

CÓDE	NAME OF MODULE	TYPE
	FROM NANOSCIENCE TO NANOTECHNOLOGY	M

M = mandatory
E = elective

3.3.1. Learning goals of the module.

(List the specific learning goals that the current module should provide to the student; goals can focus on content, skills, or attitudes.)

THE BASIC AIM OF THE MODULE IS KNOWING THE STATE OF THE ART IN SEVERAL TECHNOLOGY FIELDS, THE PERSPECTIVES AND THE IMPACT OF NANOSCIENCE IN THOSE FIELDS. IN THIS CONTEXT, THE MODULE FOCUS ON THE CONNECTION OF CURRENT RESEARCH ACTIVITIES IN NANOSCIENCE TO THEIR POTENTIAL TECHNOLOGICAL APPLICATION.

3.3.2. Methodology: learning activities and credit value of the module (ECTS).

3.3.2.1. Learning activities.

(Time required to teach the module; links to other modules included in the MSc Program and suggested chronological sequence with the latter)

THE TIME REQUIRED TO TEACH THE MODULE IS 32 HOURS
 THE LINK WITH OTHER MODULES IS OBVIOUS
 THE MODULE MUST BE TUGHT AFTER BASIC SCIENTIFIC SUBJECTS, SUCH AS QUANTUM PHYSICS AND MATHEMATICS

3.3.2.2. ECTS credit value (and time)

1 ECTS credit = 25 hours UPV/EHU

TYPE OF LECTURE ⁽¹⁾	Theory		Practice							Evaluation	
	M ⁽²⁾	S	PA	PL	PO	TA	TAI	PCL	PCC	Periodic Grading	Final Grading
Classroom lectures	15	10								5	3
Personal work ⁽³⁾	22	20									
TOTAL	37	30								5	3

(1) M (standard lecture); S (seminar); PA (practical exercises in classroom); PL (practical exercises in laboratory); PO (practical exercises with computers); TA (non-industrial workshops); TAI (industrial workshops); PCL (clinical practice); PCC (field practice); the acronyms are taken from the Spanish wording.

(2) M = maximum allowed is 60% of the full classroom lectures

(3) Personal work = time that the student would use to prepare and develop individual and group assignments.

3.3.2.3. Module Program.

(Lectures)

Lecture 1	1 <u>Creating small objects in a controlled way</u> 1.1 The top down strategy: Lithography
Lecture 2	1.2 The bottom-up strategy: self-assembly
Lecture 3	<u>2. Introduction to the geometries of nanoscale carbon</u> 2.1 Fullerenes
Lecture 4	2.2 Carbon Nanotubes
Lecture 5	<u>3. Quantum dots</u>
Lecture 6	<u>4. Nanocomposites</u>
Lecture 7	4 <u>The semiconductor industry: state of the art and challenges</u> 4.1 CMOS: fundamentals, technology and limits
Lecture 8	4.2 Magnetic recording: state of the art and challenges 4.3 State of the art Lithography and its limits
Lecture 9	5.4 Towards molecular electronics
Lecture 10	5 <u>Nanotechnology challenges in solar energy research</u> 5.1 The energy challenge 5.2 The solar energy challenge
Lecture 11	5.2.1 Solar Photovoltaics
Lecture 12	5.2.2 Solar fuel 5.2.3 Solar thermal

3.3.2.4. Bibliography.

(Basic and specialized bibliographies, journal references, internet addresses, etc.)

- 1.- INTRODUCTION TO NANOSCALE SCIENCE AND TECHNOLOGY EDS DI VENTRA, EVOY AN HEFLIN SPRINGER, 2004.
- 2.- NANOTECHNOLOGY, BASIS SCIENCE ADN EMERGING NANOTECHNOLOGIES. WILSON ET AL CHAPMAN, 2002
- 3.- INTERNATIONAL TECHNOLOGY ROADMAP FOR SEMICONDUCTORS ITRS-2007
- 4.- "BASIC RESEARCH NEEDS FOR SOLAR ENERGY UTILIZATION", Report on the Basic Energy Sciences Workshop on Solar Energy Utilization
[HTTP://WWW.SC.DOE.GOV/BES/REPORTS/FILES/SEU_RPT.PDF](http://www.sc.doe.gov/bes/reports/files/seu_rpt.pdf)

3.3.3. Criteria and methods for evaluation and grading

(Analysis of the methodology that will be used to evaluate the learning process of the student)

THE EVALUATION IS MADE ON THE BASIS OF AN INDIVIDUAL EXERCISES AND A SEMINAR ON A RELATED SUBJECT

3.3.4. Learning resources

ACCESS TO LECTURE VIEGRAPH PDF'S

3.3.5. Language and number of groups attending the module

1

NUMBER OF GROUPS

x

LANGUAGE: ENGLISH

3.3.6. Fields of science and technology to which the module is related

CODE	FIELD
	PHYSICS OF CONDENSED MATTER
	APPLIED PHYSICS

3.3.7. Department in charge of the Program

CODE	DEPARTMENT ⁽¹⁾
	DEPARTMENT OF MATERIALS PHYSICS

3.3.8. Teachers in charge of the module

DNI	Teacher UPV/EHU	Number of credits
15960590Q	José Enrique ORTEGA CONEJERO	2

DNI	Teacher other institutions	Number of credits
	Andrés AYUELA	1