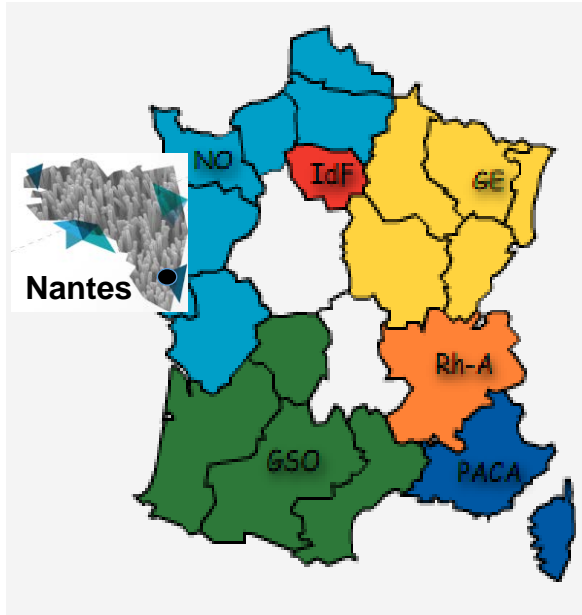


**Master 2 in “Nanoscience, Nanomaterials and Nanotechnology”
 in Nantes, France**



This master's degree is proposed by a consortium of four French universities located in neighbouring cities of Brittany, the western region of France : Nantes, Rennes-1, Bretagne-Sud Lorient and Bretagne-Occidentale Brest.

Who can apply ? Students who have a 4-year university degree (240 ECTS) in Physics, Physical Chemistry or Materials Science.

Professional perspectives after M2 C’Nano: almost all our graduates obtain a PhD position, either in high-level research institutes in France, United Kingdom, Canada,... (80%), or in innovative industries (20%): microelectronics, materials, energy, cars, aerospace,...

❖ **Aims, scientific and professional environment**

The master 2 C’Nano aims to prepare physicists, material scientists or engineers to handle the concepts of nanosciences (nanophysics, nanoelectronics), nanotechnologies and advanced instrumentation, nanomaterials, and their professional development for innovation.

A key element of this master's degree is that it offers courses that go beyond purely nanotechnology; the ambition is to cover thoroughly the interdisciplinary domain of nanosciences. It draws on a broad range of skills, with instructors who are involved in top level research in the laboratories of the consortium.

The master 2 C’Nano is distinguished by the label of the Competence Center “C’Nano Nord Ouest”. This center is an organisation initiated by the French national CNRS and ministry of research, that aims to bring together at a regional level research and training programs in the domain of nanosciences. 6 research laboratories (list in Appendix) located in Nantes, Rennes, Lorient and Brest particularly define the scientific content of the master's programme, by making available high level equipment for the nanoscale (synthesis and processing, nanocharacterization, modelling), and a large variety of human expertise. These 8 labs are potential hosts for training periods of master students.

This extended scientific ground offers original training routes for students with different professional projects:

- **fundamental Research in academic laboratories**
- **Research & Development in private research and development centers.**

Not only intended to meet the demands of the large scale industry of micro and nano(opto)electronics, the master's degree initiates tight relations with diverse small business companies or technological resource centers acting in domains such as advanced and innovative processes, functional thin films, polymer and (nano)composites, hybrid or bio-source materials.

Nantes is also distinguished by the label of the French competitiveness cluster “EMC2”, which federates a number of companies (both SMEs and large scale companies) in the domain of metallurgy and composite materials for aeronautics, shipbuilding, and the automotive industry, with a specific emphasis on future nanocomposite materials.

❖ ACADEMIC PROGRAM

- **September to January:** Brought together, the complementary skills (Table below) allow the definition of a **complete common set of courses, practical training and, project work (300 h, 30 ECTS)** associating fundamental knowledge and practical experience. Practical training benefits from access to the laboratory equipment and the clean rooms at the university of Rennes 1 (CCMO) through our partnership.
- **February to June:** A large period is dedicated to an internship in an academic research lab or in a R&D lab in industry (**5 months minimum ; 30 ECTS**).

	Courses	Schedule (h)	ECTS
TC1a	Nanophysics	20	2
TC1b	Nanoelectronics	20	2
TC1c	Surfaces, interfaces, nanostructured 3D systems	20	2
TC2a	Nanomaterials	20	2
TC2b	Nano-bio-objects	20	2
TC2c	Nanocharacterization	20	2
	Courses (including Projects : *)	Schedule (h)	
SP1a	Nanotechnology (+ introduction to nanotoxicity) *	37	3
SP1b	Thin Films *	18	2
SP2a	Numerical modeling *	20	3
SP2b	Innovation and information intelligence English for scientific communication	10 10	2
SN1	Materials and application R&D	35	4
SN2	Experimental project in Lab *	24	2
SN3	Characterization of surfaces and microscopy *	21	2

How to apply

Send by email the following documents to Jean-Luc Duvail who will advise you for your questions on the application and inscription process:

- Curriculum Vitae
- covering letter or email specifying your interests
- scan of your identity card
- scan of all acquired qualifications, diplomas and transcripts
- email of a professor with responsibilities for your current year of study.

Coordination : **Jean-Luc Duvail** **+(33)2 40 37 39 90**
jean-luc.duvail@univ-nantes.fr

University of Nantes : Jean-Luc Duvail
University of Rennes-1 : Pascal Turban
University of Bretagne Sud : Mickaël Castro
University of Bretagne Occidentale : David Spenato

- **APPENDIX: Supporting Research Institutes**

Academic research Labs	Code and town	Keywords
Institut des Matériaux Jean Rouxel (IMN)	UMR 6502 CNRS - Univ Nantes	Fabrication and properties of nanotubes, nanowires, nanoparticles ; surface nanostructuration, plasma and thin films; energy storage and photoconversion;...
Institut d'Electronique et Télécommunications de Rennes (IETR)	UMR 6164 CNRS - Univ Rennes 1, INSA Rennes, Supelec, Univ Nantes	Ferroelectric thin films, integration, MEMs, biosensors, micro and nanotechnology,...
Institut National de la Recherche Agronomique (INRA – BIA group)	UR 1268 – INRA Nantes	Nanoassembly of natural biopolymers and their functionalities
Institut de Physique de Rennes (IPR)	UMR 6251 CNRS Univ Rennes 1	Semiconductor nanostructures; spintronics; Si and a-C surfaces functionalization; nanoconfinement of complex fluids; biomimetism; close field imaging,...
Sciences Chimiques de Rennes (SCR)	UMR 6226 CNRS Univ Rennes 1	Thin films; nanoparticles and colloids; heterostructures; electrochemistry; nanolithography; organometallic catalysis;....
Institut de Recherche Dupuy de Lôme	FRE CNRS 3744, UBS, ENSTA Bretagne, UBO, ENIB	Nanocomposites; ecomaterials; metallic alloys; conducting polymers

- **Industrial partners for training periods, PhD (short list):**

Competitiveness cluster EMC2 : <http://www.pole-emc2.fr/>
Nanomaterials : Olmix ; Mecachrome ; United Monolithic Semiconductors
Nanoelectronics, Nanotechnology : CEA ; ST-Microelectronics ; Safran ; Thalès
Organic electronics/photovoltaics : Armor
Energy, Transportation, Aerospace: Renault ; CrossLux ; Bolloré ; Airbus Defense & Space