

SCIENCES, TECHNOLOGIES AND HEALTH

Master in Nanosciences and nanotechnologies

Nanosciences et nanotechnologies



Target level
Baccalaureate
+5



ECTS
120 credits



Duration
2 years



Component
Grenoble
INP, Institut
d'ingénierie et
de management
- UGA, UFR
PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Language(s) of
instruction
English

Subprograms

- > Research intensive track 1st year
- > Nanochemistry
- > Nanophysics
- > Nanobiosciences
- > Nanomedicine and structural biology
- > Micro and nanostructure engineering

Presentation



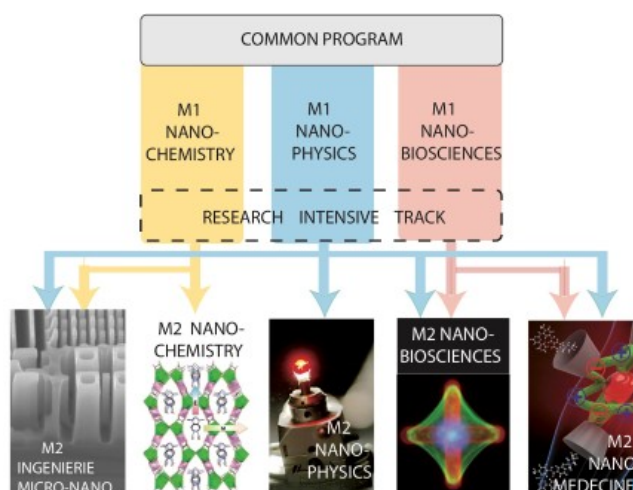
Course co-accredited by the Université Grenoble Alpes and the National Polytechnic Institute of Grenoble

Nanosciences study phenomena and manipulation of matter on the atomic and molecular scale (nanometers: i.e., one billionth of a meter). Important properties of matter such as the electrical, optical and mechanical properties are determined by the way molecules and atoms assemble into larger structures on the nanoscale.

Nanotechnology is the application of this science in new nanomaterials and nano - concepts for new components, systems and products. Therefore, nanotechnology will provide us with the ability to design custom-made materials with any property we require.

These newborn scientific disciplines are situated at the interface of physics, chemistry, material science, micro electronics, biochemistry and biotechnology. The master Nanoscience & nanotechnology of Grenoble is a 2-years integrated program with a strong research backbone and an important international outreach, providing a top quality multidisciplinary education in nanoscience and nanotechnology. The key assets of master N² are:

- A **multi-disciplinary approach** with five tracks in nanophysics, nano- chemistry, nano-biosciences, nano-medicine, and micro and nano-engineering
- A broad **international exposure** sustained by an Erasmus Mundus program and several other international partnerships
- An **experimental training** of exceptional quality in the many nano-facilities of the Grenoble area
- An **excellent immersion** in the world-class research environment of the Grenoble area, with the  Nanosciences conferences courses, the  research training program, and the extended master thesis (see RIT track).



The first year has 3 majors in nano-physics, nano-chemistry and nano-biosciences, tailored to receive students from different background. It prepares them to one of the 5 tracks of the 2nd year.

The 1st year **Research intensive track (RIT)** is dedicated to bachelors of Science totalizing 4 years of higher education (equivalent to 240 ECTS), or student having validated a 1st year of a master in another field and who want to change their orientation. They start their master thesis in the first year and pursue their second year in one of the 2nd year track.

The IMN track is available in "alternance" for professional students who work in a company. This track is taught in french.

The program for the master in Nanosciences and nanotechnologies provides students with the background

needed for continuing to doctoral level in fundamental or applied sciences. It also prepares them for high-level positions in the nanotechnologies industry.

