

MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications

Master's Sessions @ Science Faculty

Dr. Maria Pilar Pina
(mapina@unizar.es)

<https://ciencias.unizar.es/master-en-materiales-nanoestructurados-para-aplicaciones-nanotecnologicas-2014-15>

https://estudios.unizar.es/estudio/ver?id=637&anyo_academico=2020

<https://inma.unizar-csic.es/formacion/estudiantes-master/estudios-master-unizar/nanociencia-materiales/>



Universidad
Zaragoza



CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications

Universidad de Zaragoza

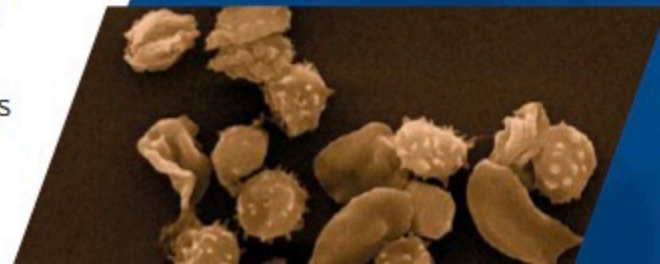
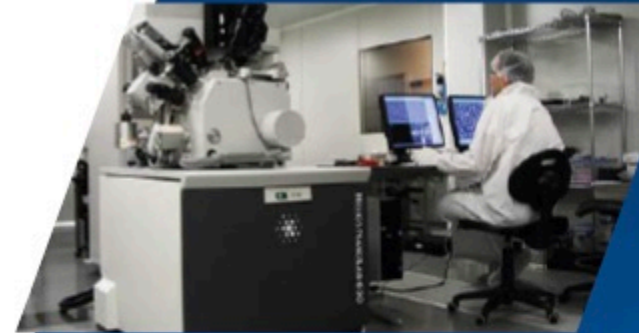
This official Master from Zaragoza University (Spain) has a duration of one academic year and comprises 60 ECTS credits. The course is suitable for graduates with science, engineering, medicine or related degrees keen to develop careers at the forefront of Nanoscience and Nanotechnology.

The course is multidisciplinary and aims to provide students with fundamental knowledge, practical experience, and skills to become a practitioner in Nanotechnology, whether in industry, research or academia.

International,
Multidisciplinary, and
Postgraduate unique
environment.

The University of Zaragoza and the Institutes of Nanoscience and Materials Science of Aragón (INA and ICMA) have exceptional materials preparation and characterization equipment, including some unique instruments in Spain and Europe.

The course is completely taught in English by highly qualified members of research and academic staff within the INA, ICMA, and the Faculty of Science of Zaragoza University as well as by other national and international departments and industrial representatives.



THE COURSE MODULES ARE:

CORE MODULES

- 1 *Fundamental Properties of Nanostructured Materials (6 ECTS credits)*
- 2 *Preparation of Nanostructured Materials (6 ECTS credits)*
- 3 *Assembly and fabrication of Nanostructures (6 ECTS credits)*
- 4 *Characterization I: Physical-chemical techniques (6 ECTS credits)*
- 5 *Characterization II: Advanced Microscopies (6 ECTS credits)*
- 6 *Case studies of industrial applications (6 ECTS credits)*

OPTIONAL MODULES

- 7.a *Introduction to Research in Nanoscience and Nanotechnologies (5 ECTS credits)*
- 7.b *Fabrication of Micro and Nanodevices (5 ECTS credits)*
- 7.c *Multidisciplinary Joint Educational Project (5 ECTS credits)*
- 7.d *Practical work in a Nanotechnology-related company (5 ECTS credits)*

MANDATORY INDIVIDUAL RESEARCH PROJECT

- 8 *Final Master Project (14 ECTS credits)*



MASTERS DEGREE IN

**Nanostructured Materials
for Nanotechnology Applications**

INTERNATIONAL

Completely taught in English

Movility Programme Erasmus⁺



Post-graduate Programme: Fundación Carolina

Collaboration Agreement with Nanjing Tech University

Erasmus Mundus Master EM3E4SW (new submission)

MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications

MULTIDISCIPLINARY

Departments Involved from Unizar

1. Biochemistry & Molecular Biology
2. Science & Technology of Materials & Fluids
3. Physics of Condensed Matter
4. Chemical & Environmental Engineering
5. Analytical Chemistry
6. Organic Chemistry
7. Physical Chemistry
8. Inorganic Chemistry
9. Marketing Direction & Market Research
10. Documentation Sciences & History of Science

Fundamental Knowledge - Practical Experience - Soft Skills





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MULTIDISCIPLINARY

**Invited lecturers from other Institutions (UCM, IMB-CNM-
CSIC, EOP, U.Liverpool...)**

Invited Speakers from companies: EXPERTIA, Catedra SAMCA

**Students from different backgrounds: Physics, Chemistry,
Biotechnology, Chemical Eng., Mat. Sciences, Industrial
Eng...)**

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Thursday's NanoSpin-off TALKS

 YouTube



Cátedra SAMCA
de Nanotecnología
Universidad Zaragoza



INMA
INSTITUTO DE NANOCIENCIA
Y MATERIALES DE ARAGÓN

TALKS

Emprendiendo ciencia, aprendiendo innovación.

RUBYnanomed (Portugal)

Carbon Nanomembranes 2D-Materials beyond Graphene

CNM Technologies GmbH (Germany)

Bridging the gap between Academy to Business (A2B)

Nanoenergy, SPin-off of Porto University

NANOVEX BIOTECHNOLOGIES: A GLOBAL BORN COMPANY

NANOVEX BIOTECHNOLOGIES SL (Spain)

VLC Photonics: pioneering services for the development of photonic integrated circuits

VLC Photonics (Spain)

TECNAN: Innovative nanotechnological protectors for industry

TECNOLOGIA NAVARRA DE NANOPRODUCTOS S.L. TECNAN (Spain)

Lessons learned from my experience in nanotech company OXOLUTIA

OXOLUTIA SL (Spain)

Immaterial. Materials discovery and molecular engineering of MOFs

Immaterial (U.K)

BIVO, Centro de Investigación en Tejidos Orgánicos, Bioestructuras y Biomateriales.

BIVO S.COOP (Spain)

Fotoglass where life and light meet

Fotoglass (Spain)



MASTERS DEGREE IN

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PRACTICAL

More than 50 % of the credits are practical

Training in advanced tools for Nanotechnology (LMA)

Communication and management skills

INTERSHIPS-UNIVERSA (BeONChip, NanoScale
Biomagnetics, Argenol, BSH, SAMCA, SAICA, IUIs...)

INMA
INSTITUTO DE NANOCIENCIA
Y MATERIALES DE ARAGÓN

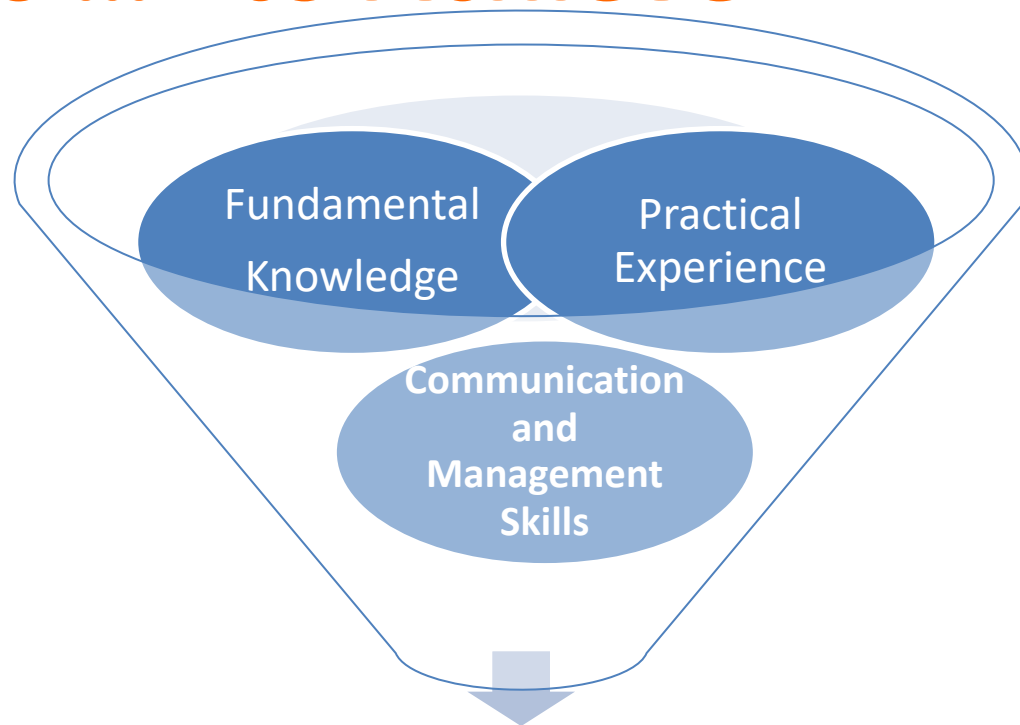
 **LMA**
LABORATORIO
DE MICROSCOPIAS
AVANZADAS



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Academic Activities ... to Achieve

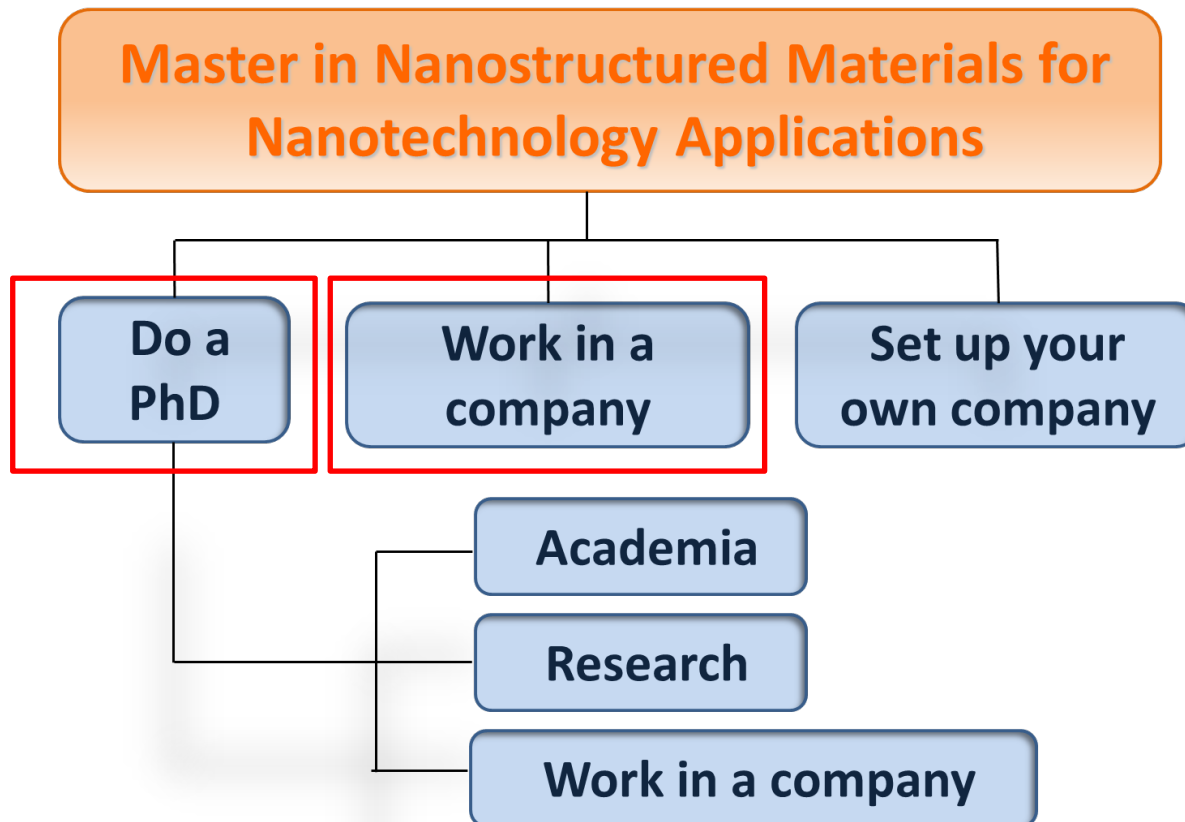


Career Opportunities across a wide range of industry sectors, academia and research

