



DEPARTMENT OF SCIENCE

COURSE OUTLINE – FALL 2012

PC1300 – WAVE MOTION, OPTICS AND SOUND – 3.8(3-0-3/2) UT

INSTRUCTOR: Dr. Tanvir Sadiq, P.Eng. **PHONE:** 780.539.2865
OFFICE: J 209 **E-MAIL:** tsadiq@gprc.ab.ca

OFFICE HOURS: Tuesdays/Wednesdays, 1530 – 1700 or By Appointment

PREREQUISITE(S)/COREQUISITE: Math 30, Math 31 and Physics 30/MA 1000

REQUIRED TEXT/RESOURCE MATERIALS: Fundamentals of Physics, 9th Edition, Authors: Halliday, Resnick and Walker, Publisher: Wiley

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

CREDIT/CONTACT HOURS: 3.8(3-0-3/2) UT

DELIVERY MODE(S): Lectures, Lab

OBJECTIVES (OPTIONAL): Upon successful completion, a student is expected to have reasonable competency and knowledge of physics governing Wave Motion, Sound and Optics.

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

Note: 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 & Quizzes	10%	(Late Assignments will NOT be marked)
Labs	20%	(Must pass Lab component to pass the course)
Midterm	30%	(October 25, 2012, possibly evening exam)
Final Exam	40%	(Time & Location TBA by Registrar's office)

GRADING CRITERIA:

GRADING CONVERSION CHART – This is a general guideline only.			
Alpha Grade	4-point Equivalent	Percentage Guidelines (General)	Designation
A ⁺	4.0	90 – 100	EXCELLENT
A	4.0	85 – 89	
A ⁻	3.7	80 – 84	FIRST CLASS STANDING
B ⁺	3.3	77 – 79	
B	3.0	73 – 76	GOOD
B ⁻	2.7	70 – 72	
C ⁺	2.3	67 – 69	SATISFACTORY
C	2.0	63 – 66	
C ⁻	1.7	60 – 62	
D ⁺	1.3	55 – 59	MINIMAL PASS
D	1.0	50 – 54	
F	0.0	0 – 49	FAIL
WF	0.0	0	FAIL, withdrawal after the deadline

STUDENT RESPONSIBILITIES:

Students are expected to attend all classes. Stay awake in class. If you miss a class, make arrangements to copy the notes from your class fellows. If you are using older edition of the textbook, you are responsible for matching page numbers, topics, figures, and problems with the editions being used in the class. You are encouraged to ask questions, but do not monopolize the class time. Give others a chance to ask questions as well.

STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the College Admission Guide at <http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at www.gprc.ab.ca/about/administration/policies/**

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

COURSE SCHEDULE:

This course is designed to be an introduction to the University Level Physics, specifically for students interested in Engineering. It is assumed that these students have mastered or at least been exposed to certain basics in physics (Classical Physics - forces, Newton's Laws, momentum, geometrical optics, waves, etc.), plus some more advanced topics including some quantum physics (The Hydrogen atom, energy levels, the electromagnetic spectrum, etc.). The course covers periodic motion, oscillations, mechanical waves, sound waves and light (properties, geometrical optics and interference).

Chapter 1. Measurement

- 1-1 What is Physics?
- 1-2 Measuring Things
- 1-3 The International System of Units
- 1-4 Changing Units
- 1-5 Length
- 1-6 Time
- 1-7 Mass

Chapter 15. Oscillations

- 15-1 What is Physics?
- 15-2 Simple Harmonic Motion
- 15-3 The Force Law for Simple Harmonic Motion
- 15-4 Energy in Simple Harmonic Motion
- 15-5 An Angular Simple Harmonic Oscillator
- 15-6 Simple Pendulum (Physical Pendulum not covered)
- 15-7 Simple Harmonic Motion and Uniform Circular Motion
- 15-8 Damped Simple Harmonic Motion
- 15-9 Forced Oscillations and Resonance

Chapter 16. Waves - I

- 16-1 What is Physics?
- 16-2 Types of Waves
- 16-3 Transverse and Longitudinal Waves
- 16-4 Wavelength and Frequency
- 16-5 The Speed of a Traveling Wave
- 16-6 Wave Speed on a Stretched String
- 16-7 Energy and Power of a Wave Traveling Along a String
- 16-8 The Wave Equation
- 16-9 The Principle of Superposition for Waves
- 16-10 Interference of Waves
- 16-12 Standing Waves
- 16-13 Standing Waves and Resonance

