KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al Imam Mohammad Ibn Saud Islamic University
College of Science
Department of Physics

المملكة العربية السعودية
وزارة التعلـيـم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الفيزياء

SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
PHY	250	Modern Physics	3	2	0	2	5	PHY 101, MAT 101	3	English

A. Course Description

This course provides an introduction to developments in modern physics over the last 150 years that have radically altered our view of nature. This course is intended for students who have already had basic physics and calculus courses. Relativity and quantum ideas are considered first to provide a framework for understanding the physics of atom and nuclei. The theory of the atom is then developed with emphasis on quantum mechanical notions. Next comes a discussion of the properties of aggregates of atoms, which includes a look at statistical physics. Finally, atomic nuclei and elementary particles are examined.

B. Course Outcomes

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

1. State the basic principles of special relativity and elementary quantum mechanics and the regimes in which the different theories apply.
2. Apply these principles in conjunction with elementary mathematical techniques to solve simple problems in relativistic and quantum mechanics.
3. Present a solution to a physics problem in a clear and logical written form.
4. Develop critical thinking and analytical problem-solving skills.

C. References

Required Textbook

Beiser A. and Berg I., *Concepts of Modern Physics*, 6th Edition, McGraw-Hill (2006).

Other references

- Serway R.A., *Modern Physics,* Brooks Cole; 3rd Edition (2004).
- Krane K., *Modern Physics,* Wiley, New York (1983).

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

D. Topics Outline

1. *Relativity: Einstein's principle of special relativity, consequences of special relativity, Lorentz transformation equations, relativistic momentum and relativistic form of Newton's laws, relativistic energy, equivalence of mass and energy (*Contact hours*: 12).*

2. *Quantum Theory of Light: Particle properties of waves, blackbody radiation and Planck's hypothesis, Photoelectric effect, explanation of the photoelectric effect, X-rays and some applications, Compton effect, pair production (*Contact hours*: 12).*

3. *Introduction to Quantum Physics: Photons and electromagnetic waves, wave properties of particles, De Broglie waves, Matter waves, electron microscope, uncertainty principle (*Contact hours*: 12).*

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4. ***Atomic Structure:*** *Particle nature of matter, early models of the atom, Bohr's quantum model of the hydrogen atom, atomic spectra and transitions, nuclear effects on spectral lines, Franck-Hertz experiment (*Contact hours*: 12).*

5. ***Molecular and nuclear Structure:*** *Molecular bonding, Energy states and spectra, Molecular vibration and rotation, electronic transitions in molecules, nuclear structure: Nuclear composition, some properties of nuclei, Binding energy and radioactivity (*Contact hours*: 12).*

E. Office Hours

Office hours give students the opportiniuty 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 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