones vectors and matrices, Poincaré sphere

4. Interaction between light and matter

5. 20th Century optics (time-permitting)

- Blackbody radiation
- Principles of lasers
- Quantum Communication

Assignments: There will be five assignments in total. Problem sets will usually be assigned on Thursday and be due the following Thursday in class, or at a date/time/location specified on the assignment. Late homework will be penalized 20% per calendar day.

(e) **Lab Schedule**

Labs: The laboratory website can be found at <http://www.pjl.ucalgary.ca/> - it includes general information regarding the labs. The lab schedule is as follows:

Week	Lab
2	Reflection & refraction
4	Thin lenses
6	Malus' law
8	Michelson interferometer
11	Fizeau Bands
13	Fraunhofer Diffraction

Further information will be provided by the laboratory instructor.

Department Approval _____ Date _____