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OPPORTUNITIES



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Section	Module	ECTS Credits Coordinator	Semester	Mandatory /Optional
Fundamentals	1. Fundamental properties of nanostructured materials	6 M.P. Pina	First Semester	Mandatory
	7.a. Introduction to Research in Nanoscience/Nanotechnology	5 G. Goya	First Semester	Optional
Fabrication	2. Preparation of Nanostructured Materials	6 (4+2) Irene Lucas	First Semester	Mandatory
	3. Assembly and Fabrication of Nanostructures	6 (4+2) F. Balas	First Semester	Mandatory
	7.b. Fabrication of Micro and Nanodevices	5 M.P. Pina	Second Semester	Optional
Characterization	4. Characterization I: Physical Chemical Techniques	6 (2+4) C. Marquina	First Semester	Mandatory
	5. Characterization II: Advanced Microscopies	6 (3+3) J.I. Arnaudas	Second Semester	Mandatory
Applications	6. Industrial Applications	6 Santamaría/Sebastián	Second Semester	Mandatory
	7.c. Joint Multidisciplinary Ac. Pr.	5 (M.P. Pina)	Second Semester	Optional
	7.d. Practicals in a company	5 (M.P. Pina)	Yearlong	Optional
Project	Final Master Project	14 (M.P. Pina)	Yearlong	Mandatory

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INMA
INSTITUTO DE NANOCIENCIA
Y MATERIALES DE ARAGÓN

How to choose your Final Master Project

Choose from a wide choice at:

<https://inma.unizar-csic.es/formacion/estudiantes-master/estudios-master-unizar/master-nanomat/>

Contact the supervisor/s of the project you are interested in.

General Session for Topics Exposition – First of October.

First Official list available in November (Annex I) at:

<https://ciencias.unizar.es/master-en-materiales-nanoestructurados-para-aplicaciones-nanotecnologicas-2014-15>

Signing the FMP Custody/Learning Agreement in Nov-Dec (Annex II)

https://ciencias.unizar.es/sites/ciencias.unizar.es/files/users/fmlou/pdf/Asuntos_academicos/annex_ii_englishnanomat.pdf

This document must be submitted by the supervisor to the Secretary of the Faculty within the prescribed period, for its referral to the guarantee of the quality of the Master's Committee

ANNEX I

PROPOSAL FINAL MASTER PROJECT

ACADEMIC YEAR:

DEPARTMENT RESPONSIBLE:

TITLE FMP:

	Name and Last Name	Center and category	Doctor (yes/no)	Email	Phone
Supervisor					
Supervisor					
Overseer					

Place the realization del FMP:

Faculty of Sciences:

Another:

Short description of the objectives and the work Plan to be developed by the student:

(Comment tasks to perform, techniques to be used, etc. Maximum 250 words). In addition, in accordance with as set out in the directives of their Master, if this is the case:

- Justify the need for a second Supervisor
- If extraordinary the TFM is affected by a confidentiality agreement, justifies the reasons and provide the required documentation

Zaragoza,

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(The proposal must be signed by the supervisors and the overseer, in his case, along with V* B* of the Department responsible)

This document must be submitted by the student to the Secretary of the Faculty within the prescribed period, for its referral to the guarantee of the quality of the Master's Committee.

ANNEX II

FINAL MASTER PROJECT CUSTODY AGREEMENT IN

■ PERSONAL DATA OF THE STUDENT PRESENTING THE FINAL MASTER PROJECT (FMP)

Name (Last and first): DNI/NIE/Passport No.
 Address: NE Floor:
 Postal Code: City: Province:
 Phone: E-mail:
 Department that manages the FMP:

■ Title FMP:

■ Supervisors /Overseer

1. Supervisor, Name and Last Name:

V* B* (signature)

2. Supervisor, Name and Last Name:

V* B* (signature)

3. Overseer, Name and Last Name:

V* B* (signature)

■ Student's signature

Zaragoza,

Nanostructured Materials for Nanotechnology Applications

FMT TOPICS SELECTED BY STUDENTS (21-22)

- ❖ Synthesis and characterization of ceramic-polymer composite electrolytes for solid state batteries.
- ❖ Nanoparticles based on dendrimers to detect biomarkers in cancer patients analyzed by Fluorescence Liquid Biopsy
- ❖ Solar cells based on the combination of perovskite and semiconductor nanocrystals
- ❖ Enzymatic generation of nanomaterials for the development of optical nanobiosensors for quality control in food
- ❖ Nanofabrication of chemically modified surfaces for large area molecular electronic devices
- ❖ DNA-Polymer Assemblies for Therapeutic Delivery
- ❖ Development of polymeric scaffolds for bone and cartilage regeneration
- ❖ Nanofabrication of heterostructures for resistive switching detection
- ❖ Synthesis and physical characterization of cobalt nanodeposits grown by focused electron beam induced deposition under cryogenic conditions
- ❖ Development of nanocatalysts based on copper and iron with enzyme-like response for biomedical applications
- ❖ Incorporation of photocatalytic materials in ceramic materials

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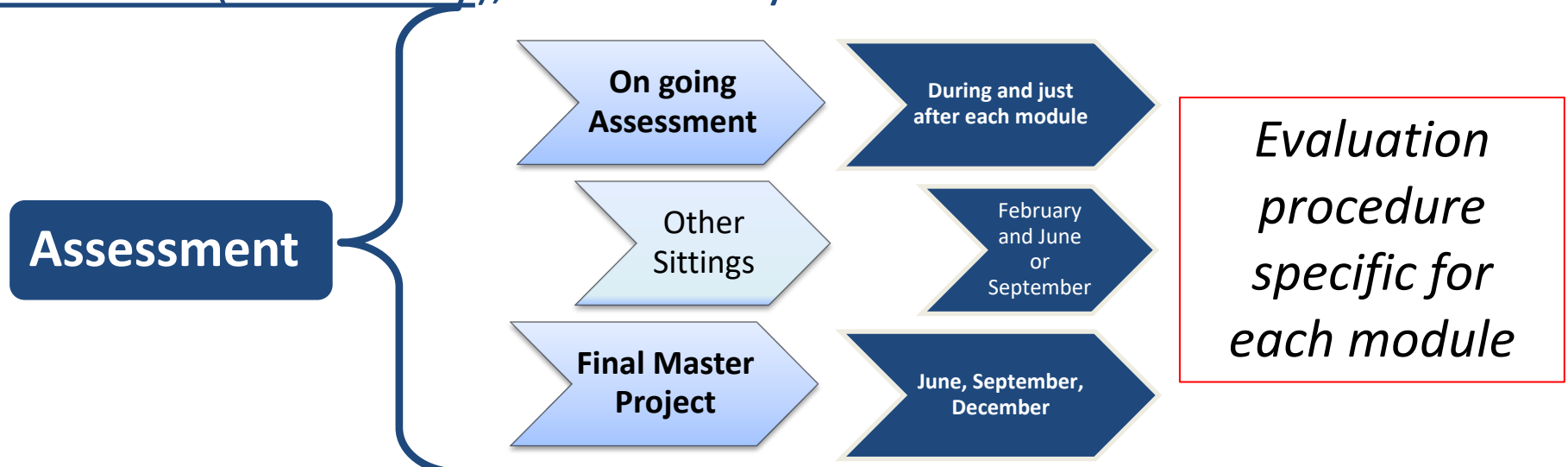
Nanostructured Materials for Nanotechnology Applications

TIMING, SCHEDULE, ASSESMENT

Lectures: from September 2022 to May 2023

Schedule: from Monday to Friday , from 15:00 up to 20:00 h (50´)

Morning Activities: experimental work-FMP, attendance to scientific seminars (mandatory), occasionally lab sessions



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CHRONOGRAM 1st Semester

**Module 1: Fundamental
Properties of Nanostructured
Materials**

Mid-September
to
Mid-October

**Module 2: Preparation of
Nanostructured Materials**

Mid-October
To
Mid-November

**Module 3: Assembly and
Fabrication of Nanostructured
Materials**

Mid of November
To
Mid-December

**Module 4: Characterization
Techniques (I)**

Mid of November
To
Mid-January

Mid-October

Module 7.a:

**Introduction to
Research in
Nanoscience
and
Nanotechnology**

Mid of December

*INNOVATION PROJECT: INTRA – INTER MODULAR UNITY

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CHRONOGRAM 2nd Semester

Module 5: Advanced
Microscopies

February

Module 6: Case Studies of
Industrial Applications

February to
End of April

Module 7.b:

Fabrication of
Micro & Nano
Devices

March

**MOBILITY
ACTION
ERASMUS+
TOTAL
14+10 ECTS**

Module 7.c:

