

SCIENCES, TECHNOLOGIES AND HEALTH

# Quantum information and quantum engineering 2nd year

Master in Nanosciences and nanotechnologies



Target level  
Baccalaureate  
+5



ECTS  
60 credits



Duration  
1 year



Component  
Grenoble  
INP - Phelma  
(Physique,  
électronique  
et matériaux),  
UGA



Language(s) of  
instruction  
English



Dual language  
Full english

## Presentation




The emergence of quantum technologies already allows us to foresee the development of new simulation and optimization tools to address major global challenges. These technologies are a strategic global issue for universities, industries and startups, as they have the potential to revolutionize the design and implementation of computing, information, communication and sensing sciences and technologies. France has recently invested 1.8 billion euros in this field.



In view of Grenoble's internationally recognized position in Quantum Technologies, and in response to the needs of students and European and national programs, this Master's 2-year program, created in 2021, offers training that is perfectly suited to the new needs of research laboratories,

industries, and startups working on cutting-edge subjects that are evolving very rapidly in the context of very strong international competition.

This 2nd year Master's program provides students with a high level of expertise in concepts at the interface between fundamental and experimental aspects of quantum physics, for the control of quantum objects and their applications to quantum technologies (Solid State Qubits, Quantum Optics, Quantum Algorithm, Practicals on the IBM-Q, Cryoelectronics and Microwaves, ...). This Master also reinforces the need for openness thanks to multidisciplinary teachings at the interface with mathematics and computer science. This training is in perfect adequacy with the current developments in Quantum Technologies, both at the level of the Grenoble eco-system, and at the national and international levels. This training allows students to finalize their training with numerous internship opportunities, and to pursue a thesis in fundamental or applied physics research laboratories, or in industrial companies and startups.

This program is aimed at national and international students with high potential and motivation, who have obtained a Master 1 or equivalent, and who wish to take up tomorrow's quantum challenges and develop their scientific ambitions

and their research project. The students will be part of the Grenoble community, which is very active in the field of quantum technologies thanks to the  QuantAlps research federation in Quantum Sciences and Technologies.

This training allows students to pursue the  Quantum Thematic Program of the Graduate School, provided they have successfully completed the first year of this program, and also allows them to apply for the  QuantEdu Excellence Scholarships program, provided they do not already hold a grant based on academic criteria.

**International education** : Internationally-oriented programmes

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## International dimension

### Study abroad as an exchange student

As part of this track, you have the opportunity to study for a semester or a year at a UGA partner University abroad.



The International Relations Officers of your faculty will be able to provide you with more information.

More information on :  <https://international.univ-grenoble-alpes.fr/partir-a-l-international/partir-etudier-a-l-etranger-dans-le-cadre-d-un-programme-d-echanges>  /

## Admission

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### Access conditions


You can apply for scholarships via the  Quantum Graduate School program or to the  QuantEdu Excellence Grant program

National diploma conferring the degree of license in a field compatible with that of the master Title or acquired recognized equivalent by the admissions committee of the University of Grenoble Alpes

Public continuing education: You fall under continuing education:


- if you resume your studies after 2 years of interruption of studies
- or if you followed training under the continuing education regime in one of the previous 2 years or if you are an employee, job seeker, self-employed person

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

For more information, see the web page of the  Continuing Education and Learning Department

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## 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

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## Fees

Tuitions fees 2023-2024 : 243 €+100€ CVEC

## Useful info

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## Contacts

### Program director

Franck Balestro

✉ [franck.balestro@univ-grenoble-alpes.fr](mailto:franck.balestro@univ-grenoble-alpes.fr)

### Administrative contact

Registrar's Office for the Master in Nanosciences  
and nanotechnologies

✉ [phitem.master.nano@univ-grenoble-alpes.fr](mailto:phitem.master.nano@univ-grenoble-alpes.fr)

### Administrative contact

Application

✉ [phitem.candidature.etudiant@univ-grenoble-alpes.fr](mailto:phitem.candidature.etudiant@univ-grenoble-alpes.fr)

### Continuing education manager

Laura DI RUZZA

✉ [fc-phitem@univ-grenoble-alpes.fr](mailto:fc-phitem@univ-grenoble-alpes.fr)

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## Partner schools

This program can be followed as part of a double degree in partnership with Karlsruher Institut für Technologie (KIT) (Germany). Professor in charge of the Double Degree: Mr. Ingo SCHIENBEIN

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## Course location(s) - City

📍 Grenoble

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## Campus

🏠 Grenoble - University campus

# Program

## 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