Course Specifications

Programme(s) on which the course is given : P., P.&Ch.,
Major or Minor element of programmes : major - minor
Department offering the programme : Physics
Department offering the course : Physics
Academic year / Level : 2
Date of specification approval: : 2012

A- Basic Information

Title: Nuclear Physics Code: P254

Credit Hours: 3 h Lecture: 3
Tutorial: 0 Practicals: 0 Total: 3

B- Professional Information

1 – Overall Aims of Course

***To provide a good base about the over all properties of atomic nucleus including size, charge, mass and nuclear binding.**

***To provide reason for why are some isotopes stable and others are not.**

***To provide roles of radiation decay processes and energies of emitted radiation.**

***To provide a comprehensive Knowledge about types, properties interactions, detections of different kinds of ionizing radiations.**

***To provide topics on the behavior of radiations emitted from radioactive sources and the laws that covering the processes.**

***To present topics on the interactions of different kinds of radiations (charged and neutral ones) with matter.**

***To study units of exposure, dose and dose equivalent.**

***To study, in details, the natural decay series, i-e- origin and type of radiation emitted.**

***To develop problem solving skills covering the different topics of the course.**

2 – Intended Learning Outcomes of Course (ILOs)

a- Knowledge and Understanding:

a1- Brief review on atomic structure

a2- Nuclear structure and constituents of the nucleus

a3- Properties of Nuclear force, binding energy and stability of nuclei.

a4- Natural and artificial radioactive transformation.

a5- Decay modes (Alpha, Beta and Gamma, neutrino, neutron)

a6- Stopping power and radiation shields and units

a7- Radiation detection using gas and scintillation counters.

a8- Concentration on the physics insights in all materials involved

B-Intellectual Skills

b1 - Providing highlights and strong attention to student to make their opinion about the importance of the nuclear technology.

C-Professional and Practical Skills

C1-The ability of the student to think about the natural radiations surrounding our world and to attain a strong feeling against the radiation pollution arising from the military use of nuclear technology.

C2-To gain experience dealing with the radiation sources and radiation detectors.

C3-Understanding the different mathematical treatment through the various parts of the course.

D- General and Transferable Skills

d1. gaining experience from dealing with the inter net searching for some materials included in the course in order to build a student shelf independent character.

d2. gaining experience on how can students deal with radioactive sources

3- Contents

Topic	No. of hours	lecture	Tutorial/practical
Atomic and nuclear structure	3	1	0
Theory of Beta and Gamma	6	2	0
Theory of alpha Decay	6	2	0
Theory of Gamma Decay	6	2	0
Neutron Source and Interactions	3	1	0
Origin of radiation and radiation Sheild	3	1	0
Radioactivity, decay low and nature series	6	2	0
Radiactive dating and radiation units	3	1	0
Radiation Detection	6	2	0
Total	42	14	0

4– Teaching and Learning Methods

4.1 _ lectures

4.2 – discussions

5- Student Assessment Methods

5.1 – midterm written exam to assess understanding about the covered first part of the course

5.2 – semester activity to develop communication skills

5.3 – final written exam to assess the overall gain from the course materials

5.4 – homework sheets to assess solving problems skills and time constrain

Assessment Schedule

Assessment 1: Oral 5th Week

Assessment 2 Midterm Exam: 7th week.

Assessment 3: problem solving 9th Week.

Assessment 3 final writing Exam: 14th Week.

Weighting of Assessments

Mid-Term Examination	**20 %**
Final-term Examination	**60 %**
Oral Examination & problem solving	**20 %**
Total	**100%**

6- List of References

6.1- Course Notes

6.2- Essential Books (text books).

-K.S.Krane, Introduction nuclear Physics (Ionh Wiely & sons, New Yourk, 1998)

- P. E. Hodgson, E. Gadioli and E. Go, Introductory nuclear physics (Oxford Science Publications, 2000)

6.3- Recommended Books

-K.S.Krane, Introduction nuclear Physics (Ionh Wiely & sons, New Yourk, 1998)

- P. E. Hodgson, E. Gadioli and E. Go, Introductory nuclear physics (Oxford Science Publications, 2000)

6.4-Periodicals, Web Sites, ….ect

Nuclear section

Radiation section

Modern physics

7- Facilities Required for Teaching and Learning:

1. **Data Show, Overhead projector and white board**
2. **Traditional methods**

Course Coordinator: **Prof. Dr. Abdel Azim Hussein**

Head of Department: **Prof. Dr. Sana Maize**

Date: / /