

Academic Year: ( 2023 / 2024 )

Review date: 29/03/2023 19:00:50

Department assigned to the subject: Physics Department

Coordinating teacher: MARTIN SOLIS, JOSE RAMON

Type: Electives ECTS Credits : 3.0

Year : 2 Semester : 1

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

Basic knowledge of atomic and surface physics (graduate level)

**OBJECTIVES**

The course intends to provide with a basic understanding of the physical and chemical processes responsible for material erosion and plasma contamination during the interaction of fusion plasmas with plasma facing materials. The concepts of edge transport, divertor configurations, neutral particle behaviour and impurity screening will be addressed. Challenges in material selection and present developments in the field will be extensively reviewed.

The course will provide the student with an appropriate training in plasma-material interactions, of interest not only in fusion plasmas but also in plasma technology and material processing.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Overview
2. Particle recycling
3. Basic approach to particle-solid interaction
4. Plasma surface interactions. Mechanisms for plasma contamination
5. Limiter design. Material selection
6. Wall coatings and material repair by plasma techniques
7. Divertors
8. Present challenges and future developments

**LEARNING ACTIVITIES AND METHODOLOGY**

\* Teaching Methods :

Classroom lectures and classroom problem solving sessions. Homework assignments

\* Course Material:

Lecture notes. Virtual facilities (links to relevant web pages) will be also provided with the aim of improving the interaction with the lecturers and the learning of the subject

**ASSESSMENT SYSTEM**

**% end-of-term-examination/test:** 70

**% of continuous assessment (assignments, laboratory, practicals...):** 30

Evaluation shall take into account attendance and class participation, including practical classes and the solution of questionnaires periodically proposed by the lecturers along the course (30% of the final mark). A written-closed book exam will take place at the end of the semester (70% of the final mark).

**BASIC BIBLIOGRAPHY**

- .K. Janev and H.W. Drawin eds. Atomic and Plasma Material Interaction in controlled thermonuclear Fusion, Elsevier, Amsterdam, 1993
- D.E. Post and R. Behrisch, eds. Physics of Plasma-Wall Interactions in Controlled Fusion, Plenum Press, New York, 1986
- W.O. Hofer and J. Roth Physical Processes of the Interaction of Fusion Plasmas with Solids, Academic Press, New York, 1996

#### ADDITIONAL BIBLIOGRAPHY

- B H Bransden and C J Joachain Physics of atoms and molecules, Longman, 1984
- EIRENE A+M code, <http://www.eirene.de/>.
- H. R. Griem Plasma Spectroscopy, Mc Graw Hill.
- I.I. Sobelman, Vainshtein, Yuko Excitation of atoms and broadening of spectral lines, Springer Verlag.
- R.D.Cowan The Theory of Atomic Structure and Spectra, University of California Press.