Department of Physical Sciences
School Of Engineering and Computer Science
Independent University, Bangladesh

Course Outline of
University Physics - II

Course No : PHY 102   **Semester : Spring 2017**   **Section : all**

This is one of the courses offered by the university, which fulfills the requirement of Basic Sciences for graduation from the university. This course is mandatory for the students who wish to major in Physics, Mathematics, CS & CSE. The course forms a one-year standard course in University Physics. It is highly recommended that the students must have a fair amount of background in mathematics. Specially, knowledge of Calculus will be required sometimes. The course will lay emphasis mainly upon physical description of processes rather than complicated mathematical derivations.

Assessment and Grading Procedures

Students are required to come to the class on time. None will be allowed to enter the class later than 5 minutes from the start of the class. Students are requested to follow the attendance policy strictly which has been set by the university.

Home assignment and problems will be assigned for practice, regularly. Students must submit the assignment within due date declared by faculty. Assessment will be based on the following weighting:

Class Test – I	**: 15%**
Midterm Exam	**: 25%**
Class Test – II	**: 15%**
Assignments and Attendance	**: 15%**
Final Exam	**: 30%**

Note: The students are advised to sit in the exam in the prescribed dates, no extensions or alternative times are possible. No extra test will be arranged for the students who will fail to sit for their test on prescribed dates

At the end of the course a letter grade will be awarded to students based upon their performance in all tests conducted over the length of the semester. The break up of the final grade will be calculated with the following schedule

85% and above	**A**	60% to less than 65% :	**C+**
80% to less than 85%:	**A-**	55% to less than 60%:	**C**
75% to less than 80%:	**B+**	50% to less than 55%:	**C-**
70% to less than 75%	**B**	40% to less than 50%:	**D**
65% to less than 70%:	**B-**	Below 40%:	**F**

References

1. *University Physics*: Sears; Zemansky and Young: Addition Wesley Publishing Company: 10th edition.
2. *Fundamentals of Physics*: David Halliday; Robert Resnick; Jearl Walker: John Wiley & Sons, Inc. : 9th edition.

3. *Foundation of Electromagnetic Theory*: J. Reitz; F. Milford and R. Christy: Addison-Wesley: 4th edition.

Tentative Dates of the Exams

(These dates may be changed with prior notification, if unavoidable circumstances arise**)**

Class Test – I : 31st January**,** 2017, Tuesday [Syllabus : Ch.1 of the course outline]
Midterm Exam : 19th February**,** 2017, Sunday [Syllabus : Ch.2, Ch.3 & Ch. 4 of the course outline]
Class Test – II : 7th March**,** 2017, Tuesday [Syllabus : Ch.5 of the course outline]
Final Exam   : According to the green book [Syllabus : Ch. 6, Ch.7, Ch.8, Ch. 9]

Course Description

1. Introduction; Coulomb's law; Electric Field and Gauss's Law : Concept of charge; Coulomb's law; Concept of electric field and its calculation; Electric dipole; Gauss's law in electrostatic and its application. Electric field due to dipole, Torque on a dipole in uniform E-field, Gausses law in differential form.

2. Electric Potential: Electric potential and its calculation; Electric potential energy; Relationship between Field and Potential; Equipotential surface; Potential gradient.

3. (i). Capacitance and Dielectric : Capacitors; Capacitors in series and parallel; Energy of charged capacitors; Electrical energy density in terms of electric field; concept of electron volt.

   (ii). Dielectric media, polarization vector & displacement vector. Capacitor with a dielectric material. Gausses law with dielectric.

4. Current; Resistance; Electromotive force: Current and current density; Resistance and Resistivity; Ohm's law; EMF Power; Resistance in series and parallel; Kirchhoff's Rules.

5. Magnetic Field : Magnetic field; Magnetic flux; Lorentz Force; Gauss's law for magnetism; Motion of a charged particles in magnetic field : Hall effect; Magnetic field intensity; Biot-Savart Law; Ampere's law and its applications; Magnetic properties of matter; paramagnet; diamagnet and ferromagnet; Magnetization vector; Hysteresis..

6. Inductions and Inductance : Induced emf and Faraday's law of induction; Lenz's law; Mutual inductance ; Self inductance; Energy in an inductor; Transformers.

7. Direct Current (DC) Circuits : R-C circuit; R-L circuit; L-C circuit; R-L-C circuit.

8. Alternating Currents (AC) : Introduction; Circuit containing resistance (R), inductance (L) or capacitance(C) ; The R-L-C Series circuit; Average and rms values; Power in AC circuits; Series resonance.

9. Electromagnetic Waves : Introduction; Speed of an electromagnetic wave; Energy in electromagnetic waves; Properties of electromagnetic waves; Maxwell equations.

No. of Lectures	Contents	Reference
1.	**Chapter 1** : Introduction and general discussion about the course, grading system etc. Concept of charge; Coulomb's law;	Ref 1: Page: 457-468
2.	**Chapter 1** : Concept of electric field and its calculation; Electric dipole; Gauss's law in electrostatic and its application	Ref 1: page: 470-493
3.	Exercises on Coulomb's law; Electric Field and Gauss's Law	Problem sheet and Ref 1
4.	**Chapter 2** : Electric potential and its calculation; Electric potential energy; Relationship between Field and Potential; Equipotential surface; Potential gradient.	Ref 1 : page: 494-515
5.	Exercises on Electric potential	Problem sheet and Ref 1
6.	**Class Test -I**	**Syllabus: Ch 1**
7.	**Chapter 3** : Capacitor and Capacitance; Energy of charged capacitors; Electrical energy density in terms of electric field; Effects of dielectric	Ref 1: page: 516-533
8.	**Chapter 3** : Capacitors in series and parallel.	Ref 1: page: 519-533
9.	Exercises on Capacitance and properties of Dielectric	Problem sheet and Ref 1
10.	**Chapter 4** : Current and current density; Resistance and Resistivity; Ohm's law; EMF Power;	Ref 1: page: 534-550
11.	**Chapter 4** : Resistance in series and parallel; Kirchhoff's Rules.	Ref 1 : page: 562-570
12.	Exercises on Current and Resistance	Problem sheet and Ref 1
13.	**Midterm Test**	**Syllabus : Ch 2, 3 & Ch 4**
14.	**Chapter 5** : Magnetic field; Magnetic flux; Lorentz Force; Gauss's law for magnetism; Motion of a charged particles in magnetic field, Ampere's law and its applications	Ref 1 : page: 583-598;619-621
15.	**Chapter 5** : Hall Effect; Magnetic field intensity; Biot-Savart Law; Magnetic properties of matter; paramagnet; diamagnet and ferromagnet; Magnetization vector; Hysteresis.	Ref 1 : page: 596-606
16.	Exercises on Magnetic Field	Problem sheet and Ref 1
17.	**Chapter 6:** Induced emf and Faraday's law of induction; Lenz's law Mutual inductance; Self inductance; Energy in an inductor; Transformers.	Ref 1 : page: 630-642;649-652
18.	Exercises on Inductions and Inductance	Problem sheet and Ref 1
19.	**Class Test -II**	**Syllabus : Ch 5**
20.	**Chapter 7:** Direct Current (DC) Circuits : R-C circuit; R-L circuit; R-L-C circuit.	Ref 1: page: 571,653,656, 658
21.	Exercises on Direct Current (DC) Circuits	Problem sheet and Ref 1
22.	**Chapter 8:** Alternating Currents (AC): Introduction; Circuit containing resistance (R), inductance (L) or capacitance(C) ;	Ref 1: page: 678-690

23.	**Chapter 8:** The R-L-C Series circuit; Average and rms values; Power in AC circuits; Series resonance.	Ref 1: page: 678-690
24.	Exercises on Alternating Currents (AC)	Problem sheet and Ref 1
25.	**Chapter 9:** Electromagnetic Waves : Introduction; Speed of an electromagnetic wave; Energy in electromagnetic waves; Properties of electromagnetic waves; Maxwell equations	Ref 1 : page: 696-707
26.	**Final Exam**	**Syllabus : Ch 6-9**