

Master Nanosciences and Nanotechnologies 2019/20

(Program Erasmus Mundus Chemical Nano-Engineering not included)

NQE : Nanoscale and Quantum Engineering

EMN : Engineering of Materials and Nanotechnologies

SEMESTRE 1

COMMON CORE (courses in french)	
Introduction to nanosciences & nanotechnologies (4 ECTS)	
Materials and nanomaterials (6 ECTS)	
Disciplinary basics 1 (3 ECTS). 1 choice among 3 : 1) Chemistry in nanosciences (3 ECTS) 2) Thermodynamics and statistical physics (3 ECTS) 3) Electronics for instrumentation (3 ECTS)	
Condensed matter et numerical simulations (6 ECTS)	
Disciplinary basics 2 (3 ECTS). 1 choice among 3 : 1) Statistical physics (3 ECTS) 2) Quantum physics (3 ECTS) 3) Electrochemistry (3 ECTS)	
Disciplinary basics 3 (3 ECTS). 1 choice among 3 : 1) Structure of solid matter (3 ECTS) 2) History and outlooks of nanoelectronics (3 ECTS) 3) Thermodynamics of alloys (3 ECTS)	
Professional course 1 (2 ECTS)	
English 1 (3 ECTS)	

SEMESTRE 2

NQE (french)	EMN (french)
Professional course 2 (2 ECTS) Initiation à l'entrepreneuriat - Qualité, sécurité, environnement et risques professionnels - Management de projets et ressources humaines	
English 2 (3 ECTS)	
Numerical simulations 2 (3 ECTS)	Energy : sectors & storage (4 ECTS)
Condensed matter and quantum mechanics (6 ECTS) # Condensed matter 2 # Quantum mechanics	Modeling of materials (3 ECTS)
	Elaboration of materials (6 ECTS)
Signal processing and sensors (2 ECTS)	Characterization of materials (6 ECTS) # Platforms of micro- and nanotechnologies # Physico-chemical characterization of materials
Platforms of micro- and nanotechnologies (4 ECTS) # Platforms of micro- and nanotechnologies # Platforms of nanofabrication - characterization	
option course Disciplinary basics 4 (6 ECTS) 1) Physics of nanocompounds (6 ECTS) 2) Basics of spectroscopies (6 ECTS)	
1.5 month Internship M1 (4 ECTS)	3-month Internship (Industry or Laboratory) (3 mois - 6 ECTS)

SEMESTRE 3

NQE (English)	EMN (french)
Professional course 3	
English 3 or French course (3 ECTS)	
Student seminars (2 ECTS)	Materials & devices for energy (8 ECTS) # Materials for energy A # Materials for energy B
Nanomagnetism and spintronics (6 ECTS)	
Quantum Nanoelectronics (8 ECTS) # Nanofabrication # Low dimensional systems # Quantum transport	Materials & health (6 ECTS) # Materials & health A # Materials & health B
Option : Specialized courses (8 ECTS)	
Nano-objects (8 ECTS) # Nanomechanics # Surfaces and nano-objects # High-resolution imaging	Durability of materials (8 ECTS) # Corrosion and ageing # Protection et recyclability
Hybrid electronics 1 (4 ECTS) (2 UEs among 3) 1) Sensors (2 ECTS) 2) Organic optoelectronics (2 ECTS) 3) Advanced memories (2 ECTS)	
Hybrid electronics 2 (4 ECTS at CMP) # Hybrid electronics 2A # Hybrid electronics 2B	Materials and durability : practical work (2 ECTS)

SEMESTRE 4

NQE (English)	IMN
Emerging nanosciences (2 ECTS)	6-month Internship (Industry or Laboratory) (30 ECTS)
Nanotechnologies, environment and society (2 ECTS)	
Option 1 : Advanced courses 1 (3 ECTS) 1) Photonics and nanophotonics (3 ECTS) 2) Integration and reliability (3 ECTS)	
Option 2 : Advanced courses 2 (3 ECTS) 1) Nanobiosciences (3 ECTS) 2) Advanced numerical methods and simulations (3 ECTS)	
4-month Internship (Laboratory or Industry) (20 ECTS)	