



### Keywords

Health technologies

Biomedical engineering

Medical devices

Biomechanics

Biomaterial

Lab projects

## BIO-ENGINEERING

### PRESENTING THE UTC DEPARTEMENT OF BIO-ENGINEERING

The Department of Bio-Engineering is recognized for its expertise, nationally and internationally, in the fields of biomechanics, biomedical engineering and biotechnologies. Combining engineering and life sciences, the department offers high-level training and multidisciplinary research, both fundamental and applied, in strong interaction with industrial and societal expectations in the fields of health and life sciences.

### COURSE DESCRIPTIONS

#### BM03 - MEDICAL ROBOTICS (6 ECTS)

*Responsible : Sofiane Boudaoud (Fall semester)*

This course provides general knowledge in medical robotics to biomedical engineers and mechatronics engineers, in order to be able to integrate a medical robotics project and to dialogue with roboticists in the actively developing sectors of humanoid robotics, minimally invasive surgery and robotic imaging devices. The teaching covers analysis and processing of biomedical signals, embedded programming, motion control and robotics.

#### BM04 - ACQUISITION AND PROCESSING OF BIOMEDICAL DATA (6 ECTS)

*Responsible : Dan Istrate (Fall semester)*

This course presents useful concepts for the development and design of equipment based on the acquisition and processing of signals, in the context of biomedical applications.

#### BM06 - MEDICAL IMAGE PROCESSING (6 ECTS)

*Responsible : Imad Rida (Fall semester)*

The purpose of this course is to provide basic and fundamental knowledge about medical image processing techniques.

#### BM07 - BIOCMPATIBILITY (6 ECTS)

*Responsible : Christophe Egles (Fall semester) (teaching material in English)*

This course deals with the conception and evaluation of materials devoted to interacting with human tissues, and with the study of the main problematics linked to the design and evaluation of materials destined to be in contact in the more or less long term with human tissues. Cytotoxicity, inflammation, hypersensitivity, genotoxicity, corrosion, degradation, wear products, in vitro cultures, grafts and transplants, cryopreservation, separation techniques and regulatory aspects are considered.

#### BMI4 - MODELING OF THE OSTEO-ARTICULAR AND MUSCULOSKELETAL SYSTEMS IN INTERACTION (6 ECTS)

*Responsible: Marie-Christine Ho Ba Tho (Fall semester)*

The human body can be described as a system of smart biological systems in interaction. Methodologies of advanced modeling techniques of osteoarticular and musculoskeletal are developed as well as their interactions. Clinical and industrial applications are illustrated. Modeling projects are part of the course.

#### BMI5 - NANOTECHNOLOGY AND NANO BIOMECHANICS OF COMPLEX BIOLOGICAL SYSTEMS (6 ECTS)

*Responsible : Karim El Kirat (Fall semester)*

This course teaches the concepts, technologies, and methods which are the basis of nanotechnologies for biology. It provides examples of applications and describes the prospects in this field of Biology and Health. The biomechanical characterization of living tissues at the nanoscale is described as well.

**BT03 - TISSUE ENGINEERING AND IMMUNOTECHNOLOGY (6 ECTS)**

*Responsible : Muriel Vayssade (Fall semester) (teaching material and subtitles in English)*  
 Technical overview of animal and human cell culture focused on experimental and biomedical applications.

**BT07 - FORMULATION, INNOVATION, NUTRITION (7 ECTS)**

*Responsible: Claire Rossi (Fall semester)*  
 The objective of this course is to provide a working method in the formulation of food products, from the specifications to the finalization through aging studies.

**BM02 - ARTIFICIAL ORGANS AND BIORHEOLOGY (6 ECTS)**

*Responsible : Cécile Legallais (Spring semester)*  
 Basics of biofluid mechanics: application to cardiovascular dynamics, biorheology and microfluidics. Mass transfer analysis: application to design and use of artificial organs. An important part of the course is devoted to a personalized project (team of two) on a specific physiological function and its replacement.

