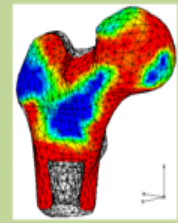


FACULTÉ
DE MÉDECINE



MASTER IN BIOMEDICAL ENGINEERING M BIOS

M BIOS meets the needs of researchers to become integrated into teams of multi-disciplinary research and development in both “life sciences” and “engineering”.

Bioengineering is a growing field of research and development. M BIOS is concerned with **Biomechanics, Biomaterials, and Bioimaging.**

In each case, the association of “life sciences” and “engineering” is at the heart of innovation and new discoveries. This association has resulted in the development of new fields such as regenerative medicine which includes tissue engineering and the use of numerical simulation tools.

The M BIOS programme is offered at University Paris-Est Creteil (UPEC). The courses are held at UPEC, only 20 minutes from the heart of Paris.



From an economic, industrial and research point of view, biomedical engineering is a scientific and technical sector with considerable value, considered to be vital to the development of various countries like France.

With this in mind, the University of Paris-Est Creteil has chosen to join internal forces to create M BIOS as well as to create a new laboratory whose aim is to bring doctors and engineers together. This new laboratory is called “Bioengineering, Tissues, Neuroplasticity”.

Engineering and Life Sciences

Students trained in M BIOS will thus be able to take part in the development of bioengineering research in medicine. They will have a higher education research level in life sciences and engineering science. This combination is a key issue for the development of medicine and biological sciences. It also has, in turn, a significant impact on the development of other related fields from engineering sciences to life sciences.

The complementarity of M BIOS is characterized by a good integration of the educational project based on a coherent set of research in various complementary areas.

Each of the fields selected for M BIOS training is supported on the research level by a set of laboratories. Hospital and research centers are well equipped with means and with researchers and

research professors who are accustomed to interdisciplinary work (biomechanics, biomaterials, bioimaging, tissue engineering ...).

Admission exams are open to all students who have completed their initial training in engineering, life sciences and medicine.

Admission Requirements

The selection process is open to:

- the holders of a four year university degree in sciences ;
- to engineering students from “Engineering school” with “integrated preparatory classes” having successfully completed their first three years ;
- to the holders of an equivalent foreign diploma in accordance with the existing international agreements

Final date of enrolment: june 29, 2018

The selection process will take place at the beginning of July with interviews.

Admission forms may be downloaded from the the University of Paris-Est Creteil website : <http://master-biologie-sante.com/formations/bio-ingenierie-sante-mbios>

**Head of M BIOS
Professor Mustapha Zidi
UPEC - Medicine Faculty - 8 rue du General Sarrail, 94010 Creteil Cedex FRANCE
✉: zidi@u-pec.fr
☎: +33 1 49 81 35 71 / +33 1 49 81 43 99**

Students of M BIOS will be trained for positions such as bioengineering researcher. They will be ready to work in multidisciplinary teams either in public or industrial laboratories, or in hospital wards.

The program is organized into two six-month periods. In the first semester, courses in the first half of the year will be adjusted according to a student’s previous coursework in order to fill any gaps in training. In the second semester, M BIOS students will be required to do an internship in a research laboratory. Each six-month period represents 30 ECTS credits.

Course Program in first semester

Courses in Life Sciences

Specialized coursework for engineering students

Period I · cellular biology · biochemistry · anatomy and physiology ·

Courses in Engineering

Specialized coursework for life sciences students

Period I · computing · mechanics of materials · mathematics and numerical analysis ·

Option courses in Bioengineering

Period II · modelling and simulation in biomechanics · biomaterials and biomimetics · bioimaging · Regenerative medicine engineering · materials chemistry ·

Mandatory courses in Bioengineering

Period II · biomechanics and biology of adaptations · research in biomechanics ·

Mandatory courses in Bioengineering

Period II · research methodology · language and science communication ·

Period III · Annual organization of the International School in Biomedical Engineering at the beginning of the second semester: five days of seminars and conferences held by French and foreign researchers. Each year, the International School in Biomedical Engineering will focus on topics in the fields of research and training of MBIOS in connection with the work of the host research teams.

Main courses

The main courses proposed during the first semester concern biomechanics, biomaterials and bioimaging. These courses strongly reflect current research needs and are in agreement with the national and European research priorities of development in bioengineering for life sciences and medicine.

Biomechanics

These courses train students in biomechanics, which includes applications of mechanics and its methods to the biological and medical fields. It focuses on the comprehension of the operation of large physiological systems at a macroscopic scale and on a tissue level as well as their adaptation to damage, remodelling and repairing.

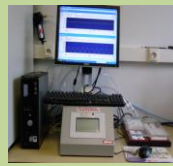
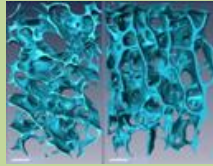
Biomaterials, biomimetics – Regenerative medicine

These courses train students to study different biomaterials and those through biomimetics, which are biologically inspired by studying pre-existing functioning devices in nature. Tissue engineering using cellular or genetic therapies will also be studied in the context of regenerative medicine.

Bioimaging

These courses train students to use data-processing software and applications dedicated to the biomedical field. The students will study the contribution of imaging methods (segmentation, classification, modelling, storage, visualization...) to aid in diagnosis, therapy, telemedicine, and computer-assisted surgery.

Each one of these specific courses is based on the work done in specific laboratories (CNRS, INSERM, University) and hospital departments (AP-HP).



Flexcell



Traction testing machine



Myograph

Training course in second semester

The second semester is entirely devoted to a research project in a public laboratory (CNRS, INSERM, University...), a hospital ward or an industrial laboratory in France or in another country.

After MBIOS and completing their training with a PhD, students will have the ability to:

- Identify and develop methods of research, data collection and analysis - Study and analyze the data and research findings - Write reports, publications, research briefs - Present and explain the scientific advances and research - Advise researchers, institutions, and companies scientifically - Supervise and carry out research and scientific study to explore, deepen and expand knowledge - Enhance and disseminate the results to the scientific community, institutions or businesses - Work with private and public research teams in the transfer frame technologies or research and development projects - Coordinate a project team, service, laboratory or research department.

The theoretical and procedural expertise is:

Research methodology - Statistical analysis - Use of document management software.

Activities and specific expertise is:

Devise theoretical models (calculation, simulation, modelling...) - Designing experimental models - Develop and coordinate a research program - Define strategic directions of research policy and evaluate scientific research - Direct service or research laboratory.

Industrial contacts: l'Oreal, Essilor, EADS, DGA, Innothera, Medtronic, Stryker, Scient'x, Hexacath...



Crédit photos : Upec, Faculté de médecine, société DMT, laboratoire Bioingenierie – tissus, neuroplasticité, article : Elham Hamed , Ekaterina Novitskaya , Jun Li , Iwona Jasiuk , Joanna McKittrick et 123RF : fbmadeira.