

Academic Year: ( 2019 / 2020 )

Review date: 22-04-2018

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 algebra and programming

**OBJECTIVES**

The course intends to provide with the basics for an understanding of the robotics and teleoperation field theory, its main applications in submarine, nuclear and spatial field. The different types of advanced control used in teleoperation is studied, and finally the application of virtual reality to this research field.

The course will provide the student with an appropriate training in robotics and teleoperation theory, its application to the nuclear industry and virtual reality.

**DESCRIPTION OF CONTENTS: PROGRAMME**

- 1 Robot history
- 2 Concepts and definitions
- 3 Technologies: Devices
- 4 Force-Torque Control
- 5 Teleoperation architectures and supervised control
- 6 Human factors and teleoperation: spatial perception
- 7 Human factors in teleoperation: force reflexions
- 8 Simulators and virtual reality
- 9 Applications: submarine, nuclear, and spatial

**LEARNING ACTIVITIES AND METHODOLOGY**

\* Teaching Methods:

Classroom lectures and classroom problem solving sessions. Homework assignments.

\* Course Material:

Lecture notes. Virtual facilities (a dedicated web page) will be also provided with the aim of improving the interaction with the lecturers and the learning of the subject.

**ASSESSMENT SYSTEM**

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).

**% end-of-term-examination:** 100

**% of continuous assessment (assignments, laboratory, practicals...):** 0

**BASIC BIBLIOGRAPHY**

- Jean Vertut and Philippe Coiffet Teleoperation and robotics. Evolution and development, Hermes , 1985

- Paul, Richard P Robot manipulators, mathematics, programming, and control: the computer control of robot manipulators, MIT Press, 1981

- Steven B, Skaar, Carl F. Ruoff Teleoperation and robotics in space, Washington, DC : American Institute of Aeronautics and Astronautics, 1994

#### ADDITIONAL BIBLIOGRAPHY

- Sheridan, Thomas Telerobotics, automation and human supervisory control, Cambridge (Massachusetts): MIT Press, 1992