Course guide
205083 - 205083 - Smart Sensors and Actuators for Internet of Things (Iot)

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.
Degree: MASTER’S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Optional subject).
MASTER’S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER’S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER’S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).
Academic year: 2023
ECTS Credits: 3.0
Languages: English

LECTURER
Coordinating lecturer: JASMINA CASALS TERRE
Others:
Primer quadrimestre:
JASMINA CASALS TERRE - 1
XAVIER SOL TORRES - 1

TEACHING METHODOLOGY
The course is develops through lectures including theoretical sessions imparted with the aid of powerpoint presentations and more applicable and more visual sessions with videos, stellar catalogues and simulations. Most of the sessions will be done in the MicroTech Lab with hands on sessions.

LEARNING OBJECTIVES OF THE SUBJECT
- To understand the behavior of fluids at a micro scale
- To know how to design microfluidic circuits
- To know the methods of integration of microfluidic systems with MEMS sensors

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>18,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>9,0</td>
<td>12.00</td>
</tr>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h
## CONTENTS

### Module 1: Mechanics and Fluid mechanics at micron scale

**Description:**

**Full-or-part-time:** 18h  
Theory classes: 6h  
Self study: 12h

### Module 2: Introduction to micromechanics and microfluidic behavior

**Description:**
Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology – Lithography, Etching, MEMS material, Bulk micromachining, Surface micromachining, Microactuator, electrostatic actuation.

**Full-or-part-time:** 18h  
Theory classes: 6h  
Self study: 12h

### Module 3: Biosensor structure

**Description:**

**Full-or-part-time:** 18h  
Theory classes: 6h  
Self study: 12h

### Module 4: Design and simulation of the biosensor fluidic behavior

**Description:**
Finite element modelling of a microfluidic mixer.

**Full-or-part-time:** 21h  
Laboratory classes: 9h  
Self study: 12h

## GRADING SYSTEM

50% - Home works  
50% - Lab report. After each lab session the students will handle a short lab report.
BIBLIOGRAPHY

Basic: