Nuclerar Physics and Fusion

Academic Year: (2020 / 2021) **Review date: 22/04/2018 16:22:19**

Department assigned to the subject:

Coordinating teacher:

Type: Electives ECTS Credits : 3.0

Year : 2 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic knowledge of quantum mechanics and special relativity theory.

OBJECTIVES

The main objective of the course is to provide basic knowledge of atomic nuclei and their properties, crucial to understand the nature of processes taking place at the femtometre scale, which constitute the basis of energy production from nuclear technology. Notions of particle physics and nuclear astrophysics which are relevant in this context will also be provided.

The course will provide the student with an appropiate training in nuclear physics especially suited to nuclear fusion science.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Fundamental constituents of matter and their interactions
2. Length, energy and time scales of the subatomic world
3. Bulk properties of nuclei. Masses, sizes and shapes
4. Nuclear radioactivity
5. Alpha, beta and gamma decays
6. Basic models of nuclear structure
7. Nuclear reactions
8. Fission and fusion processes
9. Controlled fission and fusion reactions
10. Basic nuclear astrophysics

LEARNING ACTIVITIES AND METHODOLOGY

* Teaching Methods:

Classroom lectures and problem solving sessions. Homework assignments. Oral presentations by the students.

* Course Material:

Recommended books, additional bibliography and notes will be made available to the students.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

Continuous evaluation based on class participation, homework performance and oral presentations (40% of the final mark). A written-closed book exam will take place at the end of the semester (60% of the final mark).

BASIC BIBLIOGRAPHY

- K. Heyde BASIC IDEAS AND CONCEPTS IN NUCLEAR PHYSICS, Institute of Physics Publishing, 1999

- K. S. Krane INTRODUCTORY NUCLEAR PHYSICS, Wiley & Sons, 1988

- P. E. Hodgson, E. Gadioli, E. Gadioli Erba INTRODUCTORY NUCLEAR PHYSICS, Clarendon Press, 1997

ADDITIONAL BIBLIOGRAPHY

- R. Satchler INTRODUCTION TO NUCLEAR REACTIONS, Oxford University Press, 1990