Module Description, available in: EN

Biomedical Engineering

General Information

Number of ECTS Credits

3

Module code

TSM_BioMedEng

Valid for academic year

2021-2022

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.

	Berne	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, orthopaedics, osteosynthesis)

Brief course description of module objectives and content

(1) The module's goal is to obtain a deeper understanding of biomedical engineering principles, the human musculoskeletal system, its function, and related biomechanical analysis, pathologies, possible treatment strategies in surgery and rehabilitation.

(2) Participants will obtain insight into basic requirements such as biology and physiology, materials used for implants and prostheses, and available biomaterials for skeletal tissue regeneration.

(3) Current clinical topics will be addressed, like osteoporosis, fracture fixation osteoarthritis, and neurorehabilitation. Treatment methods such as fracture fixation, primary stability, and joint replacements will be discussed besides.

(4) A more profound insight will be provided into technologies for human motion analysis (measurement technologies and performance analysis).

(5) The course will also discuss robot-assistive rehabilitation technologies in cases of neuropathology such as stroke, multiple sclerosis, and spinal cord injury.

Aims, content, methods

Learning objectives and acquired competencies

There will be lectures on the following main subjects: a) biomedical engineering) prosthetics as well as c) clinical topics. The students will learn more about these subjects and 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

Clinical topics

- aging and geriatrics, degenerative diseases, osteoporosis, muscle atrophy, neuro-/endocrinological disorders (e.g., diabetes mellitus)
- bioreactors and tissue engineering in regenerative medicine

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