Màster en Nanociència i Nanotecnologia

Universitat de Barcelona

Coordinador Sergi Hernández (shernandez@ub.edu)
WHAT IS NANOSCIENCE?

The word Nanoscience refers to the study, manipulation and engineering of matter, particles and structures on the nanometer scale (one millionth of a millimeter, the scale of atoms and molecules). Important properties of materials, such as the electrical, optical, thermal and mechanical properties, are determined by the way molecules and atoms assemble on the nanoscale into larger structures. Moreover, in nanometer size structures these properties often different then on macroscale, because quantum mechanical effects become important.

WHAT IS NANOTECHNOLOGY?

Nanotechnology is the application of nanoscience leading to the use of new nanomaterials and nanosize components in useful products. Nanotechnology will eventually provide us with the ability to design custom-made materials and products with new enhanced properties, new nanoelectronics components, new types of “smart” medicines and sensors, and even interfaces between electronics and biological systems…

These newborn scientific disciplines are situated at the interface between physics, chemistry, materials science, microelectronics, biochemistry, and biotechnology. Control of these disciplines therefore requires an academic and multidisciplinary scientific education.
WHY STUDY NANOSCIENCE & NANOTECHNOLOGY?

Nanoscience and nanotechnology are at the forefront of modern research. The fast growing economy in this area requires experts who have an outstanding knowledge of nanoscience in combination with the skills to apply this knowledge in new products. A multidisciplinary scientific education is crucial to provide industry and research institutes with top quality experts who have a generic background in the different subdisciplines such as electronics, physics, chemistry, material science, biotechnology..., and at the same time be experts in one particular field. This is what is offered in this master programme.

In the Master of Nanoscience and Nanotechnology, you will learn the basics of physics, biology, chemistry and pharmacy at the nanometer scale. The combination of a solid multidisciplinary scientific basis and an individual high level specialization in a certain area of Nanoscience is the philosophy of the program.
What is the Mission of the IN²UB?

A Centre of Reference for the **Creation of Knowledge** in Nanoscience and Nanotechnology, for **Education** through Research and for the **Transfer of Knowledge**.
Participation of 5 different Faculties from UB:

- Medicine
- Pharmacy
- Physics
- Chemistry
- Biology
Research Lines of the IN$^2$UB

1) NanoModeling, Simulation and Nanoscopic Methods (NanoMet)
2) Nanobioscience, Nanobiomechanics and BioNanotechnology (NanoBio)
3) Nanopharmaceutics and Nanomedicine (NanoPharmaMed)
4) Nanomagnetism and Spintronics (NanoMagnetics)
5) Nanoelectronics, Nano-optics and Nanophotonics (NanoPhotoElectro)
6) Nanostructured materials (NanosMat)
7) Nanoenergy: Production and Storage (NanoEnergy)
• 110 permanent research staff
• 35 PostDocs, 65 PhD Students
• 47 Research groups from 5 faculties

Research Outputs 2013-2017

1590 peer reviewed scientific papers
(Scimago Journal Ranking)

• 75.85% in the first quartile (Q1)
• 36.25% in the first decil (D1)
• average of 8.74 citations/paper.
• Collaborations with 42 companies

XIV BUSINESS FORUM
Faculties of Physics, Chemistry, Mathematics and Computer Science, Earth Sciences and Biology
April 10th 2019, from 10h to 17h at the Physics and Chemistry Faculties Building
http://www.ub.edu/fisica/firaempreses/index_en.html

• 71 Patents

• 4 spin-offs companies created

http://www.ub.edu/fisica/firaempreses/index_en.html
Scientific and Strategic Goals

- Supramolecular Chemistry for Nanomedicine
- Nanodevice Fabrication
- Biophysics and Biomechanics
- Nanoscopies and Instrumental Development
- Modelling and Simulation of Nanosystems
- Nanopharmacy and Nanotoxicity
INVOLVED INSTITUTIONS

University of Barcelona

Participation of members from:

- Catalan Institute of Bioengineering (IBEC)
- Catalan Institute of Research in Energy (IREC)
- Barcelona Institute of Microelectronics (IMB-CNM-CSIC)
- Barcelona Institute of Material Science (ICMAB-CSIC)
Advanced Degrees & Engineering

- Biology
- Pharmacy
- Physics
- Medicine
- Material engineering
- Chemical engineering
- Electronics engineering
- Chemistry

Block of fundamental topics
15 ECTS
- Nanomaterials
- Nanobiotechnology
- Manipulation and characterization at the nanoscale

Block of additional topics
25 ECTS
- Material Technology and Fabrication
- Characterization techniques
- Chemistry and Physics at the nanoscale
- Chemistry of nanosystems
- Nanoengineering for Environment, TIC, and Energy
- Nanopharmacotherapy
- Nanobiotechnology

