

**Module Description, available in: EN**

## Biomedical Engineering

**General Information****Number of ECTS Credits**

3

**Module code**

TSM\_BioMedEng

**Valid for academic year**

2022-2023

**Last modification**

2019-08-31

**Coordinator of the module**

Marcel Egli (HSLU, marcel.egli@hslu.ch)

**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		
<b>Instruction</b>					X E 100%		
<b>Documentation</b>					X E 100%		
<b>Examination</b>					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, orthopaedics, osteosynthesis)

**Brief course description of module objectives and content**

- (1) The lecture aims to provide an overview of Biomedical Engineering, like what methods and tools are applied nowadays.
- (2) There will be physiological principles discussed before focusing on subjects like biosignals and sensors.

(3) Other topics covered are 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 are addressed, such as osteoporosis, fracture fixation & osteoarthritis. In addition, treatment methods such as fracture fixation, primary stability & joint replacements are discussed.

(6) A more profound insight is provided in technologies for human motion analysis (measurement technologies & performance analysis).

(7) The course will also discuss potential (robot-assistive) rehabilitation technologies in the case of neuropathology such as, e.g., stroke, MS, and paraplegia.

## Aims, content, methods

### Learning objectives and acquired competencies

There will be lectures on biomedical engineering as well as prosthetics. The students will learn more about the basics of these subjects and will thus understand why these topics are significant in medical engineering.

### Contents of module with emphasis on teaching content

#### **Biomedical engineering**

- physiological systems
- biotechnology and tissue engineering
- bioelectric and neuro-engineering
- human sensory systems
- \_\_\_\_\_

#### **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 applied 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 does not use certification requirements

### 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

No aids permitted

### Special case: Resit exam as oral exam

#### Kind of exam

oral

#### Duration of exam

30 minutes

**Permissible aids**

No aids permitted