Brain Machine Interfaces

Academic Year: (2024 / 2025) **Review date: 24-04-2024**

Department assigned to the subject: null

Coordinating teacher:

Type: Electives ECTS Credits : 3.0

Year : 4 Semester :

LEARNING OUTCOMES

K6. To understand the existing techniques in signal processing and the theoretical bases of electrical circuits and dynamic systems that allow the analysis and conceptual design of electronic devices to solve problems in biology and medicine.
K11. To understand the most common concepts and techniques in the obtention and processing of biomedical images, as well as artificial vision, and to apply them to the resolution of problems of biological and medical interest, with special emphasis in the diagnosis by medical imaging.
K12. To understand the techniques used in the design of medical devices and the instruments that compose them, allowing their development for medical applications, such as surgical instruments, electromechanical microdevices, robots and micro- and nanometric-sized biosensors.
S3. To analyze and synthesize basic problems related to bioengineering and biomedical sciences, solving them with initiative, appropriate decision making and creativity and communicating solutions efficiently, including social, ethical, health and safety, environmental, economic and industrial implications.
S5. To analyse scientific and technical information for decision-making in the field of biomedical engineering by keeping abreast of new developments
S6. To solve mathematical, physical, chemical, biological and biochemistry problems that may arise in biomedical engineering, knowing how to interpret the results obtained and reach informed conclusions.
C3. Be able to transmit knowledge both orally and in writing, to a specialised and non-specialised audience, working in multidisciplinary and international teams.

DESCRIPTION OF CONTENTS: PROGRAMME

Neurophysiology. Brain signals: recording and imaging. Brain stimulation, internal and external. Neural signal processing. Machine learning for brain signals. Main types of brain-machine interfaces. Clinical and practical applications of brain-machine interfaces. Ethics of Brain-Machine Interfaces.

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES:
FACE-TO-FACE CLASSES: REDUCED (WORKSHOPS, SEMINARS, CASE STUDIES)
LABORATORY SESSION
STUDENT INDIVIDUAL WORK

METHODOLOGY:
PRACTICAL LEARNING BASED ON CASES AND PROBLEMS, AND EXERCISE RESOLUTION
INDIVIDUAL AND GROUP OR COOPERATIVE WORK WITH THE OPTION OF ORAL OR WRITTEN PRESENTATION
INDIVIDUAL AND GROUP TUTORIALS TO RESOLVE DOUBTS AND QUERIES ABOUT THE SUBJECT.

ASSESSMENT SYSTEM

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

FINAL EXAM: 60% Max.

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

CONTINUOUS EVALUATION: 40% Min.