BioMedical Engineering & Design
Master of Science
www.mines-stetienne.fr
« Improving health through science and engineering »

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

Taught in English

A new opportunity for international students

• Taught in English (90%)
• A one year programme
• Diploma of Master of science
• A key step for PhD studies

Course structure

The Master of science programme provides students with the background and specific requirements to lead projects in the biomedical field, or to continue on to a PhD.

Bioengineering
• Introduction to biology
• Medical diagnosis tools
• Medical image analysis and processing
• Nano-medicine, nano-toxicity
• Healthcare engineering

Innovation in Healthcare systems
• Innovation and project management in the pharmaceutical industry
• Regulation in the health sector

One Elective module among the following
• Medical image analysis and processing
• Regenerative medicine (bone, cartilage, cornea, soft tissues)
• Mechanobiology
• Human movement Mechanical models
• Ergometry & Biomechanics
• Autonomous nervous system
• Exercises, ageing, metabolic disorder
• Child exercise physiology

Semester-long research project: 6-month internship
Graduates may work at the crossroads between healthcare providers, manufacturers and end users, in any of these sectors:

- Engineering of medical devices,
- Design of implants, prostheses,
- Biomedical instrumentation,
- Medical textiles,
- Development of medicines,
- Bio-electronic devices,
- Healthcare engineering

### PhD Opportunities

- Image based inverse identification of material parameters in cardiac mechanics
- Fretting corrosion of modular junctions in total hip implants

### Internship Opportunities

- Development of automated pipelines for cortical structural analysis
- A new strategy to improve drug delivery to the maxillary sinuses: the sweep frequency acoustic airflow
- Elaboration of polymeric fibers by electrospinning technique for biological applications

### Requirements for applicants

- Prior successful completion of a first year of a Master's Degree in theoretical and / or applied science, or equivalent diploma (at the home university or Ecole des Mines) / or 240 ECTS validated
- A good command of English is mandatory

### Job Opportunities

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With the collaboration of the Education and Research Centre for Biomedical and Healthcare Engineering (CIS)

**Fields of expertise**
Mechanics, material science, physico-chemistry, mathematics, computer science, image processing and biology.

**Topics**
Biomechanics: soft tissue experimental characterisation and computational modelling in interaction with medical devices, cardiovascular bioengineering / Biomaterials: bioceramics for bone tissue engineering, biodistribution, biopersistence, bioreactivity of inhaled nanoparticles, biotribocorrosion of implants / Healthcare engineering: modelling and optimisation of healthcare systems, hospital logistics and planning

**Industrial sectors**
Biomedical devices, augmented medicine Pharmacy, healthcare systems Sports industry, cosmetics

**Research Units**
SaInBioSE (UMR INSERM 1059) LIMOS (UMR CNRS 6158) LGF (UMR CNRS –EMSE 5703)

...and the Centre for Microelectronics in Provence (CMP)

**Fields of expertise**
Pioneering Microelectronics for Applications in Flexible Electronics, Secure Hardware, Bioelectronics and Logistics Designing, Prototyping and Secure Characterisation of Circuits

**Topics**
Optimisation and operational research in industrial engineering Hardware security (smartcard) Inkjet Printing on Flexible Substrates for Connected Objects Interfacing between Life Sciences and Organic Electronics

**Research Units**
UMR : CEA, LIMOS, INSERM Marseilles

**Facilities and specific platform**
CIMPACA-MicroPackS Platform: Partnership between Business and Academic World Clean rooms, Security and Bioelectronics Labs

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La Région Auvergne-Rhône-Alpes