

17 Solid State Laser Engineering

Module title		Solid State Laser Engineering				
Term		3 rd semester	winter			
Duration		1 semester				
Responsibility		Prof. Dr. Ulrich Wittrock				
Lecturer		Prof. Dr. Ulrich Wittrock				
Language		English				
Programs in which the module is used		Master of Science in Photonics		compulsory module		
W O R K L O A D	Contact hours	Courses	credit hours	semester load	contact time	
		Lectures	2	30 h	75 h	
		Exercises	1	15 h		
		Laboratory (project)	2	30 h		
	Self study	Form			semester load	self study
		Lecture			50 h	130 h
		Exercise			40 h	
		Laboratory (project)			40 h	
					Total work load	205 h
	Credit points		7			
Learning objectives		A brief review of the fundamentals of solid state lasers ensures that the students possess active knowledge and can perform calculations on their own. At the end of the course, the students are expected to be familiar with the most important concepts for solid state lasers. They have understood the tradeoffs that have to be made and how optimum solutions can be found. They should thus be able to design solid state lasers for specific applications and requirements. Extensive practical training due to exercises and the project laboratory course will also train communication skills, methods, and organizational skills.				
Content		<ul style="list-style-type: none"> - Rate Equations (review) - Thermodynamics of Radiation (Black-Body Radiation, Brightness Theorem) - Laser Gain Media - Unsaturated and Saturated Amplification, Laser Dynamics - Laser Efficiency Calculations - Gaussian Beams and Beam Quality of Partially Coherent Light - Thermal Effects in Laser Gain Media - Concepts for Industrial and Scientific Solid State Lasers - Phase and Intensity Noise - Q-Switched Lasers - Mode-Locked Lasers 				
Requirements for participation		Formally: Admission to the M. Sc. Photonics With regard to contents: Elementary Quantum Mechanics, Laser Physics, Wave Optics				
Requirements for allocation of credits		Successful completion of laboratory class. At least a passing grade for the module examination.				
Exam		Oral or written exam of 45 minutes and 120 minutes, respectively				
Requirements to attend the exam		Successful completion of laboratory class				