Engineering in fusion devices: design, safety and fuelling technology

Academic Year: (2019 / 2020) **Review date: 22-04-2018**

Department assigned to the subject:

Coordinating teacher:

Type: Electives ECTS Credits : 6.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic knowledge of Engineering topics (mechanics, electromagnetism, electricity and power electronic, thermodynamics, material science, ¿), and Nuclear Engineering topics (safety, radioactivity, nuclear design, ¿).

OBJECTIVES

The course intends to provide an overview about the systems and components of a fusion nuclear plant, and the problems associated with the energy production. The course includes a general description of all the engineering systems, the fuel cycles and safety evaluation.

Learning outcome: Training in Engineering in Fusion Devices. The course covers the plant design, safety and fuelling technology.

DESCRIPTION OF CONTENTS: PROGRAMME

1-Introduction. Devices. Different types
2-Power plant building lay-out
3-Magnetic confinement devices. Components and systems
4-Vacuum vessel
5-Coils
6-Cryostat
7-Plasma heating systems
8- Electrical systems
9- Auxiliary systems
10- Fuel cycle
11- Waste management
12- Safety and environmental aspects in Fusion Energy

LEARNING ACTIVITIES AND METHODOLOGY

* Teaching Methods:

Classroom lectures. Homework assignments. Some exercises in activation calculation in Fusion Devices. Students will be introduced in activation
induced by neutrons using MCNP code for neutron transport calculations and ACAB code for activation and Safety evaluations.

* Course Material:

Lecture notes, review any chapter of specific books, review articles of fusion conferences.

ASSESSMENT SYSTEM

Evaluation shall take into account attendance and class participation, including practical classes, the solution of questionnaries periodically proposed by the lecturers, and short calculations in any of the fields cover by the course (40% of the finakl mark).

Examination: A final project or exam in a specific item related with the program (60% of the final mark).

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

BASIC BIBLIOGRAPHY

- Proceedings of the SOFT Conferences (Symposium on Fusion Technology) , last editions.

ADDITIONAL BIBLIOGRAPHY

- null Energy from Inertial Fusion, IAEA, 1995