

Course Profile - Department of Physics

Course Number : PHYS 212	Course Title : Modern Physics
Required / Elective : Required	Pre / Co-requisites : -
Catalog Description: Wave properties of matter, Introduction to quantum theory, the quantum numbers, atomic transitions, Statistical mechanics; band theory and solids, nuclear models .	Textbook / Required Material : Jeremy Bernstein, Paul M. Fishbane, and Stephen Gasiorowicz, <i>Modern Physics</i> (Prentice Hall, Upper Saddle River, New Jersey, 2 nd Ed. 2000).
Course Structure / Schedule : (3+0+0) 3 / 7 ECTS	
Extended Description : Galilean relativity versus special theory of relativity. Lorentz transformations, simultaneity, velocity addition, time dilation. Doppler shift. Relativistic mass, momentum and energy. Particle properties of waves, wave properties of particles, Atomic structure: correspondence principle. Schrödinger equation. Wave packets and the uncertainty principle. Barriers and wells. Hydrogen atom. Complex atoms. Statistical physics. General relativity and cosmology. Elementary particles.	
Design content : None	Computer usage: Linking to course web site for homeworks and announcements, and to Course Online for homework and exam solutions. Optional use of Java applets.
Course Learning Outcomes [relevant program outcomes in brackets]: On successful completion of this course students will be able to <ol style="list-style-type: none"> 1. demonstrate a conceptual understanding of the fundamentals of special relativity, wave-particle duality, quantum theory and the modern developments in cosmology and elementary particles.[1, 2]; 2. recognize how the fundamental physical laws can be applied to solve a variety of problems [6]; 3. analyze the properties of matter from the point of view of quantum theory [6]; 4. describe how the concept of wave function arises in quantum theory [1]; 5. describe Schrödinger 's equations and its elementary applications [1]; 6. explain the structure of atoms and galaxies [1]; 8. discuss how physics is relevant to the world around them [5, 10]. 	

Recommended reading

Arthur Beiser, *Concepts of Modern Physics*, McGraw-Hill, New York 1987, 4th Ed.,

George Gamov, *Thirty Years that Shook Physics*, Doubleday, New York 1966,

Steven Weinberg, *The First Three Minutes*, Basic Books, New York 1993,

Brian Greene, *The Elegant Universe*, Vintage, New York 2000,

Stephen Hawking, *The Universe in a Nutshell*, Bantam, New York 2001.

Teaching methods

Three lectures per week; pre-readings and homework problems.

Assessment methods (Related to course outcomes):

Two mid-term examinations, a final examination, weekly homework assignments, and quizzes.

Student workload:

Preparatory reading 42 hrs

Lectures, discussions 45 hrs

Homework 45 hrs

Independent work 38 hrs

Exams 5 hrs

TOTAL 175 hrs ... to match 25 x 7 ECTS

Prepared by : Rahmi Guven, 06.02.2010

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