



Philadelphia University
Faculty of Science
Department of Basic Sciences / Mathematics.

211104, Applied Physics / Tentative Content

Providing Department : Basic Sciences / Mathematics, Faculty of Science

Module Coordinator(s) : **Dr. Zuheir El-bayyari**

Level : 1

Credit : 3 credit hours

Prerequisite : None

Lecturer(s) : **Dr. Zuheir El-bayyari and Dr. Shatha Al-azzawi**

Aims:

This module will introduce the student to the basic language and ideas of physics that occur in all branches of science and technology. The main objective of this introductory physics course is to provide the students with a clear and logical presentation of the basic concepts and principles of physics, and to strengthen their understanding through a broad range of interesting applications to the real world

Teaching Method :

Duration: 16 weeks in first semester, 48 hours in total

Lectures: 45 hours in total, 3 per week (including two 1-hour midterm exams)

Tutorials: 13 in total, 1 per week.

Learning Outcomes:

By the end of this course the student is expected to gain understanding of the basic laws that govern everything in our world from the subatomic to the cosmic scale and will also learn much that will be important in his or her work in the science. The study of physics as a basic science is not particularly easy, but we believe it is rewarding, particularly for students planning further training in related sciences. This will be accomplished by understanding principles of motion of a particle, mechanical energy, electric charge and force, electric field, Gauss's law, electric potential and electrostatic energy, capacitance, current and resistance, elements of circuit analysis and Kirchhoff's laws, magnetostatics, and sources of magnetic field.

Assessment of Learning Outcomes

All learning outcomes are assessed by two tests during the semester, a final examination, and by a variety of assignments.

Mode of Assessment:

Two 1-hour midterm exams (20 % each); assignments (10 %); Final (unseen) 2-hours examination (50%).

Syllabus:

- **Vectors** : Coordinates systems and frames of reference, vectors and scalars, some properties of vectors, components of a vector and unit vectors, the scalar product of two vectors, the vector product [5 hours].
- **Kinematics:** Displacement, Average velocity, Instantaneous velocity, average acceleration, instantaneous acceleration, one dimensional motion with a constant acceleration, applications. [3 hours].
- **The Laws of Motion:** The concept of force, Newton's first law and inertial frames, inertial mass, Newton's second law, weight, Newton's third law, some applications of Newton's laws, uniform circular motion [5 hours].
- **Work and Energy:** Introduction, work done by a constant force, work and kinetic energy, applications [3 hours].

- **Charge and Matter:** Introduction to electrostatics, Insulators and conductors, definition of average and instantaneous electric current, Coulomb's law, and electrical forces with some applications [2 hours].
- **Electric Field :** Definition, properties of electric field, electric field lines, calculations of the electric field with some applications, motion of a charged particle in a uniform electric field. [4 hours].
- **Gauss's Law :** Electric flux, Gauss's law, applications of Gauss's law to electrostatics [3 hours].
- **Electric Potential:** Basic definition, potential difference between two points and electric potential, potential difference in a uniform and nonuniform electric fields, electric potential energy due to point charges, applications to electrostatics [4 hours].
- **Capacitance and Dielectrics:** Definition of capacitance, calculation of capacitance, capacitors networks, energy stored in a capacitor [3 hours].
- **Current and Resistance:** Electric current, resistance and Ohm's law, resistivity of different conductors, superconductors, electrical energy and power [3 hours].
- **Direct current Circuits:** Electromotive force, resistors networks, Kirchhoff's laws, RC circuits [4 hours].
- **Magnetic Field:** Introduction, definition and properties, magnetic force on a current carrying conductor, motion of a charged particles in a magnetic field, applications of the motion of a charged particle in a magnetic field [4 hours].
- **Sources of the Magnetic Field (Optional):** The Biot-Savart law, the magnetic force between two parallel conductors, Ampere's law, magnetic flux [3 hours].

Course Time Table:

Week	Subject
1	Vectors
2	Vectors
3	Kinematics
4	The laws of Motion
5	The laws of Motion
6	Work and Energy
7	Charge and Matter, Electric Field Last day for the first exam. Time table will be announced by the Department of Basic Sciences
8	Electric Field , Gauss's law
9	Gauss's law
10	Electric Potential
11	Capacitance and Dielectrics
12	Current and resistance Last day for the second exam. Time table will be announced by the Department of Basic Sciences
13	Current and resistance
14	Direct current circuits
15	Direct current circuits, Magnetic field
16	Final Exam

Attendance Policy :

Lecture attendance is mandatory. The course notes and the textbook are not comprehensive, and additional material will be covered in lectures. The student is responsible for all material covered in lectures.

Expected Workload:

On average you should expect to spend about 9 hours per week on this module.

Important Dates :

1. 1st and 2nd exams dates will be announced by the Department of Basic Sciences for the whole sections.
2. Report Submission: Three weeks before the final exam date.
3. Final Exam : announced by the admission and registration office, please always check !!.

Feedback:

Concerns or complaints should be expressed directly and immediately to the course lecturer. At the end of the course, the students will fill a course evaluation form, evaluating the course contents, its teaching, the learning, assessment methods, and the lecturer. Analysis of the students feedback will be useful to improve the quality of teaching and learning processes and related activities.

Textbooks and Supporting Material:**Recommended texts:**

- 1- Raymond A. Serway, **Physics for Scientists and Engineers**, 4th edition, Saunders Golden Sunburst Series, 1990.

Supplementary texts:

- 1- D. Halliday and R. Resnick **Fundamentals of Physics**, 6th edition , 2002 (ISBN:0471228575).
- 2- H. D. Young and R. A. Freedman **University Physics**, 9th edition, Addison – Wesley, 1996. (ISBN:0-201-57157-9).
- 3- H. D. Young, R. A. Freedman, T. R. Sandin, And A. Lewis Ford, **Sears and Zemansky's University Physics**, 10th edition, 2000. (ISBN: 0-201-60322-5).
- 4- د . محمود الكوفحي و د. عبد السلام غيث , الكهرباء والمغناطيسية , ط 2 , دار الأمل – أربد , الأردن, 1990 .

Instructors:

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