Physics - 2

Identification

Department: Physics
Semester: Spring 2010
Subject: Physics 2 (PHSC112)
Credit: 3 units
Instructor: Associate Professor Hikmet Hassanov
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Prerequisites Physics 1 (PHSC 111)

Textbooks

Core text book:

1. R. Muncaster
   A-Level Physics, 4 edition, Stanley Thorms (Publishers) Ltd., 1994

Supplementary books:

2. R. Weber, K. Manning, M. White, and G. Weygand
   College Physics (Fifth Edition)
   TATA McGRAW-Hill Publishing Company Ltd., 1992
3. E.R.Jones and R.L. Childers
   Contemporary College Physics, 2 edition,
   Addison-Wesley Publishing Company, 1990

Objectivies

General objective of the Course:

- To meet curriculum requirements of the School of Engineering and Applied Sciences
- To support the students academically, to improve their chance of realizing their potential
- To build background for the students further engineering development

Outcomes

By the end of the Course students should be able:

- To use physical laws for solving concrete applied engineering problems
- To develop ideal models of any process up to real one
- To evaluate alternating opportunities to describe the process

Developed skills

Throughout the Course students should develop and maintain the following skills:

- Analytical thinking
- Critical reasoning
- Ability to finding optimal decision of the problem

Evaluation

Your grade in the Course will be determined on the base of the following scale:

Laboratory works	20 %
Participation	10 %
Mid-term examination	30 %
Final examination	40 %
Total	**100 %**

Learning and Teaching Methods

This Course considers active learning process rather than passive one. Lectures, discussions, simulating, case analysis.

Weeks	Topics	Hours		Reading Assignment
		Lectu-res	Prac-tics	
1	Basic principles of electricity. Electric charge. The Coulomb law. Electric field and forces.	2		[1], Chapter 36; [3], §§ 15.1,15.2
	Electric field lines. Dipoles. Electric potential. Gauss's theorem.	2		[1], Chapter 9; [2], Chapter 32; [3], §§ 15.4,15.6
2	Properties of electric field. Superposition principle. Electric field in medium. Polarization of dielectrics. Capacitors.	4	2	[1], Chapter 40; [2], Chapter 34; [3], §§ 15.3

3	Current, resistance and electromotive force. Ohm law. Resistivity. Circuits. Specific resistance. Direct current circuits. Series and parallel circuits. Joule's law. Electric power.	2 2		[1], Chapter 36; [3], §§ 17.1-17.4 [2], Chapters 35,36; [3], §§ 17.4-17.9
4	Magnetic field and magnetic forces. Basic concepts of magnetic field. Magnetic flux. Lorent'z force. Types of magnetic fields (moving charge, current element, solenoid).	4	2	[1], Chapter 41; [2], Chapter 37; [3], chapter 18
5	Electromagnetic induction (Part1). Magnetic medium. Magnetic susceptibility. Lenz's law. Electromagnetic induction (Part2). Induced electric field. Maxwell's equations.	2 2		[1], Chapters 42,45; [2], Chapter 39; [1], Chapters 42,45; [3], §§ 19.1; 19.2
6	Self-induction and mutual induction. Inductance. Inductance within circuits. Magnetic field energy. Transformer.	4	2	[1], Chapter 43; [2], Chapter 41; [3], §§ 19.4
7	Electromagnetic waves. Induced vibrations in electric circuits. Speed and energy. The Pointing vector. Standing waves. Light. Wave phenomena (Part A). Laws of geometrical optics. Basic concepts of optics. Reflection. Refraction. Total internal reflection. Lenses & optical systems. Types of lenses.	2 2		[1], Chapters 28,29; [2], Chapter 43 [3], §§ 19.6,19.7 [3], Chapters 21, 22
8	Mid-term examination			
9	Light. Wave phenomena (Part B). Dispersion. Polarization. Hugen's principle. Secondary waves.	4	2	[1], Chapters 24, 27 [3], §§ 23.1,23.8 23.10
10	Interference (Part1). Coherent sources. Coherence by space and time. Two-source interference. Interference (Part2). Interference condition. Observation methods for	2 2		[1], Chapter 25 [3], §§ 23.3, 23.4, 23.7 [1], Chapter 25

	interference.			[3], §§ 23.3, 23.4, 23.7
11	Diffraction. Fresnel and Frannhofel diffraction. Diffraction from single slit. Various types of diffraction. Diffraction grating.	4	2	[1], Chapter 26; [3], §§ 23.5, 23.6
12	Corpuscular phenomena of light (Part A). Photons. Emission and absorption of light. Photoeffect. Einstein equation. Corpuscular concepts of light. Corpuscular phenomena of light (Part B). Atomic spectra. Energy levels. Energetic transitions in atoms. The Bohr model. Laser.	2 2		[1], Chapter 47; [2], Chapter 46; [3], §§ 26.4, 26.5 [1], Chapter 48; [3], §§ 26.6- 26.8
13	Wave nature of the light. De Broglie waves. Electron diffraction. Probability and uncertainty. Wave function. Action quantum.	4	2	[1], Chapter 50; [2], Chapter 48; [3], §§ 27.1-27.6
14	Atomic structure (Part 1). Hydrogen atom. Application of the Bohr model to atoms. Electronic shells. Atomic structure (Part 2). Zeeman effect. Pauli's principle. Spin. Quantum numbers. Explanation of the periodic table of chemical elements.	2 2		[2], § 48.8 [3], §§ 28.1-28.3 [2], § 48.8 [3], §§ 28.1-28.3
15	Radioactivity. Types of radioactivity. Radioactivity decay. Parameters of radioactive decay.	4	2	[1], Chapter 54; [3], §§ 28.4 -28.9
16	Nuclear reactions. Basic principles for realizing nuclear reactions. Elementary particles & antiparticles.	2	2	[3], §§ 31.1-31.5
	Final Exam			