

69725 - Medical imaging capture techniques

Syllabus Information

Academic year: 2023/24

Subject: 69725 - Medical imaging capture techniques

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 633 - Master's Degree in Biomedical Engineering

ECTS: 3.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

This subject studies the basic physical and chemical principles underlying current medical imaging technologies used in the diagnosis, treatment and investigation of disease mechanisms.

It also studies the mechanisms of interaction of electromagnetic and acoustic waves with biological matter and how, from these, images of the different tissues and organs can be obtained.

The most interesting current clinical techniques will be described, in particular: ultrasound, magnetic resonance imaging, X-rays (projection and computed tomography) and nuclear medicine (PET, SPECT).

Related Sustainable Development Goal (SDG): Goal 3 (Good health and well-being): Ensure healthy lives and promote well-being for all at all ages.

2. Learning results

- To be able to describe the physical and chemical fundamentals on which the most relevant medical imaging techniques are based.
- To be able to provide a description of the most common technical means of medical imaging in those aspects that have to do with signal acquisition.
- Given the technical parameters of the clinical test and the set of data obtained in it, which constitute the image, the student will be able to describe the information that the technique in question provides about the composition and constitution of the biological tissues observed.

3. Syllabus

1.- Medical imaging with ionizing radiation. General aspects.

1a.- X-ray image.

1a.1.- Projection X-ray.

1a.2.- X-ray computed tomography (CT).

1b.- Imaging in nuclear medicine.

1b.1.- Planar scan (PS).

1b.2.- Emission computed tomography (SPECT, PET).

2.- Ultrasound.

2.1.- Ultrasound physics.

2.2.- Image modes.

3.- Magnetic Resonance Imaging (MRI)

3.1.- Basic aspects of MRI.

3.2.- MRI techniques

4. Academic activities

- Participatory master class
- Student resolution of questions in the classroom
- Seminar given by an expert from a company with activity related to the subject or from the physics and radiation protection department of a hospital.
- Laboratory practice: a practical session will be carried out in the laboratory. This activity may be replaced or supplemented by a visit to the physics and radiation protection department of a hospital.
- Work: students will carry out a work on a current topic, related to the content of the subject previously agreed with the teachers.

- Tutorials
- Assessment

5. Assessment system

E1: Final exam (30%). Minimum grade to pass the subject: 3 points out of 10.
Written test, consisting of theoretical-practical questions and/or multiple-choice questions.

E2: Intermediate tests (20%). Throughout the two-month period, written tests will take place during regular class time.

E3: Tutored practical work (50%).

An individual work will be done on a current topic related to the subject (the content of the work must be agreed with the teacher at least 2 weeks before the corresponding evaluation). A written paper will be presented and the work will be presented orally.

Those who do not attend the classes on a continuous basis, as well as those who wish to do so, will be evaluated only by means of tests E1 and E3. In this case, the contribution to the final grade will be 50% for each of them.

Students who do not pass the subject are entitled to a global test in each of the established dates and times determined by EINA. This global test will include activities E1 and E3, each of them contributing 50% to the final grade. In these cases, the delivery and presentation of the work will take place on the same day of the test, although the topic must have been previously agreed upon.