



DEPARTMENT OF SCIENCE

COURSE OUTLINE – FALL 2011

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 12:30 – 2:00 or By Appointment

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

REQUIRED TEXT/RESOURCE MATERIALS: University Physics, 12th Edition, by Young and Freedman, Publisher: Pearson/Addison-Wesley

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

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

EVALUATIONS:

Assignments	10%	(Late Assignments will NOT be marked)
Quiz	5%	(Unannounced or announced)
Labs	20%	(Student must pass Lab component to pass the course)
Midterm	25%	(October 25, 2011, possibly evening exam)
Final Exam	40%	(Time & Location TBA by Registrar's office)

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).

Part 1: Introduction (Ch. 1)

A brief introduction to problem solving in physics. Physical quantities (standards and units). Error and uncertainty, and some math.

Part 2: Oscillations and Waves (Ch. 13)

Oscillations Simple harmonic motion. Harmonic motion and circular motion. Energy in simple harmonic oscillators. Damping and forced oscillations.

Part 3: Mechanical Waves (Ch. 15)

Characteristics of waves. Wavelength and frequency Speed and energy in a travelling wave Standing waves.

Part 4: Sound Waves (Ch. 16)

The characteristics of sound waves. The speed of sound Intensity of sound waves. Superposition of sound waves (interference and beats). Musical instruments. The Doppler effect.

Part 5: Geometrical Optics and Optical Instruments (Ch. 33,34)

The nature of light (particle vs. wave). Reflection and refraction Total internal reflection. Huygens' principle. Plane and spherical mirrors. Plane and spherical lenses. Thin lenses and multiple lens systems. Other optical instruments (the eye, telescopes, microscopes).

Part 6: The Wave Nature of Light: Interference (Ch.35)

Interference and coherent sources. Two slit interference: Young's experiment. Interference in thin films. The Michelson Interferometer.

Part 7: Diffraction (Ch. 36)

Fresnel and Fraunhofer diffraction. Single slit diffraction Multiple slits. Diffraction gratings, X-Ray diffraction. Circular apertures and resolving power.

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.

Laboratory Component

Lab No.	Lab Title	Week of
1a	Introduction to lab, Microsoft Excel, Microsoft Word	Sept 11/18
1b	Oscillations of a Spring	Sept 11/18
2	Standing Waves on a String	Sept 25/Oct 9
3	Speed of Sound in Air	Oct 16/23
4	Geometrical Optics	Oct 30/Nov 13
5	Interference of Light	Nov 20/Dec 4

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. 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.
3. CALCULATOR POLICY: Any type of calculator without communications features may be used during examinations. Palm pilots, Blackberries, laptop computers, etc. are prohibited. Cellular phones must be shut off during exams.
4. All assignments, homework, seminars, recitations etc. must be submitted on 8.5 inch 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.***