66106 - Case Studies of Industrial Applications

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	282 - Master's in Nanostructured Materials for Nanotechnology Applications 539 - Master's in Nanostructured Materials for Nanotechnology Applications
ECTS	6.0
Course	1
Period	Half-yearly
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

The " *Case studies of Industrial Applications* " module is obligatory and is equivalent to 6 ECTS credits or 150 student work hours. The course is given in the first term of the academic year. As with the other modules in this Master's, this module is taught and assessed completely in English. The objective of this module is that the students analyse and understand real Nanotechnology applications in our everyday lives. In order to achieve this objective, various speakers from the industrial sector will show how their companies make use of Nanotechnology in their production lines and end products. In addition, this module also addresses other important points related to the implementation of Nanotechnology. These range from awareness of the potential risk of nanomaterials on health, environment and sustainability and a general view of protective measures (Nanosafety aspects) to practical aspects regarding the launching of a new nanotech product (e.g. patent rights and intellectual property).

As the whole course is taught in English, students need to have an upper-intermediate level in the language: minimum level B1 in the European Common Framework Language Reference, but preferably level B2. Level B1 is reached when the student is able to understand the main points of clear, standard-language texts when covering known matters - whether in terms of work, study or leisure; when able to cope in most situations which the student encounters during a trip to places where the language is spoken; when able to write simple, coherent texts on familiar topics or those in which the student has an interest; and when able to describe experiences, happenings, wishes and ambitions as well as briefly justify opinions or explain plans. B2 is achieved when the student is able to understand the main ideas of complex texts that deal with both specific and abstract topics, even if these are technical - though within the field of specialisation; when able to communicate with native speakers with the degree of fluency and ease such that the communication takes place without effort on either side; and when able to write clear, detailed texts on diverse subjects as well as defend a point of view on general topics - giving the pros and cons of the different options.

Additional information about this master (grants, events, etc.) can be found on the web site:
www.unizar.es/nanomat

1.2.Activities and key dates for the course

Dates and key points for the subject

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This module is taught in the first term in parallel with modules 2 and 3, thus the start date is October.

The course is given in the afternoon and the calendar for classes and exam dates will be published prior to the beginning of each academic year in the web site of the Faculty of Science (https://ciencias.unizar.es/web/horarios.do).

2.Initiation

2.1.Learning outcomes that define the subject

The student, in order to pass the course, will have to show her/his competence in the following skills:

Identify the differential characteristics and competitive advantages that the application of the nanoscale can give particular commercial products.

Identify the difficulties existing for the advances achieved in the laboratory to be put into practice.

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.

2.2.Introduction

Brief presentation of the course

A very important contribution is this course is made by different speakers from the industrial world in areas from electronic to biomedical applications. In their presentations they will explain how their companies harness nanomaterials to provide added value to their products. This will give our students first hand knowledge of the real scientific, financial, social, marketing, etc. difficulties involved in launching a nanodevice or a particular application of nanostructured materials onto the market.

3.Context and competences

3.1.Goals

The expected results of the course respond to the following general aims

The students will become familiar with real cases of practical applications and get to know highly specialised experts. The course will provide a realistic view of selected applications of Nanotechnology but also of the difficulties involved in developing them into commercial products. Students will be able to improve their communication skills by direct interaction with professionals from different disciplines. It will also give them a first opportunity of professional networking, by putting them in contact with important companies that might in the future be interested in recruiting well-trained and highly specialised people in areas connected to Nanoscience and Nanotechnology.

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3.2.Context and meaning of the subject in the degree

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, and, generally speaking broadening their perspective regarding nanotech applications. In addition, this is the first opportunity to achieve a greater degree of specialisation, once the different applications of nanomaterials have been explored.

3.3.Competences

After completing the course, the student will be competent in the following skills:

Assess the importance of the nanotech product market.

Appreciate the potential of Nanotechnology as a horizontal discipline capable of incorporation into numerous production processes.

Appreciate the potential of Nanotechnology as a horizontal discipline capable of incorporation into numerous production processes.

Realize the difficulties and practical challenges involved in launching a new nanotechnology device or application of nanostructured materials onto the market.

Recognise the difficulties and the scientific, financial, social, marketing, etc. challenges involved in launching a nanodevice or a particular application of nanostructured materials onto the market.

Communicate and interact with professionals from different disciplines.

3.4.Importance of learning outcomes

This module aims to provide a bridge between the nanotechnology concepts that the students learn in other modules and their practical realization as commercial processes or products. In a way, the goal is to make the student much more aware of the real life presence of the discipline they are studying. Herein, students receive hints that should help them to understand the state of the market prior to the insertion of a nanotech product, identify the opportunity, design the product or process to fill that gap and be aware of the steps needed for technological and commercial implementation. The case studies method (around10 case studies from different areas: pharmaceutical industry, motor, textile, cosmetics, biotechnology, sensor manufacturing, etc.) will help them to develop innovative ideas and draft a basic plan for their practical implementation.

4.Evaluation

The student will prove that he/she has achieved the expected learning results by means of the following assessment tasks:

For students choosing continuous assessment (attendance to at least 80% of this module lectures is required):

(a) Students will develop a hypothetical nanotechnology product or application that could in principle be manufactured and sold commercially. A written report 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.

Important aspects that will be evaluated include the originality of the topic chosen, the review of the state of the art in the area (including patents), the identification of the niche market, the technological viability of the proposed idea will be assessed and the consideration given to the main factors (production costs, availability of raw materials, viability of proposed fabrication and characterization methods) , etc.

The report must be a minimum of 25 pages long and a maximum of 40 pages long (times new roman 12 and including the figures or schemes that accompany the text). It can be done individually or in teams, when required by the complexity of the subject chosen. In addition to the written report, a public presentation of the product will be made in front of a board of examiners. The presentation will last a maximum of 15 minutes and will be followed by a debate. The final mark (80%) will take into account both the quality of the written report and its defence presentation. The remaining 20% for this module will be obtained from a written exam on specific questions regarding nanosafety and intellectual property aspects.

GLOBAL EXAMINATION (students that did not pass the ongoing assessment or students that wish to increase their mark) will have to pass a written exam (20% of the score) related to nanosafety, patent, and applications of Nanoscience. Students must also present a written report and exam along the same lines just described for regular students and a public presentation of the product will be made in front of a board of examiners (80% of the score) .

5.Activities and resources

5.1.General methodological presentation

The learning process that has been designed for this course is based on the following activities:

Providing students with real cases of application of nanotech devices in the market through guest talks from high level specialists in their fields. Through critical analysis of case studies, the students will appreciate the advantages, limitations and difficulties in the use of novel nanotechnology developments in different industries.

5.2.Learning activities

The programme offered to the students to help them achieve the learning results includes the following activities :

Guest speakers: talks lasting - depending on the topic - one to three 50 minute sessions.

Lectures for the nanosafety and intelectual property sections will be presented, analysed and discussed by the lecturer through participatory master classes lasting 50 minutes.

The module coordinator will tutor and supervise the "case study" for which each student will prepare a report.

5.3.Program

5.4.Planning and scheduling

Calendar of actual sessions and presentation of works

This calendar will be published at the beginning of each academic year in the web site of the Faculty of Science (https://ciencias.unizar.es/web/horarios.do). Additional information could be found at www.unizar.es/nanomat . All classes will be in the afternoon.

5.5.Bibliography and recomended resources