Course Specifications

General Information

Course name	Nuclear Physics(1)
Course number	PHYS3320
Faculty	
Department	
Course type	College Needs
Course level	3
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - Investigations of the atomic nucleus and, of the fundamental forces that determine nuclear structure

2 - offer fascinating insights into the nature of the physical world.

3 - aims to give students a broad overview of the subject matter

4 - The tools for understanding high-energy particle accelerators and, more recently, colliding-beam systems

5 - Provide the student with the physics of the nuclear fission, reactors, accelerators, neutrons and neutron detectors and with a view to understanding its applications and implications.

Intended Learning Outcomes

Knowledge and Understanding	* describe the key properties of the atomic nucleus and explain these properties with the aid of an underlying theoretical framework; * identify the quantum numbers that distinguish these sequences and use their conservation to analyse production processes * state the relevant conservation laws and use them in analysing meson decays; * solve problems on topics included in the syllabus; * calculate Q-values for alpha and beta decays and for nuclear reactions * Describe the mechanisms of energy transfer and conservation in different nuclear reactions. * Provide the student with the physics of the nuclear fission, reactors, accelerators, neutrons and neutron detectors and with a view to understanding its applications and implications.
Intellectual Skills	* identify significant applications which make use of nuclear physics, and explain the role of nuclear physics in these applications; * Experience of working in a team on a short technical project. * Discriminate between the nuclear fission and nuclear fusion. * Compare between the different nuclear models. * Interpret the nuclear reactions and nuclear fissions using the nuclear physics theories
Professional Skills	* produce clear and informative written and oral presentations * be able to describe sustainability in energy production * understand and describe the special characteristics of the waste-to-energy technologies compared to other energy production technologies * Provide the student with the physics of the nuclear fission, reactors, accelerators, neutrons and neutron detectors and with a view to understanding its applications and implications. * Apply the mathematical methods for proofing the nuclear models, nuclear methods, and reactions.
General Skill	* develop judgement capabilities through assessment of their own work and that of others * learn to explain the planning principles of nuclear reactors and understand the operation principles of heavy water and gas cooled reactors. * Regular problem exercises and example will give students the chance to develop their theoretical understanding and problem. * Apply the nuclear models efficiently for explaining a physical formula. * Search the internet for topics of nuclear forces and nuclear models.

Course Contents

1 - Nuclear models and nuclear properties
2 - Radioactive decay, alpha, beta, gamma
3 - Nuclear forces, Nuclear reactions
4 - fission and fusion.
5 - detection methods.

Teaching and Learning Methods

1 - Lectures with power points presentation.
2 - Manual of solved problems and Class discussions.
3 - independent reading throughout basic text books and research papers
4 - Data show – computer – blackboard –

Students Assessment

Assessment Method	TIME	MARKS
First mid term exam	week 6	20
Second mid term exam	week 12	20
Attendance and discussion		5
Homework and project reports	End term	5
Final exam	Week 15 or 16 according to faculty's schedule for exams.	50

Books and References

Course note	Lecturer private notes
Essential books	K.S. Krane, Introductory Nuclear Physics
	I. Kaplan, Nuclear Physics, 2nd edition , Addison-Wesley, 1962
Recommended books	D. J. Rowe and P. Goldhammer, nuclear collective motion: models and theory , American Institute of Physics, 1972
	S.N.Ghoshal, Nuclear Physics , company ltd & S. Chand, New Delhi, 2009
Other References (Periodical, web sites, ... etc.)	http://www.splung.com
	http://www.physicstoday.org