

**Grande Prairie Regional College
Department of Science**

**PC 1300 A2 – Wave Motion, Optics and Sound
Fall 2006
3.8(3-0-1.5)UT**

Instructor	Tanvir Sadiq, P.Eng. Office: Room J209 Phone: 539-2865 Email: tsadiq@gprc.ab.ca										
Lectures	T R 8:30 – 9:50 am Room J204										
Laboratory Work	F 14:30 – 15:50 am Room J103 F 16:00 – 17:20 am Room J101										
Marks Distribution	<table style="width: 100%; border: none;"> <tr> <td style="padding-left: 40px;">Assignments</td> <td>10%</td> </tr> <tr> <td style="padding-left: 40px;">Quiz</td> <td>3%</td> </tr> <tr> <td style="padding-left: 40px;">Laboratory</td> <td>20% (Note: Student must pass lab component to pass the course)</td> </tr> <tr> <td style="padding-left: 40px;">Midterm</td> <td>30 %</td> </tr> <tr> <td style="padding-left: 40px;">Comprehensive Final Exam</td> <td>37 %</td> </tr> </table>	Assignments	10%	Quiz	3%	Laboratory	20% (Note: Student must pass lab component to pass the course)	Midterm	30 %	Comprehensive Final Exam	37 %
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Comprehensive Final Exam	37 %										
Exams	Midterm: <i>Date:</i> Thursday, October 26, 2006 <i>Time:</i> 1730 – 1930 hrs, <i>Place:</i> TBA Final: <i>Date, Time & Place:</i> TBA										
Textbook	<i>University Physics, 11th Edition</i> Hugh D. Young and Roger A. Freedman Pearson/Addison-Wesley										
Laboratory Manual	<i>Phys 130/En Ph 131 Laboratory Manual</i> Department of Physics University of Alberta										
Office Hours	<i>16:00 – 17:00 (Mondays)</i> <i>12:00 – 13:00 (Fridays)</i>										

Course Description and Syllabus

Calendar Description

PC 1300 3.8(3-0-1.5) UT – Wave Motion, Optics and Sound

This course includes: geometrical optics, optical instruments, oscillations, waves, sound, interference, and diffraction.

Prerequisites: Pure Mathematics 30, Mathematics 31 and Physics 30.

Co-requisites: MA 1000

Syllabus

Part I: Introduction & Geometric Optics (Ch. 32, 33 and 34)

1a. Introduction

1b. The Nature and Propagation of Light

- 1.1. The nature of light, wavefronts and ray approximation
- 1.2. Reflection and refraction
- 1.3. Dispersion and Polarization
- 1.4. Huygen's Principle
- 1.5. Reflection and Refraction at a Plane Surface
- 1.6. Reflection and Refraction at a Spherical Surface
- 1.7. Thin lenses
- 1.8. Optical instruments (magnifying glass, human eye, camera, microscope, telescope)

Part III: Oscillations and Waves (Chapters 13, 15 and 16)

2. Periodic Motion (Chapter 13)

- 2.1. Oscillations
- 2.2. Simple harmonic motion
- 2.3. Harmonic motion and circular motion
- 2.4. Energy in simple harmonic oscillations
- 2.5. Applications of Simple Harmonic Motion
- 2.6. The simple and physical pendulums
- 2.7. Damped and forced oscillations; Resonance

3. Mechanical Waves (Chapter 15)

- 3.1. Characteristics of waves; transverse and longitudinal waves; wavelength and frequency
- 3.2. Mathematical description of a wave
- 3.3. Speed of a transverse wave
- 3.4. Energy in wave motion
- 3.5. Wave interference, boundary conditions and superposition
- 3.6. Standing waves on a string
- 3.7. Normal modes of a string

4. Sound and Hearing (Chapter 16)

- 4.1. Characteristics of sound waves
- 4.2. Speed of sound
- 4.3. Sound intensity
- 4.4. Standing sound waves and normal modes
- 4.5. Resonance
- 4.6. Interference of waves; beats
- 4.7. The Doppler Effect; Shock waves

Part IV: Physical Optics (Chapters 35 and 36)

5. Interference (Chapter 35)

- 5.1. Interference and coherent sources
- 5.2. Two-Source interference of light
- 5.3. Intensity in interference patterns
- 5.4. Thin films

6. Diffraction (Chapter 36)

- 6.1. Fresnel and Fraunhofer diffraction
- 6.2. Diffraction from a single slit
- 6.3. Intensity in the single-slit pattern
- 6.4. Multiple slits
- 6.5. The diffraction grating
- 6.6. Circular apertures and resolving power

Laboratory Component

Lab No.	Lab Title	Week of
1	Introduction to lab, Microsoft Excel, Microsoft Word	Sept. 10/17
2	Geometrical Optics	Sept. 24/Oct. 1
3	Oscillations of a Spring	Oct. 8/15
4	Standing Waves on a String	Oct. 22/29
5	Speed of Sound in Air	Nov. 5/12
6	Interference of Light	Nov. 19/26

Note:

- All assignments, homeworks, seminars, recitations etc. must be submitted on 8.5 x 11 in. Engineering Paper on the due date during class (if applicable). All work must be neat and legible, done in pencil, stapled and folded length-wise with the following information appearing on the outer left fold.
 - **Your Last Name, First Name**
 - **Your College/Student ID**
 - **Course No. and Course Name**
 - **Assignment No.**
 - **Due Date**

- Leave space between problems. Box your final answers.

- Late homework will NOT be accepted.

- 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.