Biomechanics of the musculoskeletal system (2024-2025)

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Goals of the course

1. Illustrate how an engineering approach can bring new insight into the biomedical field.
2. Develop competencies useful in the biomedical industry.
3. Develop a multi-disciplinary approach to problem-solving.

Objective of formation (to be able to)

1. Translate a (bio)medical need into engineering concepts.
2. Propose a concrete solution to a biomedical problem.
3. Argue the engineering choices made for the solution, considering the biomedical context.

Study plan

Master Course for Mechanical Engineering, Microengineering, Life Sciences, Materials Science, and other Engineering Sections.

Characteristics of the students

Master students with different levels in mechanics, mechanics of continuous mediums, biology, and physiology.

Contents (28 hours)

Part 1: Biomechanics @ the body level (8 h)

1. Functional anatomy (18.02)
2. Muscle biomechanics + example past mini-projects (25.02)
3. Kinematics of joints (04.03)
4. Tissue mechanical remodeling (11.03)

Part 2: biomechanics @ the tissue level (6 h)

5. Sport and muscle performance (18.03)
6. Tissue imaging (25.03)
7. Biomech. of tissues (lin/non lin const. law) (01.04)

Part 3: biomechanics @ the “clinical” level (14 h)

1. Biomechanics in organ-on-a-chip systems (08.04)
2. Biomechanic to treat tracheomalacia (15.04)
3. Biomechanics in traumatology (29.04)
4. Biomechanics in implant development (06.05)
5. Biomechanics sport traumatology (13.05)
6. Mini-projects presentation (20.05)
7. Mini-projects presentation (27.05)