

Degree	Type	Year
Science, Technology and Humanities	OT	4

## Contact

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## Teaching groups languages

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

## Prerequisites

Not required.

## Objectives and Contextualisation

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 six 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.

## Competences

- Apply knowledge of ethics to science in society and gauge the impact of technological change on people and the human condition.
- Assess the social, economic and environmental impact when acting in this field of knowledge.
- Describe the fundamental forces of nature in relation to the configuration of the universe and the structure of matter.
- Innovate in the methods and processes of this area of knowledge in response to the needs and wishes of society.
- Make critical use of digital tools and interpret specific documentary sources.
- Produce written papers and give effective oral presentations, adopting the appropriate register in different languages.
- Relate terrestrial dynamics and the variable of time in the terrestrial, atmospheric and climatic processes, and identify the problems generated by use of natural resources on the part of humans.

- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.

## Learning Outcomes

1. Collect and interpret data on which to substantiate the conclusions drawn, including, where necessary, a reflection on social, scientific or ethical matters in a particular area of study.
2. Communicate orally and in writing in your first language.
3. Describe perspective interdisciplinary cross-curricular the impact of nanoscience nanotechnology society.
4. Describe the principal fields of application of nanoscience and nanotechnology and the prospects of these.
5. Describe the principal physicochemical properties that depend on the size of materials.
6. Identify the principal economic, environmental, social and ethical implications and prospects of nanoscience and nanotechnology.
7. Know and understand the basic theoretical and practical principles and the work methodology of science and technology, deeply enough to work in this field with ease.
8. Reason from a critical standpoint.
9. Recognise the environmental risks associated with manipulation of nanotechnology-derived products.
10. Recognise the terms specific to each topic within the fields of nanoscience, nanotechnology and society.
11. Solving problems autonomously.

## Content

### 0. The nanotechnology and its applications:

The 'nano' scale  
 Properties of nanomaterials  
 Main applications

### 1. The nanotechnology in perspective:

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

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

The EU Framework Programs: evolution  
 Horizon 2020 and Horizon Europe  
 KETs (*Key Enabling Technology*)  
 Technology Readiness Level (TRL)

Nanotechnology as a KET

The race for the leadership in nanotechnology: China and the United States

The NNI (*National Nanotechnology Initiative*)

### 3. Scientific and technological development of nanotechnology:

Scientific production: scientific publications and cites. *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 of the sector

CERCA centers

ICREA program

### 5. Ethical and social aspects:

REACH regulation in nanotechnology

Risk management in nanotechnology. FDA and EMEA.

Ethics and nanotechnology

Lessons from history

Science divulgation. Citizen science.

Perspective and dimension of gender in science in general and nanoscience in particular

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
In-class exercises and case studies	15	0.6	
Lectures	42	1.68	
Oral presentation	20	0.8	
Type: Supervised			
Mentoring	18	0.72	
Type: Autonomous			
Problem solving	5	0.2	
Reading articles	5	0.2	
Self-study	25	1	

### 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	Weighting	Hours	ECTS	Learning Outcomes
Exams	50%	10	0.4	11, 7, 3, 4, 5, 6, 8, 9, 10, 1
Group oral presentation	35%	6	0.24	11, 2, 7, 3, 4, 5, 6, 8, 9, 10, 1
Tests / problems done in class	15%	4	0.16	11, 7, 3, 4, 5, 6, 8, 9, 10, 1

In-class tests: 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.

## 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.

## Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	second semester	afternoon
(PAUL) Classroom practices	2	Catalan	second semester	afternoon
(TE) Theory	1	Catalan	second semester	afternoon