

Module Name: Natural Sciences					
Module Responsibility	Dr.-Ing. Robert Wendlandt				
Department, Facility	UzL, Clinic for Orthopedics and Biomechanics				
Lecturers	Dr.-Ing. Robert Wendlandt (Biomechanics) Prof. Dr. Sci. Nat. Max Urban (Biophysics)				
Module Number		Level	Master	Short Name	
Course of Studies	Medical Microtechnology, Master				
Compulsory/elective	Compulsory	ECTS Credit Points	4		
Semester of Studies	1	Semester Hours per Week	4		
Length (semesters)	1	Workload (hours)	120		
Frequency	WiSe	Presence Hours	48		
Teaching Language	English	Self-Study Hours	72		
Consideration of Gender and Diversity Issues	<input checked="" type="checkbox"/> Use of gender-neutral language (THL standard)				
	<input type="checkbox"/> Target group specific adjustment of didactic methods				
	<input type="checkbox"/> Making subject diversity visible (female researchers, cultures etc.)				
Applicability	Biomedical Engineering, Medical Microtechnology				
Remarks	None				
Course 1: Biomechanics					
Course Number		Short Name			
Course Type	Lecture	Form of Learning	Presence		
Lecturer	Wendlandt				
Mandatory Attendance	<input checked="" type="checkbox"/>	ECTS Credit Points	2		
Participation Limit	None	Semester Hours per Week	2		

Group Size (practical training, exercises, ...)	None	Workload (hours)	60
Teaching Language	English	Presence Hours	24
Study Achievements („Studienleistung“, SL)	Exercise	Self-Study Hours	36
SL Length (minutes)	90	SL Grading System	One-third Grades
Exam Type	Written Exam	Exam Language	English
Exam Length (minutes)	90	Exam Grading System	One-third Grades
Learning Outcomes	<ul style="list-style-type: none"> • The students are able to analyze simplified models of the human musculoskeletal system for static joint loads. • The students are able to characterize different tissue types in the scope of orthopedic biomechanics. • The students are able to characterize the most important biomaterials used in joint arthroplasty for tissue reaction and wear properties. 		
Participation Prerequisites	None		
Contents	<ul style="list-style-type: none"> • Basic static mechanics and elasto-statics • Biomechanics of the human locomotive system • Properties of biomaterials in orthopedics • Artificial joints 		
Literature	Paul Brinckmann, W. Frobin, G. Leivseth (Hrsg.), „ <i>Orthopedic biomechanics</i> “, Thieme, 2015.		
Remarks	None		
Course 2: Biophysics			
Course Number		Short Name	
Course Type	Lecture	Form of Learning	Presence
Lecturer	Urban		
Mandatory Attendance	<input checked="" type="checkbox"/>	ECTS Credit Points	2
Participation Limit	60	Semester Hours per Week	2
Group Size (practical training, exercises, ...)	12	Workload (hours)	60

Teaching Language	English	Presence Hours	24
Study Achievements („Studienleistung“, SL)	Flexible	Self-Study Hours	36
SL Length (minutes)	90	SL Grading System	One-third grades
Exam Type	Written Exam	Exam Language	English
Exam Length (minutes)	90	Exam Grading System	One-third grades
Learning Outcomes	The students shall understand the basics of the application of physical/technical models to biological/medical systems.		
Participation Prerequisites	None		
Contents	Physical principles and their application in <ul style="list-style-type: none"> • Liquid and gas flow in the human body • Electrical and magnetic interactions with biological systems • Diagnostic medical devices / application as ECG, EMG, MEG and MRI 		
Literature	<ul style="list-style-type: none"> • Roland Glaser, „<i>Biophysics: An Introduction</i>“, ISBN 978-3-642-25211-2, Springer-Verlag Berlin Heidelberg, 2012. • Paul A. Tipler, „<i>Physics for Scientists and Engineers</i>“, ISBN 978-1-4292-0265-7, 2007. 		
Remarks	None		