

Module Description, available in: EN

Biomedical Engineering

General Information**Number of ECTS Credits**

3

Module code

TSM_BioMedEng

Valid for academic year

2023-24

Last modification

2019-08-31

Coordinator of the module

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Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Lausanne			Lugano	Zurich		
Instruction					X E 100%		
Documentation					X E 100%		
Examination					X E 100%		

Module Category

TSM Technical scientific module

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences**Prerequisites, previous knowledge**

Basic knowledge in cell biology, anatomy, functional anatomy, and pathology (fracture, neuro, orthopedics, osteosynthesis)

Brief course description of module objectives and content

(1) The lecture aims to provide an overview of Biomedical Engineering. It starts with the history of Biomedical Engineering and then focuses on current methods and tools.

(2) Physiological principles will be discussed before focusing on subjects like biosignals and sensors.

(3) Topics discussed include, among others, bioimaging, biomolecular engineering, tissue engineering, and precision/personalized medicine.

(4) The participants will get an insight into basic requirements such as biology & physiology, used materials for implants & prostheses, and available biomaterials.

(5) Current clinical topics, such as osteoporosis, fracture fixation & osteoarthritis, are addressed. In addition, treatment methods in orthopedics and osteosynthesis are analyzed, such as fracture fixation, primary stability of implants & joint replacements.

(6) A more profound insight is provided into measurement technologies for the human body's performance (kinematics & kinetics; e.g., movement analysis, muscular & brain activity).

(7) The course will also discuss (robot-assistive) rehabilitation technologies in the case of neuropathology, such as, e.g., stroke, MS, and paraplegia, with a specific focus on innovations in virtual/augmented reality.

Aims, content, methods

Learning objectives and acquired competencies

The first half of each afternoon session will be lectures on biomedical engineering and prosthetics. During the second half, the students will focus, as a group, on medical devices of their choice (either an already existing medical device or a medical aid they would like to build in the future).

Contents of module with emphasis on teaching content

Biomedical engineering

- physiological systems
- biotechnology and tissue engineering
- bioelectric and neuro-engineering
- human sensory systems
- bioreactors and tissue engineering in regenerative medicine

Prosthetics

- human movement analysis, orthopedics, biomechanics, biomaterials
- biomechanical testing of implants/test development & lab accreditation

Teaching and learning methods

There will be a mix of various teaching methods like classical teaching, group work, etc.

Literature

Slides and lecture notes will be made available to the students. Furthermore, there will be a list provided with references to books or scientific articles relevant to the topics taught.

Assessment

Certification requirements

Module uses certification requirements

Certification requirements for final examinations (conditions for attestation)

In the middle and end of the semester, there will be oral presentations of the student groups. These presentations are mandatory for acceptance to the final exam. If approved, the two presentations will account for 2/10 of the final marks (1/10 per presentation).

Basic principle for exams

As a rule, all the standard final exams for modules and also all resit exams are to be in written form

Standard final exam for a module and written resit exam

Kind of exam

written

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

Handwritten cheat sheet (two A4 pages only)

Other permissible aids

No other aids permitted

Special case: Resit exam as oral exam**Kind of exam**

oral

Duration of exam

30 minutes

Permissible aids

No aids permitted