

Module: Medical Sensors and Signal Processing

Level	Bachelor	Short Name	SE
Responsible Lecturers	Urban, Max, Prof. sc. nat.		
Department, Facility	Applied Natural Sciences		
Course of Studies	Biomedical Engineering, Bachelor		
Compulsory/elective	Elective	ECTS Credit Points	3
Semester of Studies	(Unspecified)	Semester Hours per Week	2
Length (semesters)	1	Workload (hours)	90
Frequency	SuSe	Presence Hours	27
Teaching Language	English	Self-Study Hours	63

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

Exam Type	Portfolio Exam	Exam Language	English
Exam Length (minutes)		Exam Grading System	One-third Grades

Learning Outcomes	Students will be able to understand: - How to read sensor specifications (e.g. data sheets) and identify suitable sensors for a specific task. - How exemplary sensors work and the physical principles behind these sensors. - Which applications can be implemented with which sensors. - How the signal flow must be structured from sensor data acquisition through data acquisition, analogue signal shaping and digitisation to digital signal processing of sensor signals. Moreover, students are able to present and discuss a selected sensor technology in a team presentation on selected sensors (principle, technology, application, signal processing).		
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	Electrical Engineering, Physics, Biomedical Engineering		
Remarks			

Module Course: Medical Sensors and Signal Processing

(of Module: Medical Sensors and Signal Processing)

Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	3
Participation Limit	20	Semester Hours per Week	2
Group Size		Workload (hours)	90
Teaching Language	English	Presence Hours	27
Study Achievements ("Studienleistung", SL)		Self-Study Hours	63
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	Recommended but not mandatory are		

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

Contents	• Definitions and specifications of sensors (transfer functions, dynamic behavior, stability) • Signal acquisition from the physical measuring principle (conversion of the physical signal into an electrical signal) to analog signal shaping • Digitization of measured signals (filter, sampling, ADC, discrete signals, resolution) • Digital signal processing of sensor signals (e.g. FFT, FIR) • Exemplary sensor systems in medical products & presentation of exemplary sensors by students
Literature	Handbook of Modern Sensors, J. Fraden, ISBN: 978-3-319-19302-1, 2015
Remarks	