Chapter 17. Waves - II

- 17-1 What is Physics?
- 17-2 Sound Waves

- 17-3 The Speed of Sound
- 17-4 Traveling Sound Waves
- 17-5 Interference
- 17-6 Intensity and Sound Level
- 17-7 Sources of Musical Sound
- 17-8 Beats
- 17-9 The Doppler Effect
- 17-10 Supersonic Speeds, Shock Waves

Chapter 33. Electromagnetic Waves

- 33-1 What is Physics?
- 33-2 Maxwell's Rainbow
- 33-3 The Traveling Electromagnetic Wave, Qualitatively
- 33-7 Polarization
- 33-8 Reflection and Refraction
- 33-9 Total Internal Reflection
- 33-10 Polarization by Reflection

Chapter 34. Images

- 34-1 What is Physics?
- 34-2 Two Types of Image
- 34-3 Plane Mirrors
- 34-4 Spherical Mirrors
- 34-5 Images from Spherical Mirrors
- 34-6 Spherical Refracting Surfaces
- 34-7 Thin Lenses
- 34-9 Three Proofs

Chapter 35. Interference

- 35-1 What Is Physics?
- 35-2 Light as a Wave
- 35-3 Diffraction
- 35-4 Young's Interference Experiment
- 35-5 Coherence
- 35-6 Intensity in Double-Slit Interference
- 35-7 Interference from Thin Films
- 35-8 Michelson's Interferometer

Note: This list is general. Not all topics listed above will be covered with the same degree of detail. Additional/alternate topics may be covered depending on time constraints and student interest.

Mid-term Exam: Formula sheet and calculator required. Formula sheet: one sheet of paper 8.5 x 11 inch, both sides. Calculator: any calculator with no communication features. MID-TERM EXAMINATIONS MISSED FOR ANY REASON WILL NOT BE RESCHEDULED. Students not writing the midterm exam, with a valid excuse (as defined by College policy) will have the midterm weight added to the final exam. This is not automatic, and if you miss the mid-term, you should follow all College guidelines and contact your instructor as soon as possible.

Final Exam: Formula sheet (one sheet of paper 8.5 x 11 inch, both sides), calculator and HB pencil required. Note that since the Final Exam is consolidated you can be tested on any of the material listed below, regardless of whether or not we cover it in-class.

Laboratory Component

Lab No.	Lab Title	
1a	Introduction to lab, Error Analysis	
1b	Geometrical Optics	
2	Oscillations of a Spring	
3	Standing Waves on a String	
4	Speed of Sound in Air	
5	Interference of Light	

IMPORTANT NOTES:

1. YOU MUST PASS THE LABORATORY SECTION (minimum 50 % average) TO PASS THE COURSE.
 All students are expected to come to the laboratory well prepared for the experiment that is to be performed and on time. Pre-lab assignments must be submitted at the start of each lab period. Students are expected to attend all laboratory periods. Absences due to illness must be substantiated by presenting suitable evidence to the Instructor within six days of missing the lab. An opportunity to make up a lab will be given only for **excused absences**.
 The laboratory experiments are designed to allow a well-prepared student to finish all the work within the allotted time. **IT IS YOUR RESPONSIBILITY TO COMPLETE THE LAB ON TIME.** Formal lab reports should be written using the format given in your laboratory manual. Unless instructed otherwise, the lab reports are due at the end of the lab. **LATE LAB REPORTS WILL NOT BE ACCEPTED.**

2. CALCULATOR POLICY: Any type of calculator without communications features may be used during examinations. Smartphones, Blackberries, Tablets/Laptop computers, etc. are prohibited. Cellular phones must be shut off during exams.

3. All assignments, homework, seminars, recitations etc. must be submitted on 8.5 x 11 inch Engineering Paper on the due date during class (if applicable). All work must be neat and legible, done in pencil on one side of the paper and stapled. Leave space between problems or separate them with straight line. Box your final answers. In case you do not receive your submitted work back with the rest of the class, please see me right away to resolve the problem. For further information see the example handout. Please be advised that ***late homework will be awarded zero mark.***