TECHNISCHE HOCHSCHULE LÜBECK

Module: Biomechanics and Biophysics

Level	Master	**Short Name**	Bio
Responsible Lecturers	Prof. Dr. Nestler, Bodo		
Department, Facility	Mechanical Engineering and Business Administration		
Course of Studies	Mechanical Engineering, Bachelor		
Compulsory/elective	Compulsory elective	**ECTS Credit Points**	5
Semester of Studies	2	**Semester Hours per Week**	4
Length (semesters)	1	**Workload (hours)**	150
Frequency	WiSe	**Presence Hours**	60
Teaching Language	English	**Self-Study Hours**	90

The following section is filled only if there is **exactly one** module-concluding exam.

Exam Type	Written Exam	**Exam Language**	English
Exam Length (minutes)	60	**Exam Grading System**	One-third Grades
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.		
Participation Prerequisites			

The previous section is filled only if there is **exactly one** module-concluding exam.

Consideration of Gender and Diversity Issues	✔ Use of gender-neutral language (THL standard) ✘ Target group specific adjustment of didactic methods ✘ Making subject diversity visible (female researchers, cultures etc.)
Applicability	
Remarks	

TECHNISCHE HOCHSCHULE LÜBECK

Module Course: Biomechanics and Biophysics (lecture)

(of Module: Biomechanics and Biophysics)

Course Type	Lecture	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	5
Participation Limit		**Semester Hours per Week**	4
Group Size		**Workload (hours)**	150
Teaching Language	English	**Presence Hours**	60
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	90
SL Length (minutes)		**SL Grading System**	

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents

- 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

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)
Remarks	