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	**464**	**Nuclear Physics**	**3**	**2**	**0**	**2**	**5**	**PHY 312**	**7**	**English**

A. Course Description

This course provides an introduction to basic nuclear physics, including nuclear decays and reactions and nuclear structure, while covering the essential areas of basic research and practical applications. It provides fundamental principles that underline nuclear science and its applications, as well as mathematical tools needed to grasp these concepts. Applications to nuclear science will be used to illustrate these principles. Discussions of theory are reinforced with examples which illustrate and apply the theoretical formulism, thus aiding students in their reading and analysis of current literature.

B. Course Outcomes

At the end of this course the student will be able to**:**
1. Learn and understand the basic properties of the nucleus.
2. Understand the role of conservation laws in decay processes and reactions.
3. Learn the principles of nuclear physics related to fission and fusion.
4. Compare and construct different reaction mechanisms in relation to cross-sections, excitation functions, and angular distributions.
5. Summarize and account for the main aspects of some applications of nuclear physics.
6. Develop critical thinking and analytical problem-solving skills.

C. References

Required Textbook
Krane K.S**.,** *Introductory Nuclear Physics,* Wiley (1988)**.**
Other references
- Burcham W.E. and Jobes M., ***Nuclear and Particle Physics,*** 2nd Edition, John Wiley & Sons Inc (1995).
- Knoll G.F., ***Radiation Detection and Measurements,*** 2nd Edition, Wiley (2010).
- M Guran A. C and Zimmerman W.B., ***The Quantum World of Nuclear Physics,*** World Scientific (2005).

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

D. Topics Outline

1. ***Basic Nuclear Concepts and Nuclear Properties:*** *History and overview, some introductory terminology, nuclear properties, units and dimensions, the nuclear radius, mass and abundance of nuclides, nuclear binding energy, nuclear angular momentum and parity, nuclear electromagnetic moments* (Contact hours*: 12).*
2. ***The force between nucleons:*** *The deuteron, proton-proton and neutron-neutron interactions, properties of the nuclear force* (Contact hours*: 12).*
3. ***Nuclear Models:*** *The shell model, Even-Z, Even-N nuclei and collective structure* (Contact hours*: 12).*

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4. ***Radioactive Decay:*** *The radioactive decay law, production and decay of radioactivity, growth of daughter activities, types of decay, natural radioactivity, units for measuring radiation (*Contact hours*: 12).*
5. ***Nuclear Reactions:*** *Types of reactions and conservation laws, energetics of nuclear reactions, Isospin, reaction cross section, experimental techniques, Coulomb scattering, nuclear scattering, direct reactions. Fusion and Fission (*Contact hours*: 12).*

E. Office Hours

Office hours give students the opportinuity 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