

Academic Year: (2023 / 2024)

Review date: 25-04-2022

Department assigned to the subject: Physics Department

Coordinating teacher: LEGUEY GALAN, TERESA

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

The students should be able to:

- Obtain the main parameters of magnetically confined fusion plasmas.
- Evaluate power balance of fusion plasmas.
- Calibrate gamma particle detectors.
- Determine alpha particle-target material interaction cross-sections.
- Characterize materials using the stress-strain curve.
- Obtain parameters that describe the mechanical characteristics of a material.
- Correlate mechanical characteristics and microstructure.

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 spectroscopy, 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

Classroom lectures plus post-lecture assignments.

ASSESSMENT SYSTEM

Evaluation shall take into account attendance, class participation, homework assignments and the mark obtained by the student in a questionnaire at the end of the course.

% end-of-term-examination:	70
% of continuous assessment (assignments, laboratory, practicals...):	30