

## 69305 - Scaffolds and tissue engineering

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	547 - Master's in Biomedical Engineering
ECTS	3.0
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

### **1.General information**

#### **1.1.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

#### **4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.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.

## 69305 - Scaffolds and tissue engineering

### 5.2.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:
  - o manufacturing of a ceramic scaffold (1h),
  - o measurements of density and porosity of the scaffold and preparation for in-vitro experiment (1 h),
  - o microstructural study by means of SEM and composition analysis (1 h),
  - o 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.

### 5.3.Syllabus

The course will address the following topics:

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

### 5.4.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.

### 5.5.Bibliography and recommended resources

- |           |   |
|-----------|---|
| <b>BB</b> | An introduction to bioceramics / editors<br>Larry L. Hench & June Wilson Singapore :<br>World Scientific, cop. 1993   |
| <b>BB</b> | Langer, R. and J.P. Vacanti. (1993) Tissue<br>Engineering. En: Science 14 May<br>1993:Vol. 260, Issue 5110, pp. 920-926.<br>Washington, D.C. : American Association<br>for the Advancement of Science, 1880-<br>[Publicación periódica] |
| <b>BB</b> | Lanza, R. Principles of Tissue Engineering<br>/ R. Lanza, R. Langer and J. Vacanti. - 2nd<br>ed. London : Academic Press, 2000  |
| <b>BB</b> | Tissue Engineering of Cartilage and Bone /  |

## 69305 - Scaffolds and tissue engineering

Novartis Foundation . Wiley, 2003

### LISTADO DE URLs:

Scaffolds for tissue fabrications. P.X. Ma.  
En: Materials Today. Volume 7, Issue 5,  
May 2004, Pages 30-40  
[<http://www.sciencedirect.com/science/article/pii/S1369702104002330>]