



DEPARTMENT SCIENCE

COURSE OUTLINE – FALL 2017

PC1300 (A2): WAVE MOTION, OPTICS AND SOUND – 3.8 (3-1-3/2) 82.5 Hours for 15 Weeks

INSTRUCTOR: Dr. Greg Ballentine **PHONE:** 780-539-2008
OFFICE: C 414 **E-MAIL:** gballentine@gprc.ab.ca

10:30 – 11:30 AM Monday to Friday

OFFICE HOURS: (or whenever else can be arranged – come check my office at any time)

CALENDAR DESCRIPTION: This course includes geometric optics, optical instruments, oscillations, waves, sound, interference, and diffraction.

PREREQUISITE(S)/COREQUISITE: Math 30-1 or equivalent. Math 31 and Physics 30/MA 1000

REQUIRED TEXT/RESOURCE MATERIALS: *Fundamentals of Physics*, 10th Edition Extended with WileyPlus Access Code. Authors: Halliday, Resnick and Walker, Publisher: Wiley. A WileyPlus access code is required. You can choose any ONE of the following options (subject to availability at a retailer or campus bookstore): (i) A hardcover textbook with WileyPlus, OR (ii) a 3-hole-punched binder-ready textbook with WileyPlus, PR (iii) WileyPlus E-book (stand alone; the E-book version gives online access only and does not include a physical textbook). **AND** PC 1300/1310 Lab Manual

DELIVERY MODE(S): Lectures (TR 8:30-9:50 J201), Seminars (S1 R 13:00-13:50 J229, S2 T 13:00-13:50 J202, Labs (alternating weeks – see Moodle schedule – F 14:30-17:20 J103 and J101)

COURSE OBJECTIVES: This course is designed to be an introduction to university level physics, specifically for students in Engineering. It is assumed that students have mastered or at least been exposed to certain basics in physics (classical physics – forces, Newton's Laws, momentum, geometrical optics, waves, etc.). In this course students will gain knowledge on wave motion, acoustics, and optics. The properties of waves will be discussed. The effect of medium on the properties of waves will be covered. Students will gain knowledge in the reflection interference and diffraction of waves. Students will understand the nature of lenses and their effect on the optical properties.

LEARNING OUTCOMES: Upon successful completion, a student is expected to have:

- Reasonable understanding of concepts of oscillatory motion, superposition of waves, sound and electromagnetic waves, geometrical and physical optics
- Experience with common mathematical and experimental tools, including problem solving for this course.
- Skills collecting and analyzing experimental data.

TRANSFERABILITY: UA, UC, UL, AU, Augustana UA, CUC, GMU, KUC

***Warning:** Although we strive to make the transferability information in this document up-to-date and accurate, **the student has the final responsibility for ensuring the transferability of this course to Alberta Colleges and Universities.** Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at Alberta Transfer Guide main page <http://www.transferalberta.ca> or, if you do not want to navigate through few links, at <http://alis.alberta.ca/ps/tsp/ta/tbi/onlineSearch.html?SearchMode=S&step=2>

**** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

EVALUATIONS:

- Assignments 10% (Online using WileyPlus + Paper)
- Labs 20% (Must pass Lab to pass course)
- Seminars 5%
- Midterm #1 15% (or 0%*) October 12th
- Midterm #2 15% (or 0%*) November 16th
- Final Exam 50% (or 35%*) Cumulative. Time and Location TBA by Registrar's Office

* The lowest midterm will be dropped and its weight will be added to the final exam if it improves your mark

Midterm Exams: Students are allowed a formula sheet (handwritten 8.5 x 11 inch both sides), a calculator (any calculator WITHOUT communication features) and HB pencil(s) and eraser.

Final Exam: This exam is cumulative. Students are allowed the same items as for a midterm exam.

GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:

NOTE: The course schedule is on moodle and may be updated there if necessary. This schedule is preliminary but gives a good idea of which sections in the textbooks you should read to be caught up with the class lectures

Date	Topic	Sections in Halliday, Resnick and Walker
Aug 31 th	Introduction	1-1, 1-2, 1-3
Sept 5 th	Simple Harmonic Motion	15-1, 15-2
Sept 7 th	Mass on Spring, Pendulum	15-4
Sept 12 th	Damped + Forced Harmonic Motion	15-5, 15-6
Sept 12 th /14 th	Seminar – Simple Harmonic Motion	
Sept 14 th	Waves	16-1, 16-2, 16-3
Sept 15 th /22 nd	Lab 1b Thin Lenses	
Sept 19 th	Mathematical Description of Waves	16-4
Sept 19 th /21 st	Seminar – Springs and Pendulums	
Sept 21 st	Wave Equation, Interference of Waves	
Sept 26 th	Standing Waves	16-5
Sept 26 th /28 th	Seminar – Waves	
Sept 28 th	Phasers	16-6
Sept 29 th /Oct 6 th	Lab 2 Oscillations on a Spring	
Oct 3 rd	Sound Waves	17-1, 17-2, 17-4
Oct 3 rd /5 th	Seminar – Standing Waves	
Oct 5 th	Standing Sound Waves	17-5, 17-6
Oct 10 th	Doppler Effect	17-7, 17-8
Oct 10 th /12 th	Seminar – Sound Waves, decibels	
Oct 12 th	Midterm #1	
Oct 13 th /20 th	Lab 3 Standing Waves	
Oct 17 th	Interference of Sound Waves	17-3
Oct 17 th /19 th	Seminar – Midterm problems students found difficult	
Oct 19 th	Light – Reflection, Refraction, Total Internal Reflection (TIR)	33-1,33-5,33-6
Oct 24 th	Mirrors	34-1,34-2
Oct 24 th /26 th	Seminar – Interference of sound waves	
Oct 26 th	Lenses	34-3,34-4
Oct 27 th /Nov 3 rd	Lab- Speed of Sound	
Oct 31 st	Thin Lens Equation	

Oct 31st/Nov 2nd Seminar – Reflection, Refraction, TIR

Nov 2 nd	Multi-Lens Systems	34-6
Nov 7 th	Aberrations, Eye, Camera	
Nov 7 th /9 th	Seminar – Lens, Mirrors	
Nov 9 th	Microscopes, Telescopes	34-5
Nov 14 th	Interference of Light	35-1, 35-4
Nov 14 th /16 th	Seminar - Interference of Light	
Nov 16 th	Midterm #2	
Nov 17 th /24 th	Lab – Interference of Light	
Nov 21 st	Double Slit / Interferometer	35-2, 35-3, 35-5
Nov 21 st /23 rd	Seminar – Midterm problems	students found difficult
Nov 23 rd	Diffraction	36-1,36-2
Nov 28 th	Multi-Slit Diffraction	36-4,36-6
Nov 28 th /30 th	Seminar-Diffraction	
Nov 30 th	Diffraction Grating	36-5
Dec 5 th	Resolving Power	36-3
Dec 7 th	Conclusion	

STUDENT RESPONSIBILITIES:

Refer to the College Policy on Student Rights and Responsibilities at <https://www.gprc.ab.ca/about/administration/policies/fetch.php?ID=69>

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Calendar at <http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at <https://www.gprc.ab.ca/about/administration/policies>

**Note: all Academic and Administrative policies are available on the same page.