

67244 - Biomedical electronic technology

Syllabus Information

Academic year: 2023/24

Subject: 67244 - Biomedical electronic technology

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 622 - Master's in Electronic Engineering

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Optional

Module:

1. General information

The objective of the subject is to provide knowledge to specify, analyse and design electronic systems for biomedical instrumentation equipment, especially electrosurgical systems applied in medical therapies such as cancer treatment.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

- Goal 3: Ensure Healthy Lives and Promote Wellness for All at All Ages. 3.d Strengthen the capacity of all countries, particularly developing countries, in early warning, risk reduction, and management of national and global health risks.
- Goal 9: Industry, Innovation and Infrastructure. 9.5 Enhance scientific research and technological capabilities in the industrial sectors in all countries, in particular developing countries, including through fostering innovation and significantly increasing, by 2030, the number of R&D personnel per million population and public and private sector R&D expenditures.

2. Learning results

Upon completion of this subject, the student will be able to:

- Know the electrophysiological basis for biomedical electronic instrumentation.
- Identify and distinguish the various electronic systems used in medical diagnostic and therapeutic applications.
- Know the electronic techniques for the design of electrosurgical systems, especially those based on radiofrequency and electroporation technologies.
- Apply electrosurgical systems for medical therapies, especially in the treatment of cancer.

3. Syllabus

BASES OF BIOMEDICAL ELECTRONIC INSTRUMENTATION:

- Overview and applications.
- Electrophysiological fundamentals.
- Electronic systems for medical diagnostic and therapeutic applications.

ELECTROSURGICAL TECHNOLOGY AND APPLICATION TO CANCER TREATMENT:

- Introduction to electrosurgery.
- Electrosurgical systems.
- Application of radiofrequency and microwaves.
- Application of electroporation.

4. Academic activities

The learning process designed for this subject is based on the following:

- Theory classes, in which the theoretical bases of the subject are presented.
- Application case classes, in which representative designs are developed.
- Practical laboratory sessions and associated work, where experimental setups and reports of results are carried out.
- Oral presentations of papers.

The learning activities foreseen in this subject are the following:

- 1) Lecture (approximately 20 hours)
- 2) Resolution of application cases (approximately 10 hours)

- 3) Laboratory practices (approximately 9 hours)
 - 4) Special practices (approximately 6 hours)
 - 5) Teaching assignments (approximately 42 hours)
 - 6) Study (approximately 60 hours)
 - 7) Evaluation tests (approximately 3 hours)
- 6) Study (60 hours approximately)
 - 7) Evaluation tests (3 hours approximately)

5. Assessment system

The student must demonstrate achievement of the intended learning results through the following assessment activities:

Theoretical work and oral presentation:

The work and oral presentation of a topic related to the subject will be evaluated. This activity will be graded from 0 to 3 points (C1) and will represent 30% of the student's grade in the subject.

Assessment of laboratory practices and associated work:

The work done in relation to the practices will be evaluated, as well as its previous preparation and development. This activity will be graded from 0 to 7 points (C2) and will represent 70% of the student's grade in the subject.

The total grade for the subject (out of 10 points) will be $C1 + C2$, provided that $C1$ is greater than or equal to a total grade of 1 and $C2$ is greater than or equal to 3. Otherwise, the grade for the subject will be the minimum between $C1 + C2$ and 4. The course is passed with a total grade higher than or equal to 5 points out of 10.

Global test:

For those students who prefer it, there will be a global test consisting of a theoretical-practical exam.