Registrar

Grande Prairie Regional College

PC 337 A3 Electromagnetism and Optics
3(3-0-1.5) UT(3) Winter 92
U of A Equivalent - Phys 238

Course Outline

Instructor	Dr. Jaime P. Santiago J209 539-2865 (Office) 539-4534 (Residence)
Prerequisites:	PC 237 or PC 243
Lecture:	M W F 12:00 - 1:00 p.m.
Laboratory:	W 3:00 - 5:50 p.m.
Textbook:	**Fundamentals of Physics, 3rd Edition** by David Halliday and Robert Resnick
Laboratory Manual:	**Physics 204/238 Laboratory Manual** University of Alberta Physics Department
Assignments:	10 assignment problem sets No late assignment will be accepted.

MARKS:	Assignments	15%
	Laboratory	15%[1]
	Midterm Exam	20%[2]
	Final Exam	50%[3]

Notes:

1. An average of 50% must be obtained in laboratory work in order to pass the course.
2. An average of 45% in written examinations must be obtained to pass the course.
3. There is no supplemental or final examination re-write.

COURSE MATERIAL:

Lec. No.	Date	Day	Chap	Sections	Topics
	Jan. 6	M			Course Orientation
1	Jan. 8	W	30	30-1, 30-2, 30-3	The Magnetic Field, Definition of B, Discovering the Electron
2	Jan. 10	F	30	30-4, 30-5, 30-6	The Hall Effect, A Circulating Charge, Cyclotrons and Synchrotrons
3	Jan. 13	M	30	30-7	The Magnetic Force on a Current
4	Jan. 15	W	30	30-8, 30-9	Torque on a Current Loop, Magnetic Dipole
5	Jan. 17	F	31	31-1, 31-2	Current and the Magnetic Field, Biot-Savart Law
6	Jan. 20	M	31	31-3, 31-4	The Magnetic Force on a Current-Carrying Wire, Two Parallel Conductors
7	Jan. 22	W	31	31-5	Ampere's Law
8	Jan. 24	F	31	31-6	Solenoids and Toroids
9	Jan. 27	M	31	31-7	Current Loop as a Magnetic Dipole

Lec. No.	Date	Day	Chap	Sections	Topics
10	Jan. 29	W	32	32-1, 32-2, 32-3	Two Symmetries, Two Experiments, Faraday's Law of Induction
11	Jan. 31	F	32	32-4, 32-5	Lenz's Law, Induction
12	Feb. 3	M	32	32-6, 32-7	Induced Electric Fields, Betatron
13	Feb. 5	W	33	33-1, 33-2, 33-3	Capacitors and Inductors, Inductance, Self-Inductance
14	Feb. 7	F	33	33-4	LR Circuit
15	Feb. 10	M	33	33-5, 33-6, 33-7	Energy and the Magnetic Field, Energy Density and the Magnetic Field, Mutual Inductance
16	Feb. 12	W	34	34-1, 34-2, 34-3	Magnets, Magnetism and the Electron, Orbital Angular Momentum and the Electron
17	Feb. 14	F	34	34-4, 34-5	Gauss's Law for Magnetism, The Magnetism of the Earth
18	Feb. 17	M	34	34-6, 34-7, 34-8, 34-9	Paramagnetism, Diamagnetism, Ferromagnetism, Nuclear Magnetism
19	Feb. 19	W			Midterm Review

Lec. No.	Date	Day	Chap	Sections	Topics
	Feb. 19			**Midterm Exam**	**Chapters 30, 31, 32, 33, 34**
20	Feb. 21	F	37	37-1, 37-2, 37-3	Pulling Things Together, Maxwell's Equations, Induced Magnetic Fields
	Feb. 25, 27			**Winter Break**	
21	Mar. 2	M	37	37-4, 37-5	Displacement Current, Maxwell's Equations
22	Mar. 4	W	38	38-1, 38-2, 38-3	Maxwell's Rainbow, Generating EM Waves, Travelling EM Waves
23	Mar. 6	F	38	38-4	Travelling EM Waves
24	Mar. 9	M	38	38-5	Energy Transport and the Poynting Vector
25	Mar. 11	W	38	38-6, 38-7, 38-8	Radiation Pressure, Polarization, Speed of Electromagnetic Waves
26	Mar. 13	F	39	39-1, 39-2	Geometrical Optics, Reflection and Refraction
27	Mar. 16	M	39	39-3, 39-4	Total Internal Reflection, Polarization by Reflection

Lec. No.	Date	Day	Chap	Sections	Topics
28	Mar. 18	W	39	39-5, 39-6	Plane Mirrors, Spherical Mirrors
29	Mar. 20	F	39	39-7	Ray Tracing
30	Mar. 23	M	39	39-11, 39-8	Three Proofs, Spherical Refracting Surfaces
31	Mar. 25	W	39	39-9, 39-10	Thin Lenses, Optical Instruments
32	Mar. 27	F	40	40-1, 40-2	Interference, Light as a Wave
33	Mar. 30	M	40	40-3, 40-4	Diffraction, Young's Experiment
34	April 1	W	40	40-5, 40-6	Coherence, Intensity in Double-slit experiment
35	April 3	F	40	40-7, 40-8	Interference in Thin Films, Michelson's Interferometer
36	April 6	M	41	41-1, 41-2	Diffraction and the Wave Theory of Light
37	April 8	W	41	41-3, 41-4, 41-5	Diffraction from a Single Slit
38	April 10	F	41	41-6, 41-7	Diffraction from a Circular Aperture, Double Slit

39	April 13	M	41	41-8, 41-9	Multiple Slits, Diffraction Grating
40	April 15	W	41	41-10, 41-11	Dispersion and Resolving Power of Gratings, X-ray diffraction

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. 15	3	Measurement of e/m for Electrons
2	Jan. 29 (Feb. 26)	4	Electromagnetism
3	Feb. 12 (March 25)	5	The Magnetic Coil Balance
4	Mar. 25 (April 1)	8	Geometric Optics
5	April 8	10	Interference of Light

Note: Dates in parenthesis indicate earliest possible lab dates to use borrowed U of A equipment.