Multidisciplinary
Joint Educational
Project

To be presented
in June or September

Module 7.d:

Practical
work
in a Nano
Related
Company

To be presented
in June or September

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SCHEDULE

Module 1: Fundamental Properties of Nanoscale Materials, Module 2: Fabrication of Nanostructured Materials, Module 3: Assembly and Fabrication of Nanostructures, Module 6: Industrial Applications, Module 7.a: Introduction to the Research in Nanoscience, Festivos en España

	lun 9/16	mar 9/17	mié 9/18	jue 9/19	vie 9/20	sáb 9/21	dom 9/22
		Día de Melilla (Melilla)					
12pm							
1pm							
2pm							
3pm							
4pm		Physical Chemistry at the Nanoscale (S. Martín) @ Physics Building. 3:30pm - 5pm	Physical Chemistry at the Nanoscale (S. Martín) @ Physics Building. 3:30pm - 5pm	Physical Chemistry at the Nanoscale (S. Martín) @ Physics Building. 3:30pm - 5pm	Physical Chemistry of Surfaces (S. Martín) @ Physics Building. 3:30pm - 5pm		
5pm	Welcome. Nanomat Presentation & Introduction to Module I (Pilar) 5pm - 6:30pm	Introduction to Supramolecular Chemistry (Jesús del Barrio) @ Physics Building. Room 4. 5pm - 7pm	Introduction to Supramolecular Chemistry (Jesús del Barrio) @ Physics Building. Room 4. 5pm - 7pm	An overview of polymer structure and polymers (Milagros Piñol) @ Physics Building. Room 5pm - 7pm	Econanotoxicology (Rafael Martín) @ Physics Building. Room 4. 5pm - 7pm		
6pm			Self-assembly of organic compounds 6pm - 7pm				
7pm	Plenary Lecture (Scott Mitchell): Foreseen and 6:30pm - 7:30pm						
8pm							

Colours code for the courses

Title of the lecture name of the Lecturer and location

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Module 1: Fundamental Properties of Nanomaterials, Module 2: Fabrication of Nanostructured Materials, Module 3: Assembly and Fabrication of Nanostructures, Module 6: Industrial Applications, Module 7.a: Introduction to the Research in Nanoscience, Festi...

	lun 9/23	mar 9/24	mié 9/25	jue 9/26	vie 9/27	sáb 9/28
12pm						
1pm						
2pm						
3pm						
4pm	Physical Chemistry of Surfaces (S. Martin) @ Physics Building. 3:30pm - 5pm	Magnetic Properties of Nanomaterials (I. Lucas) @ Physics Building. 3:30pm - 5pm	Magnetic Properties of Nanomaterials (I. Lucas) @ Physics Building. 3:30pm - 5pm	Magnetic Properties of Nanomaterials (I. Lucas) @ Physics Building. 3:30pm - 4:30pm	Carbon based nanomaterials (A. Monzón) @ I+D+i Building (Campus Rio Ebro). Conference 4pm - 6pm	
5pm	Electrochemistry of Interfaces (Ignacio Gascon) @ Physics Building. Room 4. 5pm - 7pm	Optical Properties of Nanomaterials (Luis Martin) @ Physics Building. Room 4. 5pm - 7pm	Seminar Econanotoxicology (Rafael Martin) @ Physics Building. Room 4. 5pm - 7pm	Introduction to Biomaterials (A. I. Gracia-Lostao) @ I+D+i Building (Campus Rio Ebro). Classroom. 4:30pm - 6:30pm		Introduction to Biomaterials (A. I. Gracia-Lostao) @ I+D+i Building (Campus Rio Ebro). Conference 6pm - 8pm
6pm				Applications of Magnetic NPs (G. Goya) @ 6:30pm - 7:30pm		
7pm	Self-assembly of organic compounds 7pm - 8pm					
8pm						
9pm						



Colours code for the modules



Title of the lecture name of the Lecturer & location:

Room 4 – Physics (Campus S. Francisco)
Classroom-I+D+i (Campus Rio Ebro)



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FELLOWSHIPS

- **CATEDRA SAMCA DE NANOTECNOLOGÍA**
- **PROGRAMA PI2 INMA**
- **CSIC JAE INTRO ICU**

Open Recruitment based on merits and motivation

<https://inma.unizar-csic.es/formacion/estudiantes-master/>