Master Thesis
20 ECTS

60 ECTS
CONTENTS

Fundamentals of Nanotechnology (3×5 ECTS)
- Nanomaterials
- Nanobiotechnology
- Characterization and manipulation at the nanoscale

COURSE MODULES
1. Fabrication and Technology of Nanomaterials
2. Characterisation techniques
3. Chemistry and Physics at the nanoscale
4. Chemistry of Nanosystems
5. Physics and nanoengineering for TIC
6. Nanopharmacotherapy
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Scholarships

IN2UB

Ofertas/Formación

- Si desea información específica actualizada del Master Oficial de la UB en Nanociencia y Nanotecnología, por favor clicke AQUÍ
- Si desea información específica de los contenidos, líneas de investigación y profesorado del Programa de Doctorado en Nanociencias de la UB, por favor clicke AQUÍ
- Si desea información actualizada sobre becas y ayudas, por favor clicke AQUÍ
- En el PROGRAMA MÁSTER+ UB DE CAPTACIÓN DE ESTUDIANTES PARA CURSAR UN MÁSTER UNIVERSITARIO E INCENTIVAR LAS VOCACIONES CIENTÍFICAS EN EL SEÑO DE UN GRUPO DE INVESTIGACIÓN Curso 2020/2021, el IN2UB ha convocado 2 becas NUEVO

Convocatoria. Hasta: 22/08/2020

A continuación podéis consultar las propuestas de TFM

- Propuestas de TRABAJOS FIN MASTER IN2UB: TFM_IN2UB
  - Oferta TFM "Iron Gold Nanorods" coordinado por los grupos: Group of Magnetic Nanomaterials and Laboratory of Nanostructured and Nanocomposite Materials
  - Oferta TFG "Trabajo fin de grado (Grado de Química)"
  - PROPUESTA TFM/DOCTORADO en el grupo Cellular responses to xenobiotics
  - PROPUESTA TFM/DOCTORADO en el grupo Supramolecular Systems in Nanobiomedicine
  - PROPUESTA TFM/DOCTORADO en nanopartículas magnéticas con diferentes aplicaciones

OFERTAS EXTERNAS

Atomic Force Microscopy (AFM) biotechnician (Offer)
3rd PSI-FELLOW Postdoctoral (Offer)

Student services and activities (UB)

http://www.ub.edu/monub/
**Nanoscience and Nanotechnology**

**About the master's degree**
- Introduction
- Objectives and competences
- Admission and pre-enrolment
- Course curriculum
- Placements
- Teaching methodology and assessment system
- Career opportunities
- Support for studying
- Enrolment
- Calendar, timetables, classrooms and assessment
- Course plans and teaching staff
- Course details

**Introduction**

Nanoscience and nanotechnology are disciplines at the cutting-edge of scientific knowledge. They combine aspects of basic and applied sciences applied to specific fields, such as biotechnology, medicine, chemistry, pharmaceutical sciences, physics, materials engineering, sciences and electronic engineering. Nanoscience and nanotechnology are therefore key areas of interdisciplinary research and development, in which activity is increasing across the globe.

The master's degree in Nanoscience and Nanotechnology at the University of Barcelona is taught in English and intended for students with an academic background in science.

The aim of the master's degree is to provide students with professional competences in the field of nanoscience and nanotechnology, for industry and science. Students must be capable of addressing problems that require interdisciplinary skills. On completion of the master's degree, graduates will be equipped to work on creative tasks in a new scientific or technological environment and form part of interdisciplinary research groups. The compulsory subjects are designed to bolster this interdisciplinarity. The practical component of the optional
EMM-Nano Master Program

Erasmus Mundus Master Nanoscience and nanotechnology (120 stp)

Nanoscience and nanotechnology fundamentals (0-12 ects, KU Leuven)
- Quantum physics - 3 ects
- Semiconductor physics - 3 ects
- Semiconductor devices - 3 ects
- Atomtheory, chemical periodicity and chemical bond - 3 ects
- Structure synthesis and cellular function of macromolecules - 3 ects
- Electronic components, circuits and sensors - 3 ects
- Basics of Pharmacology - 3 ects

General interest courses (6-9 ects, KU Leuven)
Courses chosen from an extensive list of general interest courses

Core courses (36 stp, KU Leuven)
- Material physics and technology for nanoelectronics - 6 ects
- Nanostructured biomacromolecules - 6 ects
- Chemistry at nanometer scale - 6 ects
- Technology of integrated systems - 6 ects
- Mesoscopic physics - 3 ects
- Lectures on nanoscience and nanotechnology - 3 ects
- Practical design for nanotechnology or Project work nanoscience - 6 ects

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<td>Option Nanochemistry UGA Grenoble</td>
<td>Option Nanoelectronics TU Dresden</td>
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