



PARIS-CACHAN CAMPUS

MAJOR



Engineering & Health

#BIOMEDICAL #E-HEALTH #BIOMECHANICS #DIGITAL
#MEDTECH #M-HEALTH #CONNECTEDHEALTH #TELEMEDICINE
#TECHFORHEALTH #MEDICALEQUIPMENT #MEDICALROBOTICS
#IA #SPORTSENGINEERING #HANDICAP

PROGRAM ACCREDITED
BY THE PARIS REGION
HEALTH CLUSTER



ENGINEERING SCHOOL
Creating the future together



COURSE OBJECTIVES

The objective of this major is to prepare generalist engineers capable of putting their skills to work in the world of healthcare to design innovative systems in the field of biomechanics (prostheses, medical robotics, etc.), but also in the field of e-health (digital hospital, telemedicine, information systems, etc.).

In addition to a number of subjects that are designed to enable future engineers to familiarize themselves with the world of healthcare, you will be able to choose between the following two technical tracks to develop specialist skills:

- ▶ **E-healthcare**
- ▶ **Biomechanics.**

The Engineering & Health major is accredited by the Medicen Paris Region competitiveness cluster. This label means that the program is recognized as being **in line with the needs of healthtech companies**, and its proximity to companies in the health innovation sector is reinforced by access to a network of over 500 private and public players.

COURSE DESCRIPTION

The Major spans two academic years structured around two academic semesters and two semesters of internships: a student-engineer internship in Year 4 and a 'final year project' internship in Year 5.

Year 4 involves a core curriculum to develop the knowledge and skills necessary to understand the world of healthcare. In Year 5, you will choose optional modules that

will allow you to focus on biomechanics or e-health, depending on your personal interests and career objectives.

It is also possible to replace one year of study with a double degree programme at one of EPF's partner universities (in France or abroad) to specialize in the world of research or industry.

YEAR 4 . COMPULSORY MODULES

Tools for engineers	64 hours 5 ECTS
<ul style="list-style-type: none">• Employment law• Medical statistics & applications• Project management• English	Master the fundamental multidisciplinary tools of the engineer.
The healthcare sector	64 hours 5 ECTS
<ul style="list-style-type: none">• The challenges of 21st century healthcare• The healthcare and hospital system• P4 medicine	Acquire a general knowledge of the healthcare field. Understand the challenges of healthcare: the impact of lifestyle and the ageing of the population.
Understanding the human body	64 hours 5 ECTS
<ul style="list-style-type: none">• The human body & pathologies• Functional rehabilitation• Elements of cell biology• Anatomy & physiology	Understand the functioning of the human body. Understand pathologies, the limitations caused and their remedies.
Biomechanics basics	64 hours 5 ECTS
<ul style="list-style-type: none">• Modeling and control of robotic systems• Finite element modeling• Motion analysis	Discover the world of biomechanics through its robotics, mechanical design and motion analysis.
MedTech	64 hours 5 ECTS
<ul style="list-style-type: none">• IoT basics• Virtual reality for healthcare• AI for healthcare	Discover the world of e-health. Acquire the fundamentals of virtual reality, and IoT tools. Understand how to process healthcare data using artificial intelligence tools.
Project	120 hours 5 ECTS
<ul style="list-style-type: none">• Cross-disciplinary project	Management and delivery of a complex healthcare project.

YEAR 5 . COMPULSORY MODULES

Healthcare regulations and engineering	64 hours 5 ECTS
<ul style="list-style-type: none">• Regulations• Innovation management• Statistics	Master the techniques of medical engineering.
Medical equipment	64 hours 5 ECTS
<ul style="list-style-type: none">• Orthopedic equipment (prostheses, orthoses, etc.)• Exoskeletons	Control and development of medical equipment.
Technology in the hospital	64 hours 5 ECTS
<ul style="list-style-type: none">• Medical imaging• EEG analysis	Mastery of selected healthcare technologies and data processing.
Proactivity & networking	64 hours 1 ECTS
<ul style="list-style-type: none">• Visits (companies, hospitals, etc.) and practitioner testimonies	Learn about the world of practice.
Project	150 hours 4 ECTS
<ul style="list-style-type: none">• Cross-disciplinary project	Management and delivery of a complex healthcare project.

YEAR 5 . OPTIONAL MODULES . 1 TRACK TO BE CHOSEN FROM:

. BIOMECHANICS TRACK

Human Biomechanics	64 hours 5 ECTS
<ul style="list-style-type: none">• Biomechanical modeling and applications (sport, surgery, etc.)	Knowledge and understanding of the mechanical nature of the human body.
Human Lab	64 hours 5 ECTS
<ul style="list-style-type: none">• Tissue biomechanics	Knowledge and understanding of the behavior of living tissues and their substitutes.

. E-HEALTHCARE TRACK

Data Science	64 hours 5 ECTS
<ul style="list-style-type: none">• Artificial intelligence: machine learning & deep learning	Develop proficiency in the use of mass data analysis tools.
Healthcare Information Systems	64 hours 5 ECTS
<ul style="list-style-type: none">• Telemedicine, IoT for healthcare• Urbanization and management of information systems	Develop an expertise in remote data capture technologies and hospital information systems.

YOUR FUTURE AFTER THE ENGINEERING & HEALTH MAJOR:

GROWTH SECTORS

The sectors of activity covered by this major are hospitals, the various stakeholders involved in the patient's healthcare pathway, manufacturers and suppliers of medical and surgical equipment, medical equipment and medical robotics, as well as e-health and m-health start-ups.

JOBS OF THE FUTURE

- Biomedical engineer
- Biostatistical engineer
- Medical robotics engineer
- Medical equipment design engineer
- Support engineer
- Research engineer
- Hospital engineer

REAL-WORLD PROJECTS TO DEVELOP YOUR EMPLOYABILITY

To develop their skills and expertise, students carry out long-term projects during their studies. These may be linked to laboratories, hospitals or business organizations.

► **Biomechanics**

- Development of a child's prosthetic foot using 3D printing
- Development of an active ankle exoskeleton to assist the physical recovery of post-stroke patients
- Performance analysis of swimming movement with a single fin.

► **E-health**

- Development of an application for monitoring the side effects of drugs
- Design of a connected tool for monitoring running activity
- Development of a connected orthosis for monitoring day-to-day re-education.





PRACTICAL DETAILS

- **Duration of studies:** 2 years
- **Location:** Paris-Cachan Campus

ANY QUESTIONS

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Maxime MEDAN

2022 Graduate

“ After graduating from high school, I hesitated a lot between medicine and engineering. I opted for engineering, but chose a school that would enable me to specialize in healthcare in the future: EPF with the Engineering & Health major. This major began in 4th year, and I wasn't disappointed. We had courses in anatomy, biology, movement analysis, etc. This 4th year enabled me to develop my skills in the field of health. This major enabled me to prepare myself as well as possible for my professional life and to enter CentraleSupélec for a specialized Master's degree: Healthcare and Biomedical Services. ”

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