COURSE DESCRIPTION CARD

Course name	**Free space optics transmission systems**				
Course type	**optional**	**Course code**	**SDPB0009**	**ECTS credits**	**1**
Forms and number of hours	**lecture: 10 h**	**Scientific discipline**	**automation, electronics and electrical mechanical engineering**		
Course objectives	Propagation of optical signal in the atmosphere, maximum range in the various atmospheric conditions, inter-satellