# 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: / /**