Module Name: **Optics for Engineers**					
Module Responsibility / Lecturer	Assoc. Prof. Dr. Jacek Fiutowski				
Department, Facility	SDU, Mad Clausen Institute and NanoSYD				
Module Number		**Level**	Master	**Short Name**	
Course of Studies	Medical Microtechnology, Master				
Compulsory/elective	Compulsory	**ECTS Credit Points**	5		
Semester of Studies	2	**Semester Hours per Week**	4		
Length (semesters)	1	**Workload (hours)**	150		
Frequency	SuSe	**Presence Hours**	48		
Teaching Language	English	**Self-Study Hours**	102		
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	None				
Remarks	None				

Course 1: Optics for Engineers			
Course Number		**Short Name**	
Course Type	Lecture and lab exercises	**Form of Learning**	Presence
Mandatory Attendance	☒	**ECTS Credit Points**	5
Participation Limit	None	**Semester Hours per Week**	4
Group Size (practical training, exercises, …)	2-3	**Workload (hours)**	150
Teaching Language	English	**Presence Hours**	48

Study Achievements („Studienleistung“, SL)	Lab reports	**Self-Study Hours**	102
SL Length (minutes)	n. a.	**SL Grading System**	7-point grading scale
Exam Type	Oral Exam	**Exam Language**	English
Exam Length (minutes)	20	**Exam Grading System**	7-point grading scale
Learning Outcomes	Knowledge • Profound knowledge of the basis of the field of optics • The knowledge of the fundamentals of physical and geometrical optics. Skills • The ability to design and construct simple optical systems • The ability to compute the image properties: size, location, fidelity, brightness • The ability to estimate diffraction-limited imaging performance • The ability to explain optical diagrams • The ability to compute the spectral distribution of a source • The ability to describe the difference between photon and thermal detectors • The ability to explain the main factors of laser beams: monochromaticity, collimation, and propagation. Competences • The ability to solve realistic optical problems • The ability to developed applications using basic optical components		
Participation Prerequisites	None		
Contents	• Geometrical and instrumental optics • Wave optics • Optical detection • Nonlinear optics • Optical Microscopy The course introduces Maxwell’s equations and the wave equation, which form the mathematical basis of the field of optics. Explains also the fundamentals of physical and geometrical optics, in sufficient depth to enable students to solve many realistic problems. Finally, it addresses the importance of the measurement and quantification of light in optical systems, covering radiometry, photometry and optical detection. It also introduces basic concepts of nonlinear optics.		

Literature	• Charles A. DiMarzio, *"Optics for Engineers"*, 2011 by CRC Press • F. L. Pedrotti, S. J. Pedrotti, L. M. Pedrotti, L. S. Pedrotti: *"Introdution to Optics"*, Pearson, 1987. • M. V. Klein and T. E. Furtak: *"Optics"*, John Wiley and Sons, 1986. • E. Hecht, *"Optics"*, Addison-Wesley, 2002.
Remarks	None