Module Name: **Summer School (Elective)**					
Module Number		**Level**	Master	**Short Name**	
Module Responsibility	Assoc. Prof. Dr. Jacek Fiutowski				
Department, Facility	SDU, Mad Clausen Institute and NanoSYD				
Lecturers	several lecturers from participating universities				
Course of Studies	Medical Microtechnology, Master				
Compulsory/elective	Elective	**ECTS Credit Points**	5		
Semester of Studies	2	**Semester Hours per Week**	5		
Length (semesters)	1	**Workload (hours)**	150		
Frequency	SuSe	**Presence Hours**	60		
Teaching Language	English	**Self-Study Hours**	90		
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: Summer School			
Course Number		**Short Name**	
Course Type	Lecture and lab exercises	**Form of Learning**	Presence
Mandatory Attendance	☒	**ECTS Credit Points**	5
Participation Limit	20	**Semester Hours per Week**	5
Group Size (practical training, exercises, …)	n. a.	**Workload (hours)**	150

Teaching Language	English	**Presence Hours**	60
Study Achievements („Studienleistung“, SL)	None	**Self-Study Hours**	90
SL Length (minutes)	n. a.	**SL Grading System**	n. a.
Exam Type	Oral exam	**Exam Language**	English
Exam Length (minutes)	20	**Exam Grading System**	7-scale grading
Learning Outcomes (as planned for 2021)	The main objective is to learn the principles and applications of various medical device types and imaging techniques. This includes the design, modelling, fabrication and characterization of microfluidic chips, the development of optical analysis systems, as well as different imaging techniques with applications within the medical field. Knowledge - The students should have • an understanding of the basic physics of fluids • an understanding how to run a simulation and apply results in practice • a comprehension of the fundamentals of microfluidic sensing • an understanding of fabrication process steps for microfluidic systems • an understanding of proper microfluidic chip layout and functions • an understanding of basics of 3D scanning and 3D model metrology • an understanding of the most common optical and non-optical imaging techniques for medical applications • an understanding of spectroscopy techniques and instrumentation and awareness of the challenges in optical analysis of biological tissue • an understanding of the principles of magnetic particle imaging • a realistic aspect of working in a team to fulfil a common goal. Skills - The students should have the • ability to design and manufacture microfluidic chips • ability to analyze and interpret simulation output • ability to setup and test microfluidic systems • ability to select a suitable imaging technique for a given application • ability to develop and implement machine learning in spectroscopic applications Competences		

	• The students can manage their own activities related to the different phases of a typical development project. They are independently able to define and analyze problems within the area of microfluidics. • The student can simulate, design and fabricate microfluidic chips.
Participation Prerequisites	None

Contents (as planned for 2021)	• Microfluidics
	  • Theory
	  • Simulations
	  • Protype design, realization and testing
	• Medical devices
	  • Optical blood analysis
	  • Spectroscopic techniques and instrumentations
	  • Data analysis incl. machine learning approaches
	• Imaging techniques for medical applications
	  • Optical and non-optical methods
	  • Magnetic particle imaging

Literature	Will be provided during the lectures.
Remarks	None