

Degree programme	Type	Course
Nanoscience and Nanotechnology	OB	2

Contact lecturer

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Prerequisites

There are not any prerequisites.

Group languages

You can consult this information at the [end](#) of the document.

Objectives

This subject provides students with a general overview of nanotechnology, beyond the scientific content developed during the degree. The main goal is to offer a cross-training which will allow students to identify what are the fields of application of nanotechnology, its impact on society, and what will our society look like in the near future. This will enable students to uncover areas in which a nanotechnologist can have a place but have so far been unknown. The subject is organized into five units: 0) Nanotechnology and its applications. 1) Nanotechnology in perspective. 2) Nanotechnology in Europe, Asia and the United States. 3) Scientific and technological development of nanotechnology. 4) Nanotechnology in Spain and Catalonia. 5) Ethical and social aspects. The idea is to explore beyond the science itself so that, after the multiple possibilities nanotechnology fits into society and labour market are disclosed, students become aware that greatest potential for labour market integration happens when the scientific training acquired during the degree couples to transferable skills.

Learning outcomes

- CM28 (Assess the socio-economic and environmental impact of nanotechnologies.) Assess the socio-economic and environmental impact of nanotechnologies.
- CM29 (Assess sex and gender inequalities in terms of both access to and the application of nanotechnology.) Assess sex and gender inequalities in terms of both access to and the application of nanotechnology.
- KM48 (Recognise the impact of nanoscience and nanotechnology on society from an interdisciplinary point of view.) Recognise the impact of nanoscience and nanotechnology on society from an interdisciplinary point of view.
- KM50 (Identify the ethical principles and legislative standards involved in marketing new products based on nanotechnology and their experimental validation.) Identify the ethical principles and legislative standards involved in marketing new products based on nanotechnology and their experimental validation.
- SM41 (Analyse the risks to the environment associated with handling and using products derived from nanotechnology.) Analyse the risks to the environment associated with handling and using products derived from nanotechnology.

Contents

0. Nanotechnology and its applications:

The 'nano' scale
Properties of nanomaterials
Main applications

1. Nanotechnology in perspective:

Social perception of nanotechnology
Top 10 emerging technologies in the last five years
Knowledge economy
Hype Cycle
Evolution of nanotechnology in recent years
Investment in nanotechnology

2. Nanotechnology in Europe, Asia and the United States:

EU framework programs: evolution
Horizon 2020 and Horizon Europe
KETs (*Key Enabling Technology*)
Technology Readiness Level (TRL)
Nanotechnology as a KET
The race to lead nanotechnology research: China and the United States
The NNI (*National Nanotechnology Initiative*)

3. Scientific and technological development of nanotechnology:

Scientific production: scientific publications and citations. *Publish or perish*
Intellectual protection. Patents
Entrepreneurship. Spin-off versus start-up
Venture capital

4. Nanotechnology in Spain and Catalonia:

The NanoSpain network
National companies in the sector
CERCA centers
ICREA program

5. Ethical and social aspects:

REACH regulation in nanotechnology

Risk management in nanotechnology. The FDA and the EMEA.

Ethics and nanotechnology

Lessons from history

Dissemination of science. Citizen science.

Gender perspective and dimension in science in general and nanoscience in particular

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Oral presentation	20	0.8	CM28, CM29, KM48, KM50, SM41
Lectures	42	1.68	CM28, CM29, KM48, KM50, SM41
In-class exercises and case studies	15	0.6	CM28, CM29, KM48, KM50, SM41
Estudi	25	1	CM28, CM29, KM48, KM50, SM41
Mentoring	18	0.72	KM48
Reading articles	5	0.2	CM28, CM29, KM48, KM50, SM41
Problem solving	5	0.2	KM48

Lectures

The teacher will introduce and develop the theoretical contents of the subject using ppt. Supporting material will be delivered to students.

Classroom debates (forums) and exercises

Debates and exercises (in the broadest sense of the word) will serve to consolidate and see how the knowledge acquired during theory classes is put into practice. They will be intercalated with the theory classes to reinforce specific aspects or at the end the thematic units. The debates will be carried out under the guidance of the teacher and with the proactive participation of the students. Classroom tests will be carried out to monitor the knowledge acquired.

Group presentations

Oral presentations in small groups will be given at the end of the semester, covering topics from the contents of the subject and beyond.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
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Surveys / problems done in class	15	4	0.16	CM28, CM29, KM48, KM50, SM41
Oral group presentación	35	6	0.24	CM28, CM29, KM48, KM50, SM41
Exams	50	10	0.4	CM28, CM29, KM48, KM50, SM41

In-class surveys / exercises: the student will have to demonstrate consolidation of the acquired knowledge (15% of the mark).

Group oral presentations: they represent 35% of the final mark and will be held by the end of the semester. Oral presentations will be followed by a discussion with the classmates. They are compulsory, as well as attendance at the presentations delivered by the other students. The technical and formal quality of the presentation as well as the answers given during the discussion phase will be considered.

Two exams covering the theory content of the subject and the aspects addressed during the practical sessions and seminars. They account for 50% of the final mark.

The proactive attitude in the classroom will be taken into account for the final grade of the subject.

Re-assessment for this subject requires the student must previously have done a minimum of two-thirds of the course-assessment items.

In order to pass the course, you must have an overall grade equal to or higher than 5.0. If you fail, but you get a minimum of 3.5 overall in the subject, you will have the right to a written make-up test covering the entire contents of the subject that will allow you to pass with a maximum mark of 5 over 10.

A student will receive a *Non-assessable* grade if they have submitted no more than 30% of the assessment activities.

In this course, the use of Artificial Intelligence (AI) technologies is permitted as an integral part of the development of the group assignment and oral presentation, provided that the final outcome reflects a significant contribution from the student in terms of analysis and personal reflection. Students must clearly identify which parts have been generated using AI, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final outcome of the activity. Any irregularity committed during an assessment activity (including academic fraud, plagiarism, or the improper use of AI) that may lead to a significant alteration of the assessment outcome will result in a grade of 0 for that assessment activity. If multiple irregularities are committed in the assessment activities, the final grade for the course will be 0. In addition, the University may initiate disciplinary proceedings against any student who commits any of these irregularities.

This course does not offer a single-assessment option.

Bibliography

There is not a dedicated textbook. Relevant works in the field will be indicated in the ppt slides and lecture notes given by the teacher.

Software

Not applicable.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	second semester	afternoon
(PAUL) Classroom practices	1	Catalan	second semester	afternoon
(PAUL) Classroom practices	2	Catalan	second semester	afternoon