| | | | | | |
|---|---|---|---|---|---|
| | Studiengang: *Program:* | **Master of Science im Maschinenbau** *Master of Science in Mechanical Engineering* | | | FACH HOCHSCHULE LÜBECK University of Applied Sciences |
| 1 | Modul: *Module:* | **Biomechanics and Biophysics** *Biomechanics and Biophysics* | | | **English** *Englisch* |
| | **Fach-Nr.** *Course number* | **Semester** *Semester* | **Dauer** *Duration* | **Status** *Status* | **Turnus** *Regular cycle* |
| | | 2. Semester | 1 Semester | elective | annual |
| | **Kreditpunkte** *Credits* | **Aufwand** *Workload* | **Kontaktzeit** *Contact-hours* | **Selbststudium** *Student's efforts* | |
| | 5 ECTS | 200 hrs | 4hrs/week = 60hrs Lecture | 120 hrs Self-study | |

**2 Beschreibung** *Description*

- Biomechanics lecture
- Biophysics lecture

**3 Lernziele** *Learning Outcomes*

- The students shall acquire consolidated knowledge of physical, electrical, and mechanical principles of medical products.
- The students shall be enabled to contribute to the development of medical products according to relevant standards
- The students shall understand the basics of the application of physical/technical models to biological/ medical systems.

**4 Schlüsselqualifikationen** *Key qualifications*

| Sozialkompetenz *Social Competence* | Methodenkompetenz *Competence in Methods* | Selbstkompetenz / Personenkompetenz *Self-Competence Personal Competence* | Interkulturelle Kompetenz *Intercultural Competence* | Medienkompetenz *Media-Competence* |
|---|---|---|---|---|
| | X | X | | |

**5 Lehrveranstaltung/ -methoden** *Course type and methods*

Lecture (Board, transparencies, LCD-projector)

**6 Vorbedingungen / Vorkenntnisse** *Prerequisites*

Basic knowledge in physics und biology

**7 Arbeitsmittel / Literatur** *Required material / Literature*


- Mow, V.C., R. Huiskes (Ed.): Basic orthopaedic biomechanics & mechano-biology. 3rd Edition.). Lippincott, Williams & Wilkins, Philadelphia, 2003
- P. Brinckmann, W. Frobin, G. Leivseth, (Hrsg.): Orthopedic Biomechanics, Thieme, 2015
- Thews et al.: Human Physiology. Springer (1989)
- Webster: Medical Instrumentation, 3rd edition, Wiley and Sons.
  Tritthart, H.: Medizinische Physik und Biophysik. Schattauer (2001)
- Hutten. H.: Biomedizinische Technik, 4. Aufl. Springer (1991)
- Kresse, H.: Kompendium Elektromedizin. Siemens (1978)

## Detailinformationen

### 8 Inhalte

*Course topics*

- Basic static mechanics
- • Deformation behaviour of viscoelastic materials
- • Biomechanics of the human locomotive system:
  Mechanical behaviour of biological tissues (bone, tendons/ligaments, cartilage, synovial fluid)
  Loads acting in the locomotive system (forces/moments, stress/strain): hip joint, femur, knee joint, foot, spine)
- • Biomaterials:
  types, chemical composition, biocompatibility, corrosion resistance, mechanical properties
- • Artificial joints (endoprostheses):
  types, materials, laboratory testing, wear
- • Bone fractures (healing and fixation):
  types of fracture healing, internal fixation, external fixation
- Physical principles and their application in:
- • Liquid and gas flow in the human body
- • Electrical and magnetic interactions with biological systems (cells)
- • HF surgery
- • EEG
- • EMG
- • MRI
- • Knowledge about lecturer´s current research projects

### 9 Prüfungsform

*Assessment*

Two written examinations

### 10 Voraussetzung für die Vergabe von Kreditpunkten

*Requirements for granting of credits*

Passing the examinations

### 11 Weiterführende Veranstaltungen

*Related courses*

-

### 12 Zuordnung

*Classification*

| Mathematik & Naturwissenschaft *Mathematics & Natural Sciences* | Ingenieur-wissenschaften *Engineering Science* | Ingenieur-anwendungen *Engineering Application* | Entwicklung & Konstruktion *Design* | Werkstoffe *Material* | Wirtschaft, Management, Sprachen *General Education* | Anderes *Other* |
|---|---|---|---|---|---|---|
| | | | | X | | X |

### 13 Modulbeauftragter / Lehrpersonen

*Responsible person / Lecturers*

Prof. Dr. Jürgen Klein / Prof. Dr. Jürgen Klein