Orthopaedic biomechanics

Lecturer
Bernardo INNOCENTI (Coordinator)

Course mnemonic
MEDI-H503

ECTS credits
5 credits

Language(s) of instruction
English

Course period
Second term

Course content

The course is subdivided in the following parts:

1. The Musculoskeletal System: anatomy and function of the main structures of the human body

2. Loads and Motion in the Musculoskeletal System: static and dynamics analysis and joint stability, kinematics and motion analysis

3. Tissue Mechanics: Bone and Soft tissue biomechanics. Material models. Measurement and model of bone and soft tissues properties.

4. Functional adaptation of the skeleton: Bone remodeling theories and models,

5. Structural Analysis of Musculoskeletal Systems

6. Biomechanics of the main joint of the human body (hip, knee, spine, ankle,...)

7. Develop of a musculoskeletal model, patient specific modeling

Objectives (and/or specific learning outcomes)

The course addresses the mechanical and structural aspects of the skeletal system and it focused on the fundamental topics of orthopaedic biomechanics.

The student will be able to understand how the laws of physics (mechanics) can explain body structure and function of human and animal.

The student will learn how to apply principles of physics when solving tasks associated with human daily activities.

The student will learn how to to plan, conduct and analyze results of simple biomechanics experiments and to use engineering tools (hardware and software) for solving problems of biomechanics

Teaching method and learning activities

36h lectures and 12h exercises

Contribution to the teaching profile

This teaching unit contributes to the following competences:

- To model and simulate complex physical systems in the field of the biomedical engineering.
- To identify proper hypothesis, input and output of simple biomechanical model aimed to understand and solve complex biomechanical system.
- Understand, measure and verify the main physical quantities related to living subjects (both morphological and functional).
- Translate the behavior of the living subjects and the language of the clinicians into the language of the engineers;
- Understand the effect that each parameter (as materials, shape, stiffness, etc.) of a biomechanical model has on its final performance.
- Define, describe, explain and interpret common biomechanical model.
- Communicate in English in the field of (biomedical) engineering

References, bibliography and recommended reading

Orthopaedic Biomechanics: Mechanics and Design in Musculoskeletal Systems. Bartel, Davy, Keaveny. Pearson Prentice Hall. 2007.

Basic Orthopaedic Biomechanics and Mechano-Biology. Van C Mow, Rik Huiskes Third Edition. Lippincott Williams & Wilkinns 2005.

Other information

Contact(s)

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Evaluation method(s)

Other

Evaluation method(s) (additional information)

Written examination + Oral examination

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRCB | Master of science in Biomedical Engineering | finalité Professional/unit 1