

## CAREER PROSPECTS

Industry sectors of interest for this major are the hospital sector, all the stakeholders involved in the patient care system, suppliers of medical and surgical appliances, suppliers of medical devices, suppliers of medical robots, as well as e-health and m-health start-ups.

### POSITIONS TARGETED

- Bioinformatician engineer
- Biomedical engineer
- Biostatistician engineer
- Medical robotics engineer
- Medical device design engineer
- Sales engineer
- Research engineer
- Hospital engineer

## PROJECTS

Health related projects are suggested to students throughout their curriculum. According to the chosen track, students will have to plan and execute a project in:

- **Biomechanics** (for example, dimension, prototype and test a child foot prosthesis through 3D printing in Year 4; Design an in-vehicle measurement system for biomechanical data acquisition for running in Year 5);
- **Information systems** (for example, create an app to track medication side effects in Year 4; Adapt the Nao robot to contribute to the supervision of rehabilitation programs in collaboration with a Research Centre in Columbia).

## ANY QUESTIONS?

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For further information please check the "Application process for international students" section on our website [www.epf.fr/en](http://www.epf.fr/en)



TELEMEDECINE  
**E-HEALTH**  
PROSTHETICS  
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## PROGRAM STRUCTURE

The major extends over two academic years and is organized around **two in-class semesters, alternating with two internship semesters**: a student engineer internship in Year 4 and a "final year project" internship in Year 5. Students choose elective course units (CUs) in Years 4 and 5 which enable them to orient their study track either towards the field of biomechanics or information systems, according to their preferences and career plan.

The track chosen in Year 4 is followed through in Year 5.

## PROGRAM AIMS

The aim of this major is **to train general engineers who are able to use their skills to serve the healthcare sector, by designing innovative systems** either in the field of mechanics (prostheses, medical robots...), or in the IS field (digital hospital, telehealth, e-health etc.). Students are offered two technical tracks, which are paired with a wide array of courses enabling future engineers to become familiar with the healthcare sector:

- One track focuses on developing Information System skills ;
- The other develops skills in mechanics.



## COMPULSORY CUs – YEAR 4

COURSE UNIT	
<b>Tools for engineers   64 h   5 ECTS</b>	
Labour law Business Game Statistics Project management English	Providing the basic tools essential to engineers.
<b>Health sector   64 h   5 ECTS</b>	
Health system and hospital organisations 21 <sup>st</sup> century challenges in health Medical devices regulation	Acquiring general knowledge on health. Understanding the issues for healthcare in the 21 <sup>st</sup> century: impact on our lifestyles, ageing population.
<b>Human Body   64 h   5 ECTS</b>	
Human body and pathologies Anatomy	Understanding the functioning of the Human body. Understanding pathologies, consecutive limitations and remediations.
<b>Project   150 h   5 ECTS</b>	

## ELECTIVE CUs – YEAR 4 – 1 track to be chosen

MECHANICS TRACK	
<b>Robotics   64 h   5 ECTS</b>	
Modeling and control of robotic systems Practical sessions	Acquiring robotics fundamentals : modelling and control.
<b>Biomechanical basics   64 h   5 ECTS</b>	
Biomechanical modelling Movement analysis Prosthesis and orthopedic systems Functional re-education	Acquiring the fundamentals of biomechanical tools, movement analysis and the applications to prosthesis. Getting acquainted with the finite-element method.
INFORMATION SYSTEMS TRACK	
<b>Digital and data mangement for health   64 h   5 ECTS</b>	
Health data management Digital for health	Controlling issues linked to data management, storage and encryption.
<b>Networks and IoT for health   64 h   5 ECTS</b>	
Information systems and networks for health IoT	Understanding the issues linked to the use of IS in the Health sector. Managing IOT and on-board measuring tools.

## COMPULSORY CUs – YEAR 5

COURSE UNIT	
<b>Health sector and engineering for health   64 h   5 ECTS</b>	
Patient specific medicine Ethics and prevention Management for innovation Interfaces robot-patient-doctor	Understanding actual issues and practices in nowadays medical world. Developing an ethical and responsible approach.
<b>Biotechnologies   64 h   5 ECTS</b>	
Cell biologies Physiological signals and corresponding sensors Biotechnologies examples	Understanding key elements of biotechnologies and some of its applications.
<b>Medical images and robotics   64 h   5 ECTS</b>	
Medical images Robot uses in hospitals 3d printing for health Exoskeletons	Understanding key elements of robotics and the use of medical images.
<b>Signals and virtual reality   64 h   5 ECTS</b>	
Signal processing & embedded measurements Virtual reality Physiology	Understanding key elements of virtual reality. Learning how to measure and process signals.
<b>Networking   1 ECTS</b>	
Hospitals and companies visits Pro-active behavior	Learning how to interact with professionals.
<b>Project   150 h   4 ECTS</b>	

## ELECTIVE CUs – YEAR 5 – 1 track to be chosen

MECHANICS TRACK	
<b>Human Biomechanics   64 h   5 ECTS</b>	
Sport biomechanics Tissues biomechanics and biomaterials Prosthesis and orthosis Biomechanical modelling	Managing laboratories' and biomechanical analysis' measuring tools. Application to prosthesis and orthosis conception.
INFORMATION SYSTEMS TRACK	
<b>DataSciences   64 h   5 ECTS</b>	
Digital for health Artificial Intelligence and Machine Learning	Understanding DataSciences.