International education : Double degrees, joint degrees, Erasmus Mundus, Education with formalized international partnerships, Internationally-oriented programmes

International dimension

The master in Nanosciences and nanotechnologies is one of the international masters of UGA. At the beginning of 2010, he joined the european master Erasmus-Mundus EMM Nano and, as such, has a joint degree with KU Leuven University. He operated a partnership with the NanoTech master from Delhi University. The international character of the master's degree has been reinforced year by year with the signing of double-degree agreements with foreign universities: Polytechnic University of Tomsk (TPU), Institute of Technology Karlsruhe (KIT). In 2015 the European Master "EMM NAno" was renewed in Erasmus Plus for the period 2016-2019.

Admission

Access conditions

National diploma equivalent to a bachelor degree (licence) in a field compatible with that of the master. Qualification or achievement recognised as equivalent by the admissions board of the Université Grenoble Alpes.

Public continuing education : You are in charge of continuing education :

- if you resume your studies after 2 years of interruption of studies
- or if you followed a formation under the regime formation continues one of the 2 preceding years
- or if you are an employee, job seeker, self-employed

If you do not have the diploma required to integrate the training, you can undertake a [validation of personal and professional achievements \(VAPP\)](#)

Candidature / Application

Would you like to apply and register ? Be aware that the procedure differs depending on the diploma, the degree obtained, or the place of residence for foreign students. Let us guide you simply by following this [link](#)

Target

The students are of university origin, national territory or recruited internationally, or students of high schools (Grenoble INP) who, as part of their curriculum, take this training instead of their last year of studies . Because of its generalist nature in science, the master is naturally well suited to students with a background in physics and chemistry (or physical sciences), who can access all courses. It is also suitable for engineering graduates with a broad enough prior curriculum in mathematics, physics and general chemistry. Students recruited internationally are sometimes licensed (Batchelor) in electrical engineering, mechanics or materials. Students graduated in the field of life sciences can follow the path nano-biosciences if they have the prerequisites (see program).

Fees

Tuition fees 2019-2020 : 243 €

Prerequisites

See program

Recommended prerequisites

See program

And after

Further studies

Continuation of study possible in PhD.

Reorientation

The course of 1st year Research intensive track allows to accommodate in reorientation students who have validated the equivalent of an 1st year (240 ECTS) in a field not directly compatible with that of the master, or not having a sufficient background generalist in sciences to enable them to follow the 2nd year of the master.

Sector(s)

- Research
- R & D
- Higher Education

Targeted trades

Research
Research and development
Higher Education

Additional information

The acquisition of in-depth knowledge in physics, chemistry and biology is fostered by an exceptional research environment: the Grenoble scientific community, comprising the laboratories of the UGA, Grenoble INP, CEA and CNRS, as well as major research centres such as the Synchrotron (ESRF) and the Institut Laue-Langevin (ILL).

All courses (except the IMN track) are taught in english and welcome a majority of international students. The master N² of UGA is part of a European Mundus Master consortium, the EMM Nano, open to european and non-european students. Student admitted at the EMM Nano spend their 1st year at KU Leuven, Belgium, and their 2nd year at UGA in either the nano-physics, nano-chemistry or nano-biosciences track. They obtain a joint-degree of the KU Leuven and UGA. The master N² has also partnerships and double-degree programs with the Tomsk Polytechnic University (TPU), and the Tsukuba University, Japan.

Useful info

Contacts

Program director

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Program director

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Program administration

Registrar's Office for the Master in Nanosciences and nanotechnologies

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Program administration

Application

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Program administration

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Partner schools

CEA-INSTN

🔗 <http://www-instn.cea.fr/formations/diplomes-et-titres/les-mentions-master/mention-nanosciences,-nanotechnologie.html>

