

PC 237 A3 Wave Motion and Electricity  
4.3(3-1-1.5) UT(4.3) Winter

U of A Equivalent - Phys 137

Course Outline

Instructor: Dr. Jaime P. Santiago  
J209  
539-2865 (Office)  
539-4534 (Residence)

Prerequisites: PC 231 Mechanics

Co-requisite: MA 213 or consent of department

Lecture: T R 9:30 - 10:50 a.m.

Laboratory: T 3:00 - 5:50 p.m.

Seminar: S1 R 1:30 - 2:20 p.m.  
S2 T 1:30 - 2:20 p.m.

Textbook: **Fundamentals of Physics, 3rd Edition**  
by David Halliday and Robert Resnick

Laboratory Manual: **Physics 131/137/141/143 Laboratory Manual**  
University of Alberta  
Physics Department

Assignments: 10 assignment problem sets  
20% deduction for 1 day late assignments  
No assignment late more than 1 day will be accepted.

MARKS:	Assignments	15%
	Quizzes	10%
	Midterm Exam	20%
	Final Exam	39%
	Laboratory Work	16%

**COURSE MATERIAL:**

Lec. No.	Date	Day	Chap	Sections	Topics
1	Jan. 7	T	14	14-1, 14-2, 14-3	First and Second Order Linear Differential Equations, Hooke's Law, Simple Harmonic Oscillator
2	Jan. 9	R	14	14-4, 14-5, 14-6, 14-7	Simple Harmonic Motion, Energy of Simple Harmonic Oscillation, Simple Harmonic Motion and Uniform Circular Motion
3	Jan. 14	T	14	14-8, 14-9	Damped Harmonic Motion, Forced Oscillations, Resonance
4	Jan. 16	R	17	17-1, 17-2, 17-3, 17-4, 17-5	Wave Motion, wavelength, period, frequency, phase velocity
5	Jan. 21	T	17	17-6, 17-8, 17-9	Waves on a Stretched String: wave speed, energy, power Superposition Principle
6	Jan. 23	R	17	17-11, 17-12, 17-13	Wave interference, Standing Waves, Resonance
7	Jan. 28	T	18	18-1, 18-2, 18-3, 18-4, 18-5	Sound: velocity, displacement, pressure, intensity, level Musical Instruments
8	Jan. 30	R	18	18-6, 18-7	Beats, Doppler Effect

Lec. No.	Date	Day	Chap	Sections	Topics
9	Feb. 4	T	23	23-1, 23-2, 23-3, 23-5, 23-6	Electromagnetism, Electric charge, Quantization and Conservation of Charge, Conductors and Insulators
10	Feb. 6	R	23, 24	23-4 24-1, 24-2	Coulomb's Law Electric Field
11	Feb. 11	T	24	24-3, 24-4, 24-5	Lines of Force, Electric Field due to Point Charge and Dipole
12	Feb. 13	R	24	24-6, 24-7, 24-8, 24-9	Calculation of E field for Ring and Disk Point charges and dipoles in Electric Field
13	Feb. 18	T	25	25-1, 25-2, 25-3, 25-4, 25-5	Flux, Flux of Electric Field, Gauss' Law
	Feb. 20	R	Midterm Exam		Chapters 14, 17, 18, 23, 24
	Feb. 25, 27	T,R	Winter Break		
14	Mar. 3	T	25	25-5, 25-6, 25-7, 25-8	Gauss' Law, Coulomb's Law, Charged Isolated Conductor, Test of Coulomb's Law
15	Mar. 5	R	25	25-9, 25-10, 25-11	Electric Field Calculations Using Gauss' Law

Lec. No.	Date	Day	Chap	Sections	Topics
16	Mar. 10	T	26	26-1, 26-2, 26-3	Potential Energy, Electric Potential, Equipotential Surfaces
17	Mar. 12	R	26	26-4, 26-5, 26-6	Calculations of V from E
18	Mar. 17	T	26	26-7, 26-8, 26-9, 26-10	Electric Potential for Charged Disk, Calculating E from V, Potential Energy, Insulated Conductor
19	Mar. 19	R	27	27-1, 27-2, 27-3	Capacitance
20	Mar. 24	T	27	27-4, 27-5	Capacitors in Series and in Parallel, Energy Stored in capacitors
21	Mar. 26	R	27	27-6, 27-7, 27-8	Dielectrics, Capacitance and Gauss' Law with Dielectrics
22	Mar. 31	T	28	28-1, 28-2, 28-3, 28-4	Electric Current, Current Density, Resistance
23	Apr. 2	R	28	28-4, 28-5, 28-6, 28-7	Resistivity, Ohm's Law, Energy, Power
24	Apr. 7	T	29	29-1, 29-2, 29-3	Electromotive Force, Analysis of Single Loop Circuits

Lec. No.	Date	Day	Chap	Sections	Topics
25	Apr. 9	R	29	29-4, 29-5	Battery Internal Resistance, Voltage Source resistance, Potential Difference, Multiloop Circuits
26	Apr. 14	T	29	29-6, 29-7	Multiloop Circuits, Measuring Instruments
27	Apr. 16	R	29 Notes	29-8	RC Circuits Equivalent Circuits

#### LABORATORY WORK

Laboratory Marking: Prelab           5 marks  
                                   Lab Report       10 marks

Prelab work will be collected at the start of each lab period and marked during the lab period.

Laboratory reports are due at the end of the laboratory period. No late laboratory report will be accepted.

#### LABORATORY SCHEDULE

No.	Dates	Expt. No.	Title
1	Jan. 14/21	18	The Oscilloscope
2	Jan. 28/Feb. 4	14 15	Standing Waves in Air Standing Waves on a String
3	Feb. 11/Mar. 3	16	Electrostatics:Coulomb's Law
4	Mar. 10/17	17	Mapping of Electric Fields
5	Mar. 24/31	20	Simple Electric Circuits