

Welcome to
Mines Saint-Étienne!



ATTENTION !
AVANT CHAQUE UTILISATION
AFIN D'ÉVITER TOUTS RISQUES
DE FUITES ÉLECTROMAGNÉTIQUES
VÉRIFIER QUE TOUTS LES ORGANES OU ACCESSOIRES
INDISPENSABLES AU FOUR MICRO-ONDES
SOIENT CORRECTEMENT INSTALLÉS

Materials Science and Engineering (MSE)

Master of Science

www.mines-stetienne.fr



INSPIRING
INNOVATION
SINCE 1816

« *Shape the future
of materials with us !* »

A Master of Science

(National Masters' Degree)

Accredited by the French Ministry
of Higher Education and Research
at the *École Nationale Supérieure
des Mines de Saint-Étienne, France*



A two-year programme taught entirely in English

3 academic semesters
2 internships

A new opportunity for international students

- A two-year programme
- Taught entirely in English
- A key step for PhD studies

Durability
Additive manufacturing
Energy and transport
Metallurgy
Shaping Industry
Materials processes
Mechanical properties
Corrosion
Materials science
Modelling
Characterization
Microstructure
Binary phase diagram
Materials research
X-ray and electron diffraction
Physical metallurgy
Atomic Force Microscopy
Failure, creep, fatigue
Continuum mechanics
Microscopy and microanalysis
Phase transformations
Crystal

Materials Science / Metallurgy 21 ECTS
Physical metallurgy, Phase Transformations,
Surfaces, Corrosion and Ageing, Durability

Mechanics of Materials and Processes 18 ECTS
Elasticity/Plasticity, Failure of Materials,
Additive Manufacturing

Characterization of Materials 18 ECTS
Electron Beam and X-ray Methods,
Spectrometry,
Surface Analysis

Computing / Modelling 15 ECTS
Finite Element Modelling for Materials
Scientists, Computing in Python

Transverse Skills 14 ECTS
Life Cycle Analysis, Materials Ressources,
Ecological Transition
Preparation to Professional Life

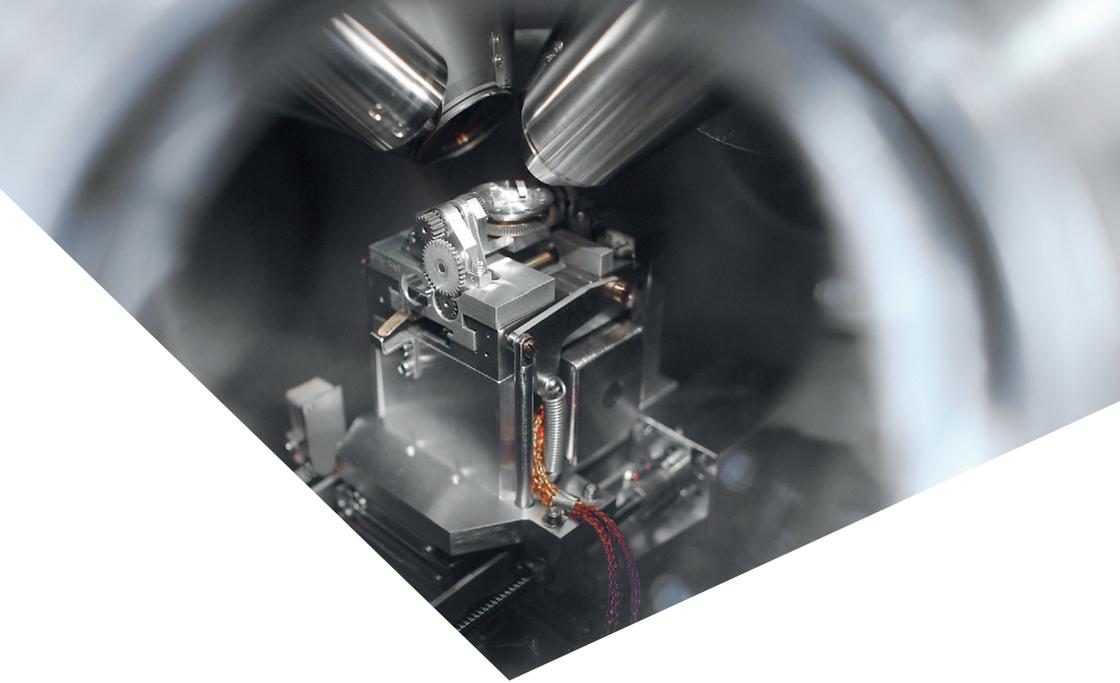
Implementation of Skills 34 ECTS
Lab Project, 2 Internships

PhD Opportunities

Each year, the SMS Research Centre opens about ten PhD student positions. All the positions are financially supported. The research topics are often linked to industrial partnerships with a high-level scientific ambition for the project.

Some recent examples of PhD studies

- Computational alloy design for additive manufacturing
- Hydrogen embrittlement of high strength maraging stainless steels
- High strain rate / small scale mechanical properties of metals
- Processing of titanium alloys using Laser Beam Melting



Internship Opportunities

The Master's Thesis internship offers students the opportunity to work on different real-life materials problems, in a university laboratory, or in a R&D centre of leading French or international companies. Each year, a wide range of diverse and financially supported placements is available.

Some recent examples of Master theses

- Effect of hydrogen on mechanical properties of Ti alloys (with SAFRAN Group)
- Multiscale modeling of inelastic behavior of INCO718 superalloy (with ONERA and SNECMA)
- Development of recrystallization textures in new Al-Li alloys for aerospace applications
- Development of new HEA (High Entropy Alloys)

Job Opportunities

Professional roles in fields like materials for energy and transport, or recycling / sustainable development. Opportunities can also be found in R&D sectors, product development or innovative business companies.

Requirements for applicants

- Have successfully completed a Bachelor's degree in Physics, Chemistry or Engineering
- Provide proof of English language proficiency (B2 level)





**With the collaboration of the
SMS Research Centre
Materials Science and
Mechanical Engineering
and the George Friedel
Laboratory
(UMR CNRS 5307)**

Staff 92

Topics

- Structural materials for low carbon energies
- Materials for hydrogen storage and transport
- Sustainable structural materials: understanding and mitigating ageing and degradation
- Additive manufacturing for saving energy and repairing
- Computational design of new alloys with lower impact

Skills and Expertise

- Development of advanced methods for microstructure characterization
- Mechanics and micro-mechanics of materials
- Multiphysics simulations of materials processing and behaviour
- Analysis of surfaces and interfaces in materials
- Elaboration and shaping of materials

Industrial partners

Cooperation with leading French or international companies such as ArcelorMittal, EDF, Framatome, Aubert&Duval, SAFRAN Group, GRT Gaz and many others.

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La Région
Auvergne-Rhône-Alpes



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