

66106 - Case Studies of Industrial Applications

Syllabus Information

Academic year: 2023/24

Subject: 66106 - Case Studies of Industrial Applications

Faculty / School: 100 - Facultad de Ciencias

Degree: 539 - Master's in Nanostructured Materials for Nanotechnology Applications

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Compulsory

Module:

1. General information

This course aims to provide the students with some key tools to apply the knowledge gained about Nanoscience, understanding the market possibilities, the competitive advantages of technological innovation, the real difficulties when launching a new product or setting up a company. This course provides an excellent opportunity to grasp the distance between a sound scientific concept and a down to earth application that can be economically profitable. The students will become familiar with real cases of practical applications benefit from the experience of experts from industry and academia that have already brought nanoproductions in the market.

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

- Identify the differential characteristics and competitive advantages that the application of nanoscale features may provide to current commercial products.
- Identify the difficulties existing for the advances achieved in the laboratory to be put into practice, and particularly, the scalability issues.
- Be aware and describe a variety of products on the market (textile, motor, pharmaceutical, energy, health, technological, construction, etc.) based on nanostructured materials.
- Recognise the design factors in high tech nano-products and the characteristics which make them successful commercially.
- Recognize possible unwanted effects of nanomaterials on health, environment and sustainability and how these effects can be eliminated or minimized.
- Communicate and interact with professionals from different disciplines.

3. Syllabus

The course will address the following topics:

- Nanosafety
- Scalability
- Intellectual Property
- Case Studies of Industrial applications of nanomaterials in automotive, consumer goods, Pharma and biotechnology, cosmetic, quantum computing, energy and environmental related sectors...

4. Academic activities

- **Lectures.** Nanosafety and Scalability Topics will be presented, analysed and discussed. 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.
- **Practical Case Studies.** Invited speakers will explain how their companies harness nanomaterials to provide added value to their products through lectures.

- **Assignment.** Students by groups (2-3 people) will develop a hypothetical nanotechnology product or application that could in principle be manufactured and commercialized. They will prepare a comprehensive report and submit a written copy at the end of the course and will do an oral presentation.
- **Autonomous work.** Students are expected to spend about 75 hours to study theory, solve problems and work on the assignments.

5. Assessment system

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

1.- Written exam (30% of the final result for the module). This written exam covers Nanosafety and Scalability thematic units and will include topic(s) to be explained and short answer and/or multiple choice questions.

2.- Monographic work: report and oral presentation (70 % of the final result of the module). Students by groups (2) will develop a hypothetical nanotechnology product or application that could in principle be manufactured and sold commercially. A written report + oral presentation must be presented describing the implementation process for a product in the market, evaluating not just the scientific difficulties and technological limitations but also giving a basic assessment of the potential market for the product and discussing technological, financial and social aspects related to its implementation. The novelty of the idea and/or its practical application will be highlighted, in comparison with existing solutions in the macro and nano realms.

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 a written test (30%) and a written report of the "nanoproduct" along the same lines just described for regular students and its oral presentation and defence in front of a board of examiners (70%).