Universidad Zaragoza

Academic Year/course: 2023/24

66116 - Fabrication of Micro and Nanodevices

Syllabus Information

Academic year: 2023/24
Subject: 66116 - Fabrication of Micro and Nanodevices
Faculty / School: 100 - Facultad de Ciencias
Degree: 539 - Master's in Nanostructured Materials for Nanotechnology Applications
ECTS: 5.0
Year: 1
Semester: Second semester
Subject type: Optional
Module:

1. General information

In this optional course, the students will apply the theoretical knowledge acquired in the core courses of the Master programme (production and characterization of nanostructured materials) to real problems, which will allow them to produce micro and nanodevices and evaluate their performance. Thus, they will become aware of the potential applications of Nanotechnology in a more natural way for fields as diverse as molecular electronics, advanced chemical sensing, optical and magnetic hyperthermia, production of nanomaterials by microfluidic technology.

These approaches and objectives are aligned with the achievement of SDG 9. Industry, innovation and infrastructures of the Agenda 2030. More specifically, they will create action to enhance research, foster innovation and upgrade industrial technologies.

2. Learning results

- Understand and successfully prepare micro and nanodevices.
- Design and create nanodevices, assessing real difficulties in their production and in the requirements for these to reach the marketplace.
- Identify and, with rigour, describe some of the recent specific developments in research that have led to nanotech applications.
- Find opportunities to apply theory and knowledge of the phenomena taking place at the nanoscale for the making of devices and specific applications.

3. Syllabus

- Chemical Microsensors
- Optical biosensors
- Electrochemical sensors
- Nanobiomedicine
- Magnetic Contrast Agents for Biomedical Applications
- Microfluidic Technology for the synthesis of Plasmonic Nanoparticles
- Organic light-emitting diodes (OLEDs)
- Quantum Dots
- Solar Cells

4. Academic activities

- **Lectures (1 ECTS)** Topics will be presented, analysed and discussed as the general framework of the lab sessions. The lecturers will provide the students with notes, handouts or summaries of class content prior to the beginning of the class (preferably via Moodle) along with the recommended reading for more in-depth understanding of the topic.
- **Laboratory Sessions (4 ECTS)**. 6 Laboratory practicals through which the student will face real problems in the production and end properties of the micro-nanodevice built. Thanks to the work with their colleagues in practical groups, the students will develop group work skills.
- **Assignments**. At the end of every topic, each student will complete the Q&As that the lecturers givethem over the

course. The Q&As are to be completed individually by students and sent electronically or handed in to the lecturers. In some cases, the Q&As will be presented and openly debated during class. Here, the students must also show their oral communication skills. Students will receive a reply from the lecturers as a result of the Q&As and there will be a discussion on the areas of discrepancy in the answers.

- **Autonomous work**. Students are expected to spend about 85 hours to study theory, solve problems,prepare lab sessions and assignments and take exams.

5. Assessment system

For students choosing **Continuous Assessment** (attendance to at least 80% of this module lectures is required)

1.-Practical Assessment (80% of the final result for the module) where the abilities in the lab, fundamental knowledge on which the practical is based, and/or the Q&As and reports handed in by the students on their laboratory results and the interpretation of these. Special attention will be paid to checking that students have acquired the necessary abilities from these practical sessions, i.e. handling of nanomaterial production techniques, recognition of experimental difficulties in these processes, problem, risk and difficulty evaluation, interpretation of results obtained, professional presentation of laboratory-acquired results and written communication ability with specific language appropriate to the topic under consideration.

2.- Individual Assessments (20% of the final result for the module) where the lecturers involve in the theoretical fundamentals supporting the laboratory sessions will assess problem solving, exercises and questions during the classes answered by the student at that time or later according to the lecturer's indications.

A minimum qualification of 4 out of 10 is needed in each of the two tasks to pass the subject. In any case, the average over the two sections must be at least 5 out of 10 to pass the subject.

For students that did not pass the ongoing assessment or wish to increase their mark, **Global Assessment** comprising three exercises: a multiple choice test on safety rules (5%), practical exam (65%) where the student must show the capability to plan the necessary experiments given the objectives to be achievedm and a written report (35%) for data interpretation and conclusions drafting.