**BM08 - MODELLING OF BIOMECHANICAL SYSTEMS (6 ECTS)**

*Responsible: Marie-Christine Ho Ba Tho (Spring semester)*  
 The course presents geometric and numerical techniques as well as the methodology to model biomechanical systems. Different aspects of the methodology of modeling will be addressed such as techniques of geometric modeling derived from medical images, mechanical behavior of biological materials, and clinical and industrial examples. Modeling projects are part of the course.

**BT10 - BIOLOGICAL RISKS AND FOOD SAFETY (5 ECTS)**

*Responsible: Virginie DuceL (Spring semester) (teaching material in English)*  
 This course introduces food toxicology. The different categories of toxic molecules or suspected of being harmful will be described as well as the food processes involved. In a second part, the microbiological aspects will be discussed as well as the industrial operations intended to limit these risks.

**BT22 - AGRO-RESOURCES (6 ECTS)**

*Responsible: Adrian Troncoso-Ponce (Spring semester)*  
 Definition and study of agro-resources, their production methods, and their potential for food and non-food applications. The application of natural products in cosmetology and regulatory aspects are addressed. The last part of the course deals with managing agro-resources and their impact on the environment.

**GENERAL LAB AND PROJECT COURSES****PR00 – MULTIDISCIPLINARY PROJECT (5 ECTS)**

*Responsible: Bruno Ramond (Fall and Spring semesters)*  
 The goal of this course is to have students participating to the achievement of a project. The project should be under the supervision of one adviser.

**TX00 - LAB PROJECT (5 ECTS)**

*Responsible: Claude-Olivier Sarde (Fall and Spring semesters)*  
 The TX Unit is a technical Unit belonging to the category "Techniques and Methods" (TM). It allows the students to realize a concrete technical project operating an approach of engineering.

**Contact**

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## HUMANITIES AND LANGUAGES

### EI02 : INTERNATIONAL PROJECT MANAGEMENT (4 ECTS)

*Responsible: Frederic Huet (Fall and Spring semesters)*

Managing international projects presents unique challenges: implementing standard project management methods and tools while accommodating cultural differences and distance in the project team. This course addresses the knowledge, skills, and behaviors required to successfully manage projects across the world.

### EI05 : EUROPEAN UNION, SOCIETY AND SCIENCE POLICY (4 ECTS)

*Responsible: Martin Morgeneyer (Fall and Spring semesters)*

Introduction to Europe: Countries, figures, languages - and you! - EU's history and EU's news - From an economic to a political Europe: The treaties and the constitution project, Introduction to Lisbon - The European Institutions - Europeans about Europe - The European citizenship - Key figures - Intro to ERA and REACh - Intro to Bologna - Decision making - European law - Research, EIT, REACh and Sustainable development in Europe - Horizon 2020 - Public consultations - Europe and me.

### SO07 : DIGITAL POLICIES AND INTERNET REGULATION (4 ECTS)

*Responsible: Anne Bellon (Fall and Spring semesters)*

Can we govern technology and how? By bringing together different disciplines (political science, law, and economics). This course explores the technical and social arrangements that shape the organization and transformation of content and practices on the web. It adopts a thematic and historical perspective, which aims to discuss specific issues, but above all to grasp the evolution and ruptures that mark the regulation of the Internet.

### LA91 - FRENCH AS A FOREIGN LANGUAGE - level 1 (4 ECTS)

*Responsible: Anna Wiacek-Le Verger (Fall and Spring semesters)*

### LA92 - FRENCH AS A FOREIGN LANGUAGE - level 2 (4 ECTS)

*Responsible: Anna Wiacek-Le Verger (Fall and Spring semesters)*

### LA93 - FRENCH AS A FOREIGN LANGUAGE - level 3 (4 ECTS)

*Responsible: Carole Lefrancois-Yasuda (Fall and Spring semesters)*

### LA94 - FRENCH AS A FOREIGN LANGUAGE - level 4 (4 ECTS)

*Responsible: Carole Lefrancois-Yasuda (Fall and Spring semesters)*

## Contact

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