

COURSE DESCRIPTION CARD

Faculty of Electrical Engineering									
Field of study	Electrical and Electronics Engineering							Degree level and programme type	Master's degree
Specialization/ diploma path	-							Study profile	-
Course name	Photonics							Course code	IS-FEE-20008S
								Course type	elective
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	summer
			30		15			No. of ECTS credits	4
Entry requirements	Basics of Photonics								
Course objectives	Acquainting students with the optical phenomena in semiconductors, glasses and photonics structures. Teaching the rules of the use of quantum wells in semiconductor emitters and detectors of radiation. Introduction to selected photonics structures and phenomena occurring in them. Teaching the measurement methods of properties of both photonic components and layouts. Presentation of modern trends in development of photonics. Introduction to selected non-linear optical elements.								
Course content	The basics of the optical phenomena in semiconductors, glasses, photonic structures and optical waveguides. Low dimensional structures - the principle of the use of quantum wells in semiconductor emitters of radiation. Basics of wave optics. Periodic optical structures - a construction of selected elements, The construction and selected applications of the matrix of sources and detectors with low-dimensional structures. The phenomenon of optical bistability. Spectroscopy of optical materials, absorption - luminescence. Nonlinear phenomena.								
Teaching methods	laboratory classes, specialization workshop, projects' reports								
Assessment method	tests; laboratory classes – evaluation of reports, verification of preparation for classes, presentation and discussion								
Symbol of learning outcome	Learning outcomes <i>Student who has completed the module:</i>							Reference to the learning outcomes for the field of study	
L01	has detailed knowledge of photonics								
L02	explains optical phenomena occurring in semiconductors and photonic structures								
L03	measures and analyzes the properties of semiconductor emitters of radiation								
L04	measures and analyzes the spectroscopic properties of materials used in photonics								
L05									
Symbol of learning outcome	Methods of assessing the learning outcomes							Type of tuition during which the outcome is assessed	

LO1	evaluation of the report on exercise, a discussion during the laboratory classes and specialization workshop	LC, SW	
LO2	evaluation of the report on exercise, a discussion during the laboratory classes and specialization workshop	LC, SW	
LO3	evaluation of the report on exercise, a discussion during the laboratory classes and specialization workshop	LC, SW	
LO4	evaluation of the report on exercise, a discussion during the laboratory classes and specialization workshop	LC, SW	
Student workload (in hours)		No. of hours	
Calculation	laboratory classes and workshop sessions attendance	45	
	preparation for laboratory classes and workshop sessions	15	
	working on projects, reports, etc.	10	
	participation in student-teacher sessions related to the classes/seminar/project	5	
	preparation for and participation in exams/tests	5	
		TOTAL:	80
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		50	2
Student workload – practical activities		80	3
Basic references	1. Kasap, Safa, Cambridge illustrated handbook of optoelectronics and photonics, Cambridge : Cambridge University Press, 2012. 2. M. Jamal Deen, P.K. Basu, Silicon photonics : fundamentals and devices, Chichester : John Wiley a. Sons, 2012.		
Supplementary references	1. Nikolai V. Tkachenk, Optical Spectroscopy, Elsevier, 2006.		
Organisational unit conducting the course	Department of Photonics, Electronics and Lighting Technology	Date of issuing the programme	
Author of the programme	Marcin Kochanowicz, PhD, DSc	26.01.2020	

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar