INTERNATIONAL GRADUATE PROGRAM
TAUGHT IN ENGLISH

MULTISCALE MATERIALS

FROM ATOMS TO ADVANCED DEVICES

MINESnancy
ARTEM

1 MEET THE EXPERTS

Learn from internationally renowned faculty involved in top class laboratories at the forefront of innovation.

2 ACQUIRE ADVANCED SKILLS...

...to tackle engineering challenges with a multiscale approach based on a combination of theoretical, computational and experimental methods.

3 TAKE ADVANTAGE OF A GREAT ECOSYSTEM

At the heart of the Lorraine region, Nancy is located between Belgium, Luxembourg, Germany, and is 1h30 from Paris by TGV. Lorraine is at the center of the European Valley of Materials, Energy and Processes, and offers a large set of tools for research, innovation and industry.

4 RESEARCH AND INNOVATION

Benefit from our close collaborations with the Institut Jean Lamour, one of Europe's most renowned laboratories for fundamental and applied research in Materials Science and Process Engineering.

8 REASONS FOR STUDYING AT MINES NANCY!

5 PREPARE YOUR FUTURE CAREER

75% of students hired before graduation: Mines Nancy offers close interaction with industry, through lectures given by our industrial partners and the possibility to perform either academic or industrial research projects.

6 LIVE A MULTICULTURAL EXPERIENCE

This English curriculum is open to and popular with local French students. You will also mix with students from all around the world, as 25% of the students at Mines Nancy come from abroad with origin from over 20 different countries.

7 MINES NANCY WELCOME PACK

The teachers, staff and students of Mines Nancy are looking forward to welcoming you. Many services are provided and social events are organized for international students to help you settle in and feel comfortable. An optional French summer school is also available for you to feel even more at ease.

8 ENJOY NANCY

Nancy is renowned throughout the world for its Unesco-listed Place Stanislas. This Capital of Lorraine is a wonderfully charming and dynamic city with more than 40000 students. There are more than 60 clubs and student societies at Mines Nancy (sports, arts, social events, professional activities...).

WHY MINES NANCY?

The international graduate program "Multiscale Materials" covers the science and engineering necessary to characterize and model the properties of a wide range of materials such as metals and alloys, polymers, ceramics, composites, biomaterials and nanomaterials. It highlights the relationships between material structures and their mechanical and physical properties and functionalities. Bridging multiple length-scales, this program addresses fundamental aspects as well as cutting-edge applications in multiple areas,

The development of industrial systems and the design of sustainable devices are major strategic challenges for our societies. "Multiscale Materials" provides the tools to choose the appropriate materials, as well as to design and manufacture them as to optimize their bulk or surface structures, properties and functionalities for a wide range of targeted applications.

The Multiscale Materials program is hosted by Mines Nancy, one of the best French Graduate Schools of Engineering, and is at the crossroads between academia and industry. Mines Nancy is renowned for the high quality of its educational programs. Students receive customized tutoring in small groups and benefit from our proximity with Institut Jean Lamour a top-level laboratory for fundamental and applied research in materials science and processing, and with the high-performance computing center Explor. More than 1800 scientific instruments are available to students.

Built at the heart of a historic district in Nancy, the campus gathers the 3 schools of the ARTEM Alliance (the National School of Art and Design in Nancy, ICN Business School and Mines Nancy) and the Institut Jean Lamour. It hosts a total of 5,000 people, including 3,500 students and 1,500 faculty, administrative and technical staff. Located on the borders of several European countries and close to Paris (90min by high-speed train), Mines Nancy is at the core of the European Valley of Materials, Energy and Processes, which provides a large set of tools for research, innovation and industry in the field of materials science, energy and industrial processes.

Emilie Gaudry
Professor

PROGRAM ID

At a glance

- **From fundamental science to engineering**
- **From the atomic scale to applications**
- **A wide range of advanced materials**

The program provides deep scientific and engineering knowledge for understanding how material structures at various scales influence structural and functional properties. It also provides ideal training for innovative applications in areas such as bio-, nano-technologies, etc.

Language

English

Duration

2 semesters

Program Schedule

Semester 1: Lectures and projects (30 ECTS)
Semester 2: Full time internship (30 ECTS)

Graduate Program

Degree awarded by the University of Lorraine.
Academic level equivalent to a Master's degree.

Your career

Academic careers as well as careers in industry.
Positions: R&D, project manager, consultant, researcher, etc.
This program also provides a strong foundation for those who wish to pursue a PhD degree in Materials Science or in related fields.

PROGRAM

EMBRACE THE WORLD OF MULTISCALE MATERIALS!

New materials are sought-after for many applications and have to comply with increasingly specific demands. The desired features often inherently require the use of advanced materials, due to multiple or seemly contradictory targeted properties. Their rational development requires a deep understanding of their structure and properties at multiple length-scales, which is addressed by the international graduate program «Multiscale Materials».

Program Schedule

Core Courses

Materials by Design (21 hrs - 2 ECTS) The art of selecting and optimizing a material for a specific application.

Materials Characterization (21 hrs - 2 ECTS) The knowledge to select and assess the relevance of a wide range of techniques for materials characterization.

Multiscale mechanics (21 hrs - 2 ECTS) The goal is to predict the mechanical behavior of materials and their macro-structure using a scale transition approach.

Devices at different length-scales (21 hrs - 2 ECTS) Nano-scale to macroscopic innovative devices, in a wide range of fields.

Modeling at the atomic and molecular scales (21 hrs - 2 ECTS) This lecture includes practical sessions based on computational techniques as well as more fundamental underlying theories.

From surfaces to coatings (21 hrs - 2 ECTS) Introduction to the physics of solid surfaces, as well as the processes for preparing coatings by vapor deposition.

Materials Forming (36 hrs - 4 ECTS) The strategies to shape and dimension an object, considering the possible plastic deformations.

Elective courses

Superconductors (36 hrs - 4 ECTS) Superconductors properties and more advanced theories to understand this specific state of matter

Biomimicry (36 hrs - 4 ECTS) Introduction to emulating nature's time-tested patterns and strategies

Industry and Business project & seminars

Artem Insight (1 ECTS) 1 week dedicated to the development of a project proposed by a company or an organization

Economics, Organization, Business seminar (1 ECTS) 1 week dedicated to seminars in the field of Economy, Organization or Business

1 research project in close connection with a research laboratory (100 hrs - 8 ECTS)

Aims and skills

We use state-of-the-art computational tools combined with an in-depth discussion of experimental techniques to probe, understand and design advanced materials with targeted properties. While the first semester is dedicated to courses and project, the second semester is entirely dedicated to a research internship that can be performed within partner institutions, either academic or industrial groups.

Close connection with research Lab

All courses, projects and internships are connected to main materials Labs or industrial research centers such as :

- Institut Jean Lamour (IJL)
- Institut Jean Barriol (IJB)
- Laboratoire de Chimie Physique et Microbiologie pour les Matériaux et l'Environnement (LCPME)
- Laboratoire d'Energétique et de Mécanique Théorique et Appliquée (LEMTA)
- Laboratoire d'Etude des Microstructures et de Mécanique des Matériaux (LEM3)
- Laboratoire Matériaux Optiques, Photonique et Systèmes (LMops)
- CEATech Grand Est
- Laboratoire Structure et Réactivité des Systèmes Moléculaires Complexes (SRSMC)
- Laboratoire de Chimie et Physique - Approche Multi-échelles des milieux Complexes (LCP - A2MC)
- Laboratoire de Physique et Chimie Théoriques (LPCT)
- Laboratoire de Cristallographie, Résonance Magnétique et Modélisations (CRM2)

HOW TO APPLY?

Application deadline

Application for enrollment in September: **30th May**

Application

- **Application form duly completed**
- **Official transcripts** (in English)
- **CV and cover letter** (in English)
- **Copy of passport**
- **Proof of Language Proficiency** (compulsory minimum B2)

  Please send your application form by email to: mines-nancy-scolarite-ficm@univ-lorraine.fr

Entry requirements

Candidates should have achieved 4 years of higher education in Materials Science and Engineering, with excellent academic records.

Background in Physics, Chemistry, Mechanical Engineering or a related field can be considered if the applicant can demonstrate skills in Materials Science and Engineering.

FEES AND FUNDING

according to 2017/2018 fee regulations

Within a bilateral agreement

Erasmus exchange students: Free

Non-EU exchange students: Free

excluding compulsory National French Health Insurance (217€ in 2017/2018)

Free movers

EU/EEA/Overseas: 6000€

excluding compulsory National French Health Insurance (217€ in 2017/2018)
excluding registration fee (615€ in 2017/2018)

Fellowships

Possible fellowships based on academic achievements, application to be submitted by april 15th.

Lifelong learning

Tuition fees: 7416€

excluding registration fee (615€ in 2017/2018)

FRENCH SUMMER SCHOOL

Date: From July until end of August 2018 or possibility to make a personalized schedule
Duration : 160 hours

On an optional basis, Mines Nancy proposes a French Summer School to provide international students with the necessary skills in French. International students will also improve their knowledge of French culture and French patrimony. These courses are also tailored for engineering studies (methodological tools, professional language...).

- **2 months (from 02/07/2018 to 24/08/2018):** Participation fees are 1000€. If you are enrolled at Mines Nancy or a student coming from a Partner University, fees are reduced to 800€.
- **1 month (from 30/07/2018 to 24/08/2018):** Participation fees are 500€. If you are enrolled at Mines Nancy or a student coming from a Partner University, fees are reduced to 400€.

WELCOME PACK

Mines Nancy offers individual and personalized support throughout the mobility.

- **Accommodation & administration support**
- **Personalized welcome from the railway station to accommodation**
- **Help with arrival in Nancy**
- **Educational mentoring**
- **Buddy programme**
- **International week end**
- **Social & cultural activities**
- **Intercultural Days**

CONTACTS

Student Mobility Coordinator

Marion Carrey
mines-nancy-dai@univ-lorraine.fr
Tel. +33 (0)3 72 74 48 61

Academic contact

Bart Lamiroy
bart.lamiroy@mines-nancy.univ-lorraine.fr
Tel. +33 (0)3 72 74 48 38

MINESnancy
ARTEM

MINES NANCY
92, rue du Sergent Blandan
Campus Artem
BP 14 234
54 042 Nancy cedex - France

T +33 (0)3 72 74 48 00
F +33 (0)3 83 96 02 46
www.mines-nancy.univ-lorraine.fr

CONTACT

T +33 (0)3 72 74 48 38
mines-nancy-scolarite-ficm
@univ-lorraine.fr

UNIVERSITÉ DE LORRAINE

IMT Grand Est

ARTEM

conception & rédaction : Mines Nancy
Non contractual document - September 2018 - Photo credit: Mines Nancy