

Academic Year: ( 2023 / 2024 )

Review date: 11-04-2023

Department assigned to the subject: Physics Department

Coordinating teacher: CASTRO BERNAL, MARIA VANESSA DE

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Basic knowledge of Atomic Physics, Electrodynamics, Material Science and Solid State Physics (graduate level).

**OBJECTIVES**

Objectives

- Development of laboratory projects related to plasma diagnostic (microwave-based apparatus, radiation spectroscopy and probes)
- Development of laboratory projects on nuclear physics (particle detectors characterization, total absorption gamma-ray spectroscopy)
- Development of laboratory projects on mechanical properties of materials and microstructure (tensile properties, plastic deformation and application of PAS in microstructure investigation)

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. PLASMA DIAGNOSTICS. Interaction of lasers, microwave and infrared radiation, light atoms and heavy ions with plasmas: Thomson scattering, Laser induced fluorescence, reflectometry, interferometry, active charge-exchange spectroscopy and heavy ion beam probe diagnostics. VIS, VUV, soft and hard X-ray spectroscopies, electron cyclotron emission, magnetic and electrostatic probes. Measurement of fusion products.
2. NUCLEAR PHYSICS. Characteristics of detectors for alpha and gamma particles: Ionisation and scintillation detectors and photomultipliers. Neutron detectors. Signal transmission and electronics for pulse signal processing: amplifiers, analogical to digital converters.
3. MECHANICAL PROPERTIES. Structural Materials in Fusion Reactors. Mechanical Testing. Elastic Deformation. Materials Failure. Dislocations and Strengthening Mechanisms.

**LEARNING ACTIVITIES AND METHODOLOGY**

Laboratory sessions.

**ASSESSMENT SYSTEM**

Attendance to the laboratory sessions is compulsory. Evaluation of the reports.

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

**BASIC BIBLIOGRAPHY**

- William Callister Fundamentals of Materials Science and Engineering, John Wiley & Sons.