

Module Natural Sciences

Module Name: Natural Sciences

Module Number	Level	Master	Short Name	NATSCI
Responsible Lecturers	Dr.-Ing. Robert Wendlandt Prof. Dr. sc. nat. Max Urban			
Department, Facility	THL, Applied Natural Sciences			
Course of Studies	Biomedical Engineering, 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	40	
Teaching Language	English	Self-Study Hours	80	
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			
Remarks	None			

Module Natural Sciences

Module Course Biomechanics

Course 1: Biomechanics

Course Number		Short Name	BIOMECH
Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	<input 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	20
Study Achievements („Studienleistung“, SL)	Exercise	Self-Study Hours	40
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		

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Module Course Biophysics

Course 2: Biophysics

Course Number		Short Name	BIOPHY
Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	<input 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	20
Study Achievements („Studienleistung“, SL)	Flexible	Self-Study Hours	40
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		