Partner laboratories

Laboratories of the Nanosciences Foundation

🔗 <http://www.fondation-nanosciences.fr/>

Course location(s) - City

 Grenoble

Campus

 Grenoble - University campus

 Grenoble - Scientific Polygon

Know more

Master website

 <https://master-nanosciences.univ-grenoble-alpes.fr>

Program

Research intensive track 1st year

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits
UE Research project	Teaching Unit (UE)				6 credits
UE Micro and nanofluidics	Teaching Unit (UE)	14h	10h		3 credits
UE Occupational integration	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Coordination and supramolecular chemistry	Teaching Unit (UE)	31,5h		16h	6 credits
UE Mechanics at the micro & nano-scale	Teaching Unit (UE)	14h	10h		3 credits
UE Solid state, electrons and phonons	Teaching Unit (UE)	18h	9h		3 credits
UE Quantum physics	Teaching Unit (UE)		24h		3 credits
UE Molecular biology	Teaching Unit (UE)	22h	2h	24h	6 credits
UE Semi-conductors physics	Teaching Unit (UE)	16h	10h		3 credits
UE Optical spectroscopy	Teaching Unit (UE)	14h	8h		3 credits
UE Electromagnetism	Teaching Unit (UE)	14h	12h		3 credits

UE Mathematics for biology	Teaching Unit (UE)		3 credits
UE Scientific softwares	Teaching Unit (UE)	20h	3 credits
UE in the specialisation or Phelma	CHOICE		

Semester 8

	Nature	CM	TD	TP	Crédits
UE Nanosciences interdisciplinary practical trainings 1	Teaching Unit (UE)			28h	6 credits
UE Research internship 2	Teaching Unit (UE)				6 credits
UE Phase transition, transport and fluctuations : from nanomaterials to biologic systems	Teaching Unit (UE)	25h	25h		6 credits
UE Research intensive track internship	Teaching Unit (UE)				9 credits
UE Nanophysics with local probes	Teaching Unit (UE)				3 credits
UE Numerical simulations project	Teaching Unit (UE)				3 credits
UE Polymers 2 physico-chemistry	Teaching Unit (UE)	19h	6h		3 credits
UE in the specialisation or Phelma UE	CHOICE				

Nanochemistry

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits
UE Coordination and supramolecular chemistry	Teaching Unit (UE)	31,5h		16h	6 credits

UE From solution to solid	Teaching Unit (UE)	24h	10,5h	16h	6 credits
UE Molecular biology	Teaching Unit (UE)	22h	2h	24h	6 credits
UE Polymers 1	Teaching Unit (UE)	21h	13,5h	16h	6 credits
UE Micro and nanofluidics	Teaching Unit (UE)	14h	10h		3 credits
UE Solid state, electrons and phonons	Teaching Unit (UE)	18h	9h		3 credits
UE Mechanics at the micro & nano-scale	Teaching Unit (UE)	14h	10h		3 credits
UE Other program	Teaching Unit (UE)				3 credits
UE Optical and magnetic spectroscopies	Teaching Unit (UE)	13h	12h		3 credits
UE Optical spectroscopy	Teaching Unit (UE)	14h	8h		3 credits
UE Occupational integration	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Research internship 2	Teaching Unit (UE)				6 credits
UE Nanosciences interdisciplinary practical trainings 1	Teaching Unit (UE)			28h	6 credits
UE Phase transition, transport and fluctuations : from nanomaterials to biologic systems	Teaching Unit (UE)	25h	25h		6 credits
UE Electrochemistry and molecular photophysics	Teaching Unit (UE)	18h	7,5h	24h	6 credits
UE Nanophysics with local probes	Teaching Unit (UE)				3 credits

UE Polymers 2 physico-chemistry	Teaching Unit (UE)	19h	6h	3 credits
UE Modelling in systems biology	Teaching Unit (UE)			3 credits
UE Other program	Teaching Unit (UE)			3 credits
UE French as a foreign language	Teaching Unit (UE)			3 credits
UE English	Teaching Unit (UE)			3 credits

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Micro-nano fabrication	Teaching Unit (UE)	10h		16h	3 credits
UE Research internship	Teaching Unit (UE)				3 credits
UE Molecular nanomaterials	Teaching Unit (UE)	40h			6 credits
UE Inorganic nanoparticles	Teaching Unit (UE)	20h		4h	3 credits
UE Bio-molecular interactions : methods and applications	Teaching Unit (UE)	12h		8h	3 credits
UE Characterization of bio-molecular interactions at surfaces	Teaching Unit (UE)	20h			3 credits
UE Nanocomposites	Teaching Unit (UE)	20h			3 credits
UE Polymers for nano-electronics	Teaching Unit (UE)	20h			3 credits
UE Molecular electronics and magnetism	Teaching Unit (UE)	20h			3 credits
UE Nano-safety	Teaching Unit (UE)				3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)				3 credits

UE in an other program of the Nanosciences speciality or in another speciality CHOICE 6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master thesis	Teaching Unit (UE)		10h	14h	24 credits
UE English	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Capita selecta lectures in nanosciences	Teaching Unit (UE)				3 credits
UE Valorisation and intellectual property	Teaching Unit (UE)				3 credits
UE Transverse teaching of choice	Teaching Unit (UE)				3 credits

Nanophysics

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits
UE Mechanics at the micro & nano-scale	Teaching Unit (UE)	14h	10h		3 credits
UE Solid state, electrons and phonons	Teaching Unit (UE)	18h	9h		3 credits
UE Quantum physics	Teaching Unit (UE)		24h		3 credits
UE Micro and nanofluidics	Teaching Unit (UE)	14h	10h		3 credits
UE From solution to solid	Teaching Unit (UE)	24h	10,5h	16h	6 credits

UE Molecular biology	Teaching Unit (UE)	22h	2h	24h	6 credits
UE Semi-conductors physics	Teaching Unit (UE)	16h	10h		3 credits
UE Electromagnetism	Teaching Unit (UE)	14h	12h		3 credits
UE Physics of biological systems	Teaching Unit (UE)				3 credits
UE Optical spectroscopy	Teaching Unit (UE)	14h	8h		3 credits
UE Soft matter	Teaching Unit (UE)				3 credits
UE Scientific softwares	Teaching Unit (UE)			20h	3 credits
UE Current trends in nanosciences	Teaching Unit (UE)	16h			3 credits
UE in another program	Teaching Unit (UE)				6 credits
UE Occupational integration	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Nanosciences interdisciplinary practical trainings 1	Teaching Unit (UE)			28h	6 credits
UE Research internship 2	Teaching Unit (UE)				6 credits
UE Phase transition, transport and fluctuations : from nanomaterials to biologic systems	Teaching Unit (UE)	25h	25h		6 credits
UE Nanophysics with local probes	Teaching Unit (UE)				3 credits
UE Solid state physics 2: electronic structure	Teaching Unit (UE)			8h	3 credits
UE Numerical simulations project	Teaching Unit (UE)				3 credits

UE Research training	Teaching Unit (UE)			3 credits
UE Polymers 2 physico-chemistry	Teaching Unit (UE)	19h	6h	3 credits
UE Molecular biology project	Teaching Unit (UE)	2h	16h	3 credits
UE in another program	Teaching Unit (UE)			6 credits
UE French as a foreign language	Teaching Unit (UE)			3 credits
UE English	Teaching Unit (UE)			3 credits

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Micro-nano fabrication	Teaching Unit (UE)	10h		16h	3 credits
UE Research internship	Teaching Unit (UE)				3 credits
UE Physics and elaboration of nanostructures	Teaching Unit (UE)				3 credits
UE Quantum nanoélectronics	Teaching Unit (UE)				3 credits
UE Adhesion, friction and direct bonding	Teaching Unit (UE)				3 credits
UE Quantum engineering quantum information	Teaching Unit (UE)				3 credits
UE Nanophotonics & plasmonics	Teaching Unit (UE)				3 credits
UE Nanomagnetism, spintronics	Teaching Unit (UE)				3 credits
UE Nano-structures and energy	Teaching Unit (UE)				3 credits
UE Modeling in nanosciences	Teaching Unit (UE)				3 credits

