

SCIENCES, TECHNOLOGIES AND HEALTH

Master in Nanosciences and nanotechnologies

Nanosciences et nanotechnologies



Target level
Baccalaureate
+5



ECTS
120 credits



Duration
2 years



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



Language(s) of
instruction
English

Subprograms

- > Nanochemistry 1st and 2nd year
- > Nanophysics - Quantum physics 1st year
- > Soft matter and biophysics 1st year
- > Micro and nanostructure engineering 2nd year
- > Nanophysics 2nd year
- > Nanomedicine and structural biology 2nd year
- > Nanobiotechnologies 2nd year
- > Quantum information and quantum engineering 2nd year
- > Soft Nano 2nd year

Presentation

**Program co-accredited by the Université Grenoble Alpes
and the Institut Polytechnique de Grenoble**

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

Nanosciences study phenomena and manipulation of matter on the atomic and molecular scale. 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 nanodevices for new components, systems and products. Nanotechnology therefore makes it possible to design tailor-made materials with all the desired properties.

These emerging scientific disciplines lie at the interface of physics, chemistry, materials science, microelectronics, biochemistry and biotechnology. The Grenoble master degree in nanosciences and nanotechnologies is an integrated two-year program with a solid research network and significant international scope, offering high-

quality multidisciplinary education in nanosciences and nanotechnologies. It is part of an Erasmus Mundus Master, two thematic programs of the UGA. Double degree agreements exist with Tomsk Polytechnic Institute (Russia) and Tsukuba University (Japan).

All courses (except IMN) are taught in English and welcome a significant proportion of international students.

Objectives

The program for the master in Nanosciences and nanotechnologies provides students with the adapted background and skills needed to undertake a PhD in fundamental or applied sciences. It also prepares for senior positions in the nanotechnology 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 2023-2024 : 243 €+100€ CVEC

Prerequisites

See program

Recommended prerequisites

See program

And after

Further studies

Continuation of study possible in PhD.

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

Kuntheak Kheng

✉ kuntheak.kheng@univ-grenoble-alpes.fr

Program administration

Registrar's Office for the Master in Nanosciences and nanotechnologies

✉ phitem.master.nano@univ-grenoble-alpes.fr

Program administration

Application

✉ phitem.candidature.etudiant@univ-grenoble-alpes.fr

Continuing education manager

Contact FC STS

✉ fc-sts@univ-grenoble-alpes.fr

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

Nanochemistry 1st and 2nd year

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)			16h	6 credits
UE From solution to solid	Teaching Unit (UE)			16h	6 credits
UE Electrochemistry	Teaching Unit (UE)			12h	3 credits
UE Optic and magnetic spectroscopies	Teaching Unit (UE)				3 credits
UE Occupational integration	Teaching Unit (UE)				3 credits
UE French as a foreign language	Teaching Unit (UE)				3 credits
UE Polymers 1	Teaching Unit (UE)			16h	6 credits
UE Solid State Physics I	Teaching Unit (UE)				3 credits
UE Microscale mechanics and fluidics I : Mechanics	Teaching Unit (UE)				3 credits
UE Research Intensive Track I	Teaching Unit (UE)				3 credits
GS_Soft-Nano_UE_Research Methodologies	Teaching Unit (UE)				6 credits
1 or 2 UEs up to 6 ECTS in another program	Teaching Unit (UE)				

Semester 8

	Nature	CM	TD	TP	Crédits
UE Nanosciences I	Teaching Unit (UE)	17h		8h	3 credits
UE Nanosciences II	Teaching Unit (UE)	15h		11h	3 credits
UE Research Internship	Teaching Unit (UE)				6 credits
UE Molecular Photophysics	Teaching Unit (UE)	9h	4,5h	12h	3 credits
UE Thin films	Teaching Unit (UE)	15h	6h	4h	3 credits
UE Materials Science	Teaching Unit (UE)				3 credits
UE Surface functionalization and applications I	Teaching Unit (UE)				3 credits
UE Molecular electronics and magnetism	Teaching Unit (UE)				3 credits
UE Polymers 2 chemistry and physico-chemistry	Teaching Unit (UE)				3 credits
UE Physical measurements at nanoscale by local probes	Teaching Unit (UE)	22h		8h	3 credits
UE Physics of 2D materials: from elaboration to properties	Teaching Unit (UE)				3 credits
UE Ray-Matter Interaction	Teaching Unit (UE)	22h	3h		3 credits
UE Research Intensive Track II	Teaching Unit (UE)				3 credits
UE Graduate School Soft Nano internship	Teaching Unit (UE)				6 credits
1 or 2 UEs up to 6 ECTS in another program	Teaching Unit (UE)				

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
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UE Nano-safety	Teaching Unit (UE)	19,5h	4h	3 credits
UE Molecular nanomaterials	Teaching Unit (UE)		4h	6 credits
UE Functional Nanoparticles	Teaching Unit (UE)			3 credits
UE Advanced Functional Nanomaterials	Teaching Unit (UE)		8h	3 credits
UE Research training	Teaching Unit (UE)			3 credits
UE Polymers for flexible electronics	Teaching Unit (UE)	20h		3 credits
UE Nanocomposites	Teaching Unit (UE)			3 credits
UE Surface Functionalisation	Teaching Unit (UE)			3 credits
UE Characterization of bio-molecular interactions at surfaces	Teaching Unit (UE)	20h		3 credits
UE Nanomaterials and energy	Teaching Unit (UE)			3 credits
UE Micro-nano fabrication techniques	Teaching Unit (UE)		12h	3 credits
UE Bio-molecular interactions : methods and applications	Teaching Unit (UE)	12h	12h	3 credits
UE From nanofabrication in research laboratories to VLSI	Teaching Unit (UE)	24h		3 credits
UE Advanced characterization for Nanostructures	Teaching Unit (UE)			3 credits
UE Large Scale Facilities for Soft Matter	Teaching Unit (UE)			3 credits
UE Advanced semiconductor devices	Teaching Unit (UE)		8h	3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)			3 credits
UE Elaboration of nanostructures / physics of 2D materials	Teaching Unit (UE)			3 credits

UE International School in Soft Nanoscience (ESONN)	Teaching Unit (UE)	6 credits
UE Current trends in nanosciences	Teaching Unit (UE) 16h	3 credits
1 UE (6ETCS) OU 2 UE (2 UE de 3 ECTS) 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)				30 credits

Nanophysics - Quantum physics 1st year

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Quantum Physics I	Teaching Unit (UE)				3 credits
UE Solid State Physics I	Teaching Unit (UE)				3 credits
UE Optics	Teaching Unit (UE)	50h		8h	6 credits
UE Semiconductor physics	Teaching Unit (UE)	20h	16h	12h	6 credits
UE Magnetism and nanosciences	Teaching Unit (UE)	20h		8h	3 credits
UE Research Intensive Track I	Teaching Unit (UE)				3 credits
UE Statistical physics I: Theory	Teaching Unit (UE)				3 credits
UE Microscale mechanics and fluidics I : Mechanics	Teaching Unit (UE)				3 credits
UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits

UE Image and signal processing	Teaching Unit (UE)		3 credits
UE Electrochemistry	Teaching Unit (UE)	12h	3 credits
1 or 2 UEs up to 6 ECTS in another program	Teaching Unit (UE)		
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 I	Teaching Unit (UE)	17h		8h	3 credits
UE Solid state physics II	Teaching Unit (UE)	24h			3 credits
UE Modelling and numerical simulations	Teaching Unit (UE)				3 credits
UE Physical measurements at nanoscale by local probes	Teaching Unit (UE)	22h		8h	3 credits
UE Research Internship	Teaching Unit (UE)				6 credits
GS_Quantum_UE_Quantum Labworks	Teaching Unit (UE)			28h	3 credits
UE Nanosciences II	Teaching Unit (UE)	15h		11h	3 credits
UE Research Intensive Track II	Teaching Unit (UE)				3 credits
GS_Quantum_UE_Many-body quantum mechanics	Teaching Unit (UE)	26h			3 credits
UE Physics of 2D materials: from elaboration to properties	Teaching Unit (UE)				3 credits
UE Molecular electronics and magnetism	Teaching Unit (UE)				3 credits

UE Molecular Photophysics	Teaching Unit (UE)	9h	4,5h	12h	3 credits
UE Ray-Matter Interaction	Teaching Unit (UE)	22h	3h		3 credits
UE Materials Science	Teaching Unit (UE)				3 credits
UE Thin films	Teaching Unit (UE)	15h	6h	4h	3 credits
1 UE of 3 ECTS in other program	Teaching Unit (UE)				

Soft matter and biophysics 1st year

Master 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE Microscale mechanics and fluidics I : Mechanics	Teaching Unit (UE)				3 credits
UE Microscale mechanics and fluidics II: Fluidics	Teaching Unit (UE)	14h		10h	3 credits
UE Statistical physics I: Theory	Teaching Unit (UE)				3 credits
UE Surfaces and interfaces	Teaching Unit (UE)	14h	10h		3 credits
UE Statistical physics II : Computational aspects and introduction to AI	Teaching Unit (UE)				3 credits
GS_Soft-Nano_UE_Research Methodologies	Teaching Unit (UE)				6 credits
UE Quantum Physics I	Teaching Unit (UE)				3 credits
UE Solid State Physics I	Teaching Unit (UE)				3 credits
UE Optics	Teaching Unit (UE)	50h		8h	6 credits

UE Physics of biological systems	Teaching Unit (UE)				3 credits
UE Optic and magnetic spectroscopies	Teaching Unit (UE)				3 credits
UE Polymers 1	Teaching Unit (UE)	22h	12h	16h	6 credits
UE Electrochemistry	Teaching Unit (UE)			12h	3 credits
UE Physics of granular media	Teaching Unit (UE)				3 credits
UE Image and signal processing	Teaching Unit (UE)				3 credits
UE Molecular biology	Teaching Unit (UE)	20h	2h		3 credits
UE Molecular biology TP	Teaching Unit (UE)			24h	3 credits
UE Research Intensive Track I	Teaching Unit (UE)				3 credits
1 or 2 UEs up to 6 ECTS in another program	Teaching Unit (UE)				
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	Teaching Unit (UE)				6 credits
UE Nanosciences I	Teaching Unit (UE)	17h		8h	3 credits
UE Nanosciences II	Teaching Unit (UE)	15h		11h	3 credits
UE Ray-Matter Interaction	Teaching Unit (UE)	22h	3h		3 credits
UE Soft Matter I	Teaching Unit (UE)				3 credits

UE Soft Matter II : statistical physics aspects; polymers	Teaching Unit (UE)			4h	3 credits
UE Physical measurements at nanoscale by local probes	Teaching Unit (UE)	22h		8h	3 credits
UE Graduate School Soft Nano internship	Teaching Unit (UE)				6 credits
UE Research Intensive Track II	Teaching Unit (UE)				3 credits
UE Modelling and numerical simulations	Teaching Unit (UE)				3 credits
UE Cell biology	Teaching Unit (UE)	4h	12h		3 credits
UE Modelling in systems biology	Teaching Unit (UE)	10h	6h		3 credits
UE Experimental Protocol Design (in biology)	Teaching Unit (UE)	2h	6h	16h	3 credits
UE Physiology & Bioenergetics	Teaching Unit (UE)	10h	4h		3 credits
UE Polymers 2 chemistry and physico-chemistry	Teaching Unit (UE)				3 credits
UE Surface functionalization and applications I	Teaching Unit (UE)				3 credits
1 or 2 UEs up to 6 ECTS in another program	Teaching Unit (UE)				

Micro and nanostructure engineering 2nd year

Master 2nd year

Semestre 9

	Nature	CM	TD	TP	Crédits
UE Micro-nano fabrication techniques	Teaching Unit (UE)			12h	3 credits
UE Lab training	Teaching Unit (UE)			10h	3 credits

UE Matériaux pour les nanostructures	Teaching Unit (UE)		3 credits
UE Physique et chimie de la micro-électronique	Teaching Unit (UE)	8h	6 credits
UE Méthodes d'élaboration	Teaching Unit (UE)	4h	6 credits
UE Nano-characterization 1	Teaching Unit (UE)	20h	3 credits
UE Nano-caractérisation 2	Teaching Unit (UE)	4h	3 credits
UE Scientific softwares	Teaching Unit (UE)	18h	3 credits

Semestre 10

	Nature	CM	TD	TP	Crédits
UE Master Thesis	Teaching Unit (UE)				30 credits
UE Professional integration	Teaching Unit (UE)				3 credits
UE English - master 2 - S10	Teaching Unit (UE)				3 credits

Nanophysics 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Elaboration of nanostructures / physics of 2D materials	Teaching Unit (UE)				3 credits
UE From nanofabrication in research laboratories to VLSI	Teaching Unit (UE)	24h			3 credits
UE Nanophotonics & plasmonics	Teaching Unit (UE)				3 credits
UE Advanced semiconductor devices	Teaching Unit (UE)			8h	3 credits

UE Thematic and interdisciplinary projects	Teaching Unit (UE)		6 credits
UE Advanced characterization for Nanostructures	Teaching Unit (UE)		3 credits
UE Nanomagnetism, spintronics	Teaching Unit (UE)		3 credits
UE Nanomaterials and energy	Teaching Unit (UE)		3 credits
GS_Quantum_UE_Quantum Optics	Teaching Unit (UE)		3 credits
GS_Quantum_UE_ Condensed Matter	Teaching Unit (UE)		3 credits
UE Introduction to Machine Learning and Deep Learning	Teaching Unit (UE)	8h	3 credits
UE Active matter	Teaching Unit (UE)		3 credits
UE in another program	CHOICE		6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master Thesis	Teaching Unit (UE)				30 credits

Nanomedicine and structural biology 2nd year

Master 2nd year

Semester 9

Semester 10

Nanobiotechnologies 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Surface Functionalisation	Teaching Unit (UE)				3 credits
UE Biosensors & high through-put analysis	Teaching Unit (UE)	12h		12h	3 credits
UE Bio-molecular interactions : methods and applications	Teaching Unit (UE)	12h		12h	3 credits
UE Micro-nano fabrication techniques	Teaching Unit (UE)			12h	3 credits
UE Nano-safety	Teaching Unit (UE)	19,5h		4h	3 credits
UE Research training	Teaching Unit (UE)				3 credits
UE Fundamentals of structural biology	Teaching Unit (UE)	11h	11h		3 credits
UE Optics for bio systems	Teaching Unit (UE)	20h			3 credits
UE Metabolic and cardiovascular physiology	Teaching Unit (UE)	20h			3 credits
UE Introduction to Neurosciences	Teaching Unit (UE)	18h			3 credits
UE Cell signaling and cancer biology	Teaching Unit (UE)				3 credits
UE Biomaterials and Biocompatible Surface Engineering	Teaching Unit (UE)				3 credits
UE Molecular markers for medical Imaging and therapy	Teaching Unit (UE)	12h			3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)				3 credits
UE Introduction to Machine Learning and Deep Learning	Teaching Unit (UE)			8h	3 credits
UE Active matter	Teaching Unit (UE)				3 credits
UE Physics of biological systems	Teaching Unit (UE)				3 credits

UE International School in Soft Nanoscience (ESONN)	Teaching Unit (UE)			6 credits
UE in another program	CHOICE			6 credits
UE Microfluidics	Teaching Unit (UE)	14h	8h	3 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master thesis	Teaching Unit (UE)				30 credits

Quantum information and quantum engineering 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Open Quantum Systems	Teaching Unit (UE)				3 credits
GS_Quantum_UE_Quantum Optics	Teaching Unit (UE)				3 credits
GS_Quantum_UE_ Condensed Matter	Teaching Unit (UE)				3 credits
UE Solid State Qubits	Teaching Unit (UE)				3 credits
UE Nanomagnetism, spintronics	Teaching Unit (UE)				3 credits
UE Quantum Algorithm	Teaching Unit (UE)				3 credits
UE From nanofabrication in research laboratories to VLSI	Teaching Unit (UE)	24h			3 credits
UE Microwaves and Cryoelectronics	Teaching Unit (UE)				3 credits
UE Thematic and interdisciplinary projects	Teaching Unit (UE)				6 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Master Thesis	Teaching Unit (UE)				30 credits

Soft Nano 2nd year

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Out-of-equilibrium Statistical physics	Teaching Unit (UE)				3 credits
UE Complex fluids	Teaching Unit (UE)				3 credits
UE Large Scale Facilities for Soft Matter	Teaching Unit (UE)				3 credits
UE Adhesion, friction, nanomechanics	Teaching Unit (UE)				3 credits
UE International School in Soft Nanoscience (ESONN)	Teaching Unit (UE)				6 credits
UE Introduction to Machine Learning and Deep Learning	Teaching Unit (UE)			8h	3 credits
UE Discrete and continuous modelling	Teaching Unit (UE)		18h		3 credits
UE Research training	Teaching Unit (UE)				3 credits
UE Micro-nano fabrication techniques	Teaching Unit (UE)			12h	3 credits
UE Advanced characterization for Nanostructures	Teaching Unit (UE)				3 credits
UE Thematic school in soft condensed matter	Teaching Unit (UE)		4h		3 credits
UE Nano-pores and membranes technologies	Teaching Unit (UE)				3 credits

UE Active matter	Teaching Unit (UE)			3 credits
UE Physics of biological systems	Teaching Unit (UE)			3 credits
UE Fundamentals of structural biology	Teaching Unit (UE)	11h	11h	3 credits
UE Nano-safety	Teaching Unit (UE)	19,5h	4h	3 credits
1 UE (6ETCS) OU 2 UE (2 UE de 3 ECTS) 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)				30 credits