

Academic Year/course: 2022/23

## 69705 - Scaffolds and tissue engineering

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 69705 - Scaffolds and tissue engineering

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 633 - Master's Degree in Biomedical Engineering

**ECTS:** 3.0

**Year:**

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

## 1. General information

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures where the main contents are presented and discussed; lab sessions, practical tasks based on real application, and specific research activities.

Students are expected to participate actively in the class throughout the semester.

### 4.2. Learning tasks

The course includes the following learning tasks:

- **A01 Lectures** (22 hours). The main course contents are presented and student participation is encouraged.
- **A03 Practice sessions** (8 hours). Different lab sessions are carried out in order to make and characterize a ceramic scaffold. These sessions will take place in the lab of Ciencia de Materiales e Ingeniería Metalúrgica. In the following days after the sessions, the students will have to present a report of the corresponding lab session. The following tasks will be developed:
  - manufacturing of a ceramic scaffold (1h),
  - measurements of density and porosity of the scaffold and preparation for in-vitro experiment (1 h),
  - microstructural study by means of SEM and composition analysis (1 h),
  - mechanical characterization (1 h).
- **A05 Assignments**. In pairs, students should prepare a study of the state of the art of tissue engineering in one specific application. This work will be orally defended.
- **A06 Tutorials**. Students may ask any questions they might have about unclear contents of the course or doubts regarding the assignments.

- **A08 Assessment.** The student will take an exam and submit several reports derived from the lab sessions and the assignments.

### **4.3. Syllabus**

The course will address the following topics:

1. Introduction to Tissue Engineering
2. Tissue Mechanics
3. Cell Mechanics
4. Scaffolds for Tissue Engineering
5. Cell processes and interaction with biomaterials
6. Mass transport (nutrients y metabolitoes: vascularization)
7. Use of cells and other regulators in Tissue Engineering
8. Bioreactors and microfluidics
9. Organoids
10. Computer modeling of scaffolds and its interaction with tissues

### **4.4. Course planning and calendar**

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

### **4.5. Bibliography and recommended resources**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?id=6659>