UE Molecular electronics and magnetism	Teaching Unit (UE)	20h	3 credits
UE Biomaterials engineering	Teaching Unit (UE)		3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)		3 credits
UE Complex fluids	Teaching Unit (UE)		3 credits
UE Research training 2	Teaching Unit (UE)		3 credits
UE Current trends in nanosciences	Teaching Unit (UE)	16h	3 credits
UE in another program	CHOICE		6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master thesis	Teaching Unit (UE)				24 credits
UE English	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Capita selecta lectures in nanosciences	Teaching Unit (UE)				3 credits
UE Valorisation and intellectual property	Teaching Unit (UE)				3 credits
UE Transverse teaching of choice	Teaching Unit (UE)				3 credits

Nanobiosciences

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
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UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits
UE Electromagnetism	Teaching Unit (UE)	14h	12h		3 credits
UE Micro and nanofluidics	Teaching Unit (UE)	14h	10h		3 credits
UE Mathematics for Biology	Teaching Unit (UE)				3 credits
UE Physics and electricity for biology	Teaching Unit (UE)			24h	6 credits
UE Polymers 1	Teaching Unit (UE)	21h	13,5h	16h	6 credits
UE Research project	Teaching Unit (UE)				6 credits
UE Mechanics at the micro & nano-scale	Teaching Unit (UE)	14h	10h		3 credits
UE Physics of biological systems	Teaching Unit (UE)				3 credits
UE Semi-conductors physics	Teaching Unit (UE)	16h	10h		3 credits
UE in another program	Teaching Unit (UE)				6 credits
UE Occupational integration	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE Nanosciences interdisciplinary practical trainings 1	Teaching Unit (UE)			28h	6 credits
UE Research internship 2	Teaching Unit (UE)				6 credits
UE Phase transition, transport and fluctuations : from nanomaterials to biologic systems	Teaching Unit (UE)	25h	25h		6 credits
UE Physics of the colloidal domain	Teaching Unit (UE)			16h	6 credits

UE Modelling in systems biology	Teaching Unit (UE)			3 credits
UE Polymers 2 physico-chemistry	Teaching Unit (UE)	19h	6h	3 credits
UE in other program	Teaching Unit (UE)			6 credits
UE French as a foreign language	Teaching Unit (UE)			3 credits
UE English	Teaching Unit (UE)			3 credits

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Micro-nano fabrication	Teaching Unit (UE)	10h		16h	3 credits
UE Research internship	Teaching Unit (UE)				3 credits
UE Biosensors & high through-put analysis	Teaching Unit (UE)	20h		16h	3 credits
UE Bio-molecular interactions : methods and applications	Teaching Unit (UE)	12h		8h	3 credits
UE Optics for bio systems	Teaching Unit (UE)	18h		2h	3 credits
UE Microfluidics	Teaching Unit (UE)			8h	3 credits
UE Physiology and neurosciences	Teaching Unit (UE)	36h	10h		6 credits
UE Cell signaling	Teaching Unit (UE)	16h			3 credits
UE Biostatistics, bioinformatics and molecular modeling	Teaching Unit (UE)				6 credits
UE Biomaterials engineering	Teaching Unit (UE)				3 credits
UE Surface fonctionnalization and electrochemistry	Teaching Unit (UE)	20h			3 credits

UE Molecular markers for medical Imaging	Teaching Unit (UE)	12h		3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)			3 credits
UE Characterization of bio-molecular interactions at surfaces	Teaching Unit (UE)	20h		3 credits
UE Fundamentals of structural biology	Teaching Unit (UE)	11h	11h	3 credits
UE Optional program or MCMV with a specialisation in Physics	CHOICE			6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master thesis	Teaching Unit (UE)				24 credits
UE English	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Capita selecta lectures in nanosciences	Teaching Unit (UE)				3 credits
UE Valorisation and intellectual property	Teaching Unit (UE)				3 credits
UE Transverse teaching of choice	Teaching Unit (UE)				3 credits

Nanomedicine and structural biology

Micro and nanostructure engineering