SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Language*
PHY	**220**	**Electricity and Magnetism**	**3**	**2**	**0**	**2**	**4**	**PHY 105, MAT 102**	**4**	**English**

A. Course Description

This course covers the foundation of electricity and magnetism. In this course, students will develop solid and systematic problem solving skills, and to lay the foundations for further studies in physics. It begins with electric fields, Gauss' law, and electric potential. Capacitance and dielectrics are introduced, and then the course moves to the magnetic field, faraday's law, inductance, alternating current circuits. The course is designed to provide students with a working knowledge of the elementary physics principles mentioned above, as well as their applications, and to enhance their conceptual understanding of physical laws.

B. Course Outcomes

At the end of this course the student will be able to**:**

1. Provide the basic concepts and build a strong foundation in the principles of electricity and magnetism.
2. Analyze different physical situations and phenomena in terms of the fundamental laws of electricity and magnetism.
3. Understand how these principles are applied in the world around us.
4. Demonstrate competence with a wide variety of mathematical tools and techniques.

C. References

Required Textbook

Serway R.A. and Jewett J.W., ***Physics for Scientists and Engineers with Modern Physics,*** 9th Edition, Brooks/Cole, Belmont, CA, USA (2014).

Other references

Halliday D. and Resnick R., ***Physics,*** 9thEdition, John wiley & sons (2011).

Course Website: http://www.imamm.org/

D. Topics Outline

1. ***Electric Fields:*** *Electric charges, Coulomb's law, the electric field, electric field of a continuous charge distribution, motion of charged particles in a uniform electric field (*Contact hours*: 8).*
2. ***Gauss's Law:*** *electric field lines, electric flux, Gauss's law, application of Gauss's law to various charge distributions, conductors in electrostatic equilibrium (*Contact hours*: 6).*
3. ***Electric Potential:*** *Potential energy and electric potential, electric potential difference in a uniform electric field, electric potential due to point charges, obtaining the value of the electric field from the electric potential, electric potential due to continuous charge distributions, electric potential due to charged conductor, application of electrostatics (*Contact hours*: 8).*
4. ***Capacitance and dielectrics:*** *Definition of capacitance, calculating capacitance for parallel plate capacitors, connection of capacitors, energy stored in a charged capacitor, capacitors with dielectrics, RC circuits (*Contact hours*: 8).*

5. ***Sources of the Magnetic Field:*** *The Biot-Savart's law, the magnetic force between two parallel conductors, Ampere's law, the magnetic field of a solenoid, magnetic flux, Gauss's law in magnetism, displacement current and the generalized Ampere's law (*Contact hours*: 8).*
6. ***Faraday's law:*** *Faraday's law of induction, motional emf, Lenz's law, induced emfs and electric fields, generators and motors, Eddy currents (*Contact hours*: 8).*
7. ***Inductance:*** *Self-inductance, RL circuits, energy in a magnetic field, mutual inductance, oscillation in an LC circuit, the RLC circuit (*Contact hours*: 8).*
8. ***Alternating Current Circuits:*** *AC sources, resistors in an AC circuit, inductors in an AC circuit, capacitors in an AC circuit, the RLC series circuit, Power in an AC circuit, resonance in a series RLC circuit, the transformer (*Contact hours*: 6).*

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam**: 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	**Midterm 2:** 20 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Workload

#	Teaching/Learning activities	Contact hours	Frequency	Total contact hours	Self-study hours	Total self-study hours	Student learning time
1	Lecture	2	15	30	1	15	45
2	Tutorial	2	15	30	1	15	45
3	Lab\practical	0	0	0	0	0	0
4	Homework	0	4	0	2	8	8
5	Quiz	0.5	2	1	1	2	3
6	Midterm	1.5	2	3	5	10	13
7	Final Exam	2	1	2	12	12	14
Total				**66**		**62**	**128**

The independent self-study is approximately 4 hours per week.

H. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3