PHYS 210 ELECTRICITY AND MAGNETISM

A calculus-based course in electricity and magnetism. Topics include electrostatics; capacitance; dielectrics; electric circuits; magnetic fields; electromagnetic induction; Maxwell's equations.

OFFERED:	Winter, Quarter 1
CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 2 lab (Semester) 5 lecture, 2 lab (Quarter 1)
PREREQUISITES:	Physics 115 and Math 101or admission to the ENGBRIDGE program. *Math 235 or Math 250A recommended.*

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Office Hours:	M,T,W,Th – 11:30 - 12:30

REQUIRED MATERIALS:

Textbook: Physics for Scientists & Engineers with Modern Physics, 7th edition, Serway, R.A., and Jewett, J.W.Jr.

Physics 210 lab manual

DEPARTMENT POLICIES REGARDING TESTING:

1. The final exam will cover the entire course and will be 3 hours long. As stated in the current college calendar on page 39, "students are expected to write tests and final exams at the scheduled time and place." Exceptions will only be considered due to emergency circumstances as outlined in the calendar. Holidays or scheduled flights are not considered to be emergencies.

2. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test or provide a make-up test only in the event of documented illness or other extenuating circumstances.

TERM TESTS

There will be 2 term tests given during the tutorial hour on Friday from 11:30 - 12:30 in Portable 101 and 103. All students will write during that time. The cutoff for test material will be the Wednesday before the Friday tests. All tests will be cumulative, which means they will cover material from the beginning of the course up to the current material. Test dates are:

Test #1	Friday Oct. 17
Test #2	Friday Nov. 14

DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances.

2. At the discretion of the instructor, a student who is repeating this Physics course may apply for lab exemption.

Physics 210 Labs

Students will work in pairs in the lab and will hand in one common report for each pair. The lab schedule is in a separate document. Labs are due at 3:30 on the next scheduled lab period.

GRADING

The mark distribution for this course is as follows:

Final Exam	50%
2 Midterms	25%
Lab Reports	15%
6 tutorial quizzes	10%
	100%

GRADE SCALE

Percentage	Letter Grade
90 to 100	A+
85 to 89	A
80 to 84	A-
77 to 79	B+
73 to 76	B
70 to 72	B-
65 to 69	C+
60 to 64	C
50 to 59	D
Below 50	F

Course Content:

Chapter 23 – Electric Fields
Chapter 24 – Gauss's Law
Chapter 25 – Electric Potential
Chapter 26 – Capacitance and Dielectrics
Chapter 27 – Current and Resistance
Chapter 28 – Electric Circuits
Chapter 29, 30 – Magnetic Fields
Chapter 31 – Faraday's Law
Chapter 32 – Inductance

OUTLINE:

1. **Electric charge**

    1.1 Electromagnetism as a fundamental force of nature
    1.2 Coulomb's law
    1.3 Conservation and quantization of charge

2. **The Electric Field**

    2.1 Electric field calculations for charge distributions of high symmetry
    2.2 Electric flux
    2.3 Gauss' law

3. **Electric Potential**

    3.1 Equipotential surfaces
    3.2 Calculation of potential due to charge distributions of high symmetry

4. **Capacitance**

    4.1 Combinations of capacitors
    4.2 Energy storage in capacitors
    4.3 Dielectrics

5. **Electrical circuits**

    5.1 Series and parallel circuits
    5.2 Kirchhoff's rules

6. **Magnetism**

    6.1 Force on a current-carrying conductor

6.2 Torque on a current loop
6.3 The magnetic dipole
6.4 Magnetic flux

7. **Sources of Magnetic Fields**

7.1 The Biot-Savart law
7.2 Ampere's law
7.3 Magnetic force on a current-carrying wire
7.4 Solenoids and toroids

8. **Electromagnetic Induction**

8.1 Faraday's law
8.2 Lenz's law
8.3 Eddy currents

9. ***Introduction to Maxwell's equations***

10. **Inductance (optional)**

9.1 Capacitors and inductance
9.2 Inductance
9.3 Self-inductance
9.4 The LR circuit
9.5 Stored energy in the magnetic field of an inductor