UNIVERSITÉ DE TECHNOLOGIE DE COMPIÈGNE

UTC

Courses in English

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.

To follow any course in the bio-engineering department in any of the four specialties, students should have a minimum level of B1 in French.

If an exchange student doesn't have the minimum B1 requirement in French, they can choose:

1. **To have a project-based exchange semester, available in the fall or spring semesters, on any subject related to the different specialties at the bioengineering department with a French language course. No other courses, than the French language are possible.**
   To apply for a project, applicants should visit the research unit's website and submit a motivation letter specifying their desired unit and project (http://www.umr7025-gec.fr/ et https://www.utc.fr/recherche/les-unites-de-recherche-de-lutc/genie-enzymatique-et-cellulaire-gec-umr-cnrs-7025/ for a biotechnological project, https://www.utc.fr/recherche/les-unites-de-recherche-de-lutc/biomecanique-et-bioingenierie-bmbi-umr-cnrs-7338/ for health engineering project)

2. **Or register in a set of the following courses in English that are only available in the fall semester and in the biomechanical engineering field.**

COURSE DESCRIPTIONS

For the Fall Semester, students may choose from the following courses that each take place for the first or second half of the semester:

BMI0 - MECHANICAL PROPERTIES OF BIOLOGICAL SYSTEMS (3 ECTS)

Responsible: Sabine BENSAMOUN (Fall semester)

The continuum mechanics, solid and fluid mechanics, and the fundamental laws of physics will be covered. Experimental methods and techniques for in vivo and in vitro characterization of the mechanical and morphological properties at different scales (from ultrastructure to macrostructure: molecule, cell, tissue, organ) for different biological materials (musculoskeletal, osteoarticular, and vascular systems) will be described.

BMI1 - CONNECTED DEVICES AND AI FOR BIOMEDICAL APPLICATIONS (3 ECTS)

Responsible: Mircea-Dan ISTRATE (Fall semester)

This course presents a complete processing chain from clinical decision support to connected objects. AI classification methods and uncertainty management will be introduced. The purpose is to prepare for designing a clinical decision support system using connected objects and AI.

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BMI2 - MICROFLUIDICS AND MICROSYSTEMS FOR BIOLOGICAL AND HEALTHCARE APPLICATIONS (3 ECTS)

Responsible: Anne LE GOFF (Fall semester)

Microfluidics is a fast-growing domain with many high-tech applications (inkjet printers, implantable micro pumps, microsystems for biological analysis, microreactors, etc.). The course is an initiation to the microtechnology of liquid systems and aims to present the main physical phenomena that prevail at a scale of a few microns. It will be oriented towards the analysis of the main physical phenomena and their order of magnitude.

BMI3 - MODELLING NEUROMUSCULAR AND MUSCULOSKELETAL SYSTEMS IN INTERACTION (3 ECTS)

Responsible: Sofiane BOUDAOUD (Fall semester)

The neuromuscular and musculoskeletal systems are complex and interact to generate movement. They are composed of motor control by the nervous system, muscles, tendons, bones, and joints. After presenting muscle physiological aspects, the proposed course aims to describe electrophysiological and mechanical modeling methods of the two interacting subsystems.

BMI4 - MODELLING OSTEOARTICULAR AND MUSCULOSKELETAL SYSTEMS IN INTERACTION (3 ECTS)

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

The Human body could be described as a system of biological systems in interaction. Methods of osteoarticular and musculoskeletal modeling and their interaction are addressed. These models allow a better comprehension and evaluation of deformities and degenerescence of osteoarticular and musculoskeletal systems. Subsequently, a better planification of surgery or rehabilitation could be addressed.

BMI5 - NANOTECHNOLOGIES AND NANOMECHANICS OF COMPLEX BIOLOGICAL SYSTEMS (3 ECTS)

Responsible: Karim EL KIRAT-CHATEL (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.

BMI6 - MULTIPHYSICS MODELLING OF THE VASCULAR SYSTEM (3 ECTS)

Responsible: Anne-Virginie SALSAC (Fall semester)

The course is focused on modeling blood flow in the cardiovascular system, particularly the biomechanics of arterial blood circulation. We will study the different approaches used to model the coupling between blood flow and deformation of the vascular wall. We will also cover various vascular pathologies and their associated therapeutic treatments.

FRENCH LANGUAGE (Available both Fall and Spring semesters)

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)

Contact

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