COURSE DESCRIPTION CARD

Faculty of Electrical Engineering									
Field of study	**Electrical and Electronic Engineering**							**Degree level and programme type**	**bachelor's degree, full time programme**
Specialization/ diploma path	**-**							**Study profile**	**-**
Course name	**Basics of photonics**							**Course code**	**IS-FEE-10001W**
								Course type	**elective**
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	**winter**
			30					**No. of ECTS credits**	**4**
Entry requirements	**-**								
Course objectives	Acquainting students with the main theme of photonics research (metrology devices and systems, sensors and photonic technologies). Identification of areas of photonics applications including respectively: optical fiber technology, laser technology, optical and fiber-optic telecommunication, semiconductor optoelectronics, integrated optoelectronics. Overview of selected problems of photonics: geometrical and wave optics, propagation of the electromagnetic wave in free space and the dispersion medium. Acquainted with the elements of nonlinear optics. Teaching the principles of operation and measurement of the elements of photonic systems: cylindrical and planar optical fibers, elements of optical fiber network, optical modulators. Acquainted with the materials and microelectronic technologies. Overview of contemporary directions in the field of photonics.								
Course content	The basics of the optical phenomena theory in semiconductors and optical waveguides. Low dimensional structures - the principle of the use of quantum wells in semiconductor emitters of radiation. Engineering of the photonic bang gap - super-network. Interfaces in photonic structures. Periodic optical structures - a construction of selected elements, methods of analysis and development perspectives. The construction and selected applications of the matrix of sources and detectors with low-dimensional structures. The phenomenon of optical bistability. Bistable photonic components. Optical logic elements. Nonlinear phenomena.								
Teaching methods	Laboratory class								
Assessment method	**evaluation of reports, tests of preparation for laboratory exercise.**								
Symbol of learning outcome	**Learning outcomes (Student ...)**								**Reference to the learning outcomes for the field of study**
LO1	has detailed knowledge of photonics;								
LO2	explains optical phenomena occurring in semiconductors;								
LO3	discusses the construction of photonic structures;								
LO4	characterizes the construction of photonic structures;								
LO5	measures and analyzes the properties of semiconductor radiation emitters;								

LO6	**measures and analyzes the spectroscopic properties of materials used in photonics;**	
LO7	**represents contemporary trends photonics, finding their usefulness in technic;**	
LO8	**understands the role of photonics in modern knowledge-based society.**	
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;	
LO2	evaluation of the report on exercise, a discussion during the laboratory classes;	
LO3	evaluation of the report on exercise, a discussion during the laboratory classes;	
LO4	evaluation of the report on exercise, a discussion during the laboratory classes;	
LO5	evaluation of the report on exercise, a discussion during the laboratory classes;	
LO6	evaluation of the report on exercise, a discussion during the laboratory classes	
LO7	discussion on the report of the exercise, observation of the work in the classroom	
LO8	discussion on the report of the exercise, observation of the work in the classroom.	
Student workload (in hours)		**No. of hours**
Calculation	**preparation for the laboratory**	**30**
	description of laboratory reports or doing homework assignments (homework)	**20**
	participation in lab sessions / student-teacher consultations	**30**
	prepare to pass the module	**20**
	TOTAL:	**100**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**30**	**1**
Student workload – practical activities	**100**	**4**

Basic references	**1. Safa K.: Cambridge illustrated handbook of optoelectronics and photonics. Cambridge University Press, Cambridge, 2012.** **2. Jamal M. D., Basu P. K.: Silicon photonics : fundamentals and devices. John Wiley & Sons, New York, 2012.**	
Supplementary references		
Organisational unit conducting the course	**Department of Photonics, Electronics and Light Technique**	**Date of issuing the programme**
Author of the programme	**Marcin Kochanowicz, Jacek Żmojda, prof. Andrzej Zając,**	**20-02-2020**

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