

69702 - Biomechanics and Biomaterials

Syllabus Information

Academic year: 2024/25

Subject: 69702 - Biomechanics and Biomaterials

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 633 - Master's Degree in Biomedical Engineering

ECTS: 6.0

Year:

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The objective of the Biomechanics and Biomaterials subject is to provide the student with basic knowledge in mechanics and materials science applied to biomedical engineering and biomedicine.

2. Learning results

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

- Know the fundamentals of Biomechanics.
- Know how to apply and solve the basic equations of Elasticity to analyse simple problems in Biomechanics.
- Formulate the equations of the Elasticity: equilibrium, constitutive behaviour and compatibility.
- Interpret the results of the elastic problem, identifying for each problem the most appropriate constitutive model, as well as the variables to be analysed in each case.
- Know the basics of composition, structure, properties and characterization of biomaterials.
- Perform tests for the characterization of mechanical properties of biological tissues and biomaterials, as well as other tests for these materials.
- Select the most appropriate biomaterials for prostheses and implants of different systems according to their properties and biocompatibility.
- Interpret technical reports and catalogues related to prosthetic and implant materials.

3. Syllabus

Block I: Biomechanics

1. Fundamentals of Mechanics
2. Fundamentals of Deformable Solid Mechanics
3. Biomechanics of the locomotor system
4. Hard tissue mechanics
5. Soft tissue mechanics

Block II: Biomaterials

1. Biocompatibility and regulatory concepts
2. Fundamentals of microstructure and properties
3. Biomaterial typology and applicability
4. Applications in implant, prosthetic, scaffolding and medical device applications

4. Academic activities

A01 Participative master class (48 hours). Presentation of the main contents of the subject.

A03 Laboratory practices (8 hours). For the development of the practices, there will be scripts that must be read before starting, with a series of activities to be carried out. Upon completion of the practices, a written report will be submitted.

A05 Practical application or research work. It will be a work oriented to the application of the theoretical knowledge presented in the subject. Students must submit a written report and perform an oral presentation of the work.

5. Assessment system

The student must demonstrate that he/she has achieved the intended learning results through the following assessment activities all graded from 0 to 10 points:

- E1: Final exam (60%).

Two written exams at the end of each of the parts Biomechanics and Biomaterials. The test will consist of several theoretical-practical questions or multiple-choice questions.

- E2: Tutored practical work (20%).

The assessment of the tutored work will take into account both the report presented and the suitability and originality of the proposed solution, as well as the oral presentation and question and answer session.

- E3: Laboratory practices (20%).

The assessment of the practices will be done through the reports submitted after the internship, as well as the work done during the practical sessions.

The student must obtain a minimum total grade of 4 points out of 10 in each of the activities (E1, E2 and E3) to average with the rest of the evaluation activities, otherwise they will not pass the subject.

Students who do not pass the subject or do not opt for the previous assessment procedure, will have the right to take a global test in each of the established calls for exams, on the dates and times determined by EINA.

6. Sustainable Development Goals

3 - Good Health & Well-Being

9 - Industry, Innovation and Infrastructure