



# BioMedical Engineering & Design

Master of Science

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SINCE 1816

# « 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**



## 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

## Job Opportunities

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

## 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



# 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

SalnBioSE (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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