

# Module Electronics and Optics

## Module Name: Electronics and Optics

Module Number	<b>X4M 1600</b>	Level	Master	Short Name	EO
Responsible Lecturers	Prof. Dr. Tim Jürgens Dr. Fred Reinholz				
Department, Facility	THL, Applied Natural Sciences and UZL, Optics				
Course of Studies	Biomedical Engineering, Master				
Compulsory/elective	Elective	ECTS Credit Points	8		
Semester of Studies	1	Semester Hours per Week	6		
Length (semesters)	1	Workload (hours)	180		
Frequency	WiSe	Presence Hours	75		
Teaching Language	English	Self-Study Hours	105		
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	<p>The students shall acquire consolidated knowledge of physical, electrical, and mechanical principles of medical products.</p> <p>The students shall be enabled to contribute to the development of medical products according to relevant standards.</p> <p>The students shall know about development processes in medical technology and manage these processes according to their professional experience.</p> <p>The students shall be able to present results of their work adequately.</p>				

# Module Electronics and Optics

## Module Medical Electronics

### Course 1: Medical Electronics, Lecture

Course Number		Short Name	ME
Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	<input type="checkbox"/>	ECTS Credit Points	5
Participation Limit	None	Semester Hours per Week	4
Group Size (practical training, exercises, ...)	None	Workload (hours)	120
Teaching Language	English	Presence Hours	50
Study Achievements („Studienleistung“, SL)	None	Self-Study Hours	70
SL Length (minutes)	n. a.	SL Grading System	n. a.
Exam Type	Written Exam	Exam Language	English
Exam Length (minutes)	90	Exam Grading System	One-third Grades
Learning Outcomes	Basic understanding of principles and tools applied in medical electronics		
Participation Prerequisites	Basic knowledge in engineering sciences and analog electronics		
Contents	<ul style="list-style-type: none"> <li>• Some tools: Electrical Impedance, Transfer Function, Bode Diagram, Common Mode vs. Differential Mode Voltages</li> <li>• Electrical Safety of Medical Electronic Devices</li> <li>• Registration of Bioelectrical Signals</li> <li>• Potential Separation</li> <li>• Power Supplies</li> </ul>		
Literature	<p>Horowitz, P., Hill, W.: The Art of Electronics. Cambridge University Press, New York, 1999. ISBN: 0-521-37095-7</p> <p>Webster, J. G.: Medical Instrumentation. Application and Design. John Wiley and Sons, Inc., New York, 1998.</p> <p>Mancini, R.: Op Amps For Everyone. Texas Instruments</p>		
Remarks	Written examination		

# Module Electronics and Optics

## Module Photonics I

### Course 2: Photonics I, Lecture

Course Number		Short Name	P
Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	<input type="checkbox"/>	ECTS Credit Points	3
Participation Limit	n. a.	Semester Hours per Week	2
Group Size (practical training, exercises, ...)	n. a.	Workload (hours)	60
Teaching Language	English	Presence Hours	25
Study Achievements („Studienleistung“, SL)	None	Self-Study Hours	35
SL Length (minutes)	n. a.	SL Grading System	n. a.
Exam Type	Written exam	Exam Language	English
Exam Length (minutes)	90	Exam Grading System	One-third Grades
Learning Outcomes	The students should gain knowledge about the basic theoretical classical optic concepts. Students will learn about the modern devices and their implementation. Students will use the knowledge developed to solve concrete problems.		
Participation Prerequisites	Basic knowledge in mathematics, physics and optics		
Contents	<ul style="list-style-type: none"> <li>• Basics of optics (ray optics, wave optics)</li> <li>• Optical components (lenses, mirrors, fibres)</li> <li>• Radiation sources, detectors</li> <li>• Applications</li> <li>• Knowledge about lecturer's current research projects</li> </ul>		
Literature	<p>Hecht, E.: Optics. München: Oldenbourg</p> <p>Young, M.: Optics and Lasers: Including Fibers and Optical Waveguides. Berlin: Springer</p> <p>Pedrotti, F.L., Pedrotti, L.M., Pedrotti, L.S.: Introduction to Optics. Upper Saddle River, NJ</p> <p>B. Saleh, Teich: Fundamentals of Photonics, Wiley</p>		
Remarks	None		