COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Electrical and Electronics Engineering</td><td>Degree level and programme type</td><td>Master's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Photonics</td><td>Course code</td><td>IS-FEE-20008S</td></tr>
<tr><td>Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>summer</td></tr>
<tr><td></td><td></td><td>30</td><td></td><td>15</td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Basics of Photonics</td></tr>
<tr><td>Course objectives</td><td colspan="9">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.</td></tr>
<tr><td>Course content</td><td colspan="9">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.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">laboratory classes, specialization workshop, projects' reports</td></tr>
<tr><td>Assessment method</td><td colspan="9">tests; laboratory classes – evaluation of reports, verification of preparation for classes, presentation and discussion</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes
Student who has completed the module:</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">has detailed knowledge of photonics</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">explains optical phenomena occurring in semiconductors and photonic structures</td><td colspan="2"></td></tr>
<tr><td>LO3</td><td colspan="7">measures and analyzes the properties of semiconductor emitters of radiation</td><td colspan="2"></td></tr>
<tr><td>LO4</td><td colspan="7">measures and analyzes the spectroscopic properties of materials used in photonics</td><td colspan="2"></td></tr>
<tr><td>LO5</td><td colspan="7"></td><td colspan="2"></td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Methods of assessing the learning outcomes</td><td colspan="2">Type of tuition during which the outcome is assessed</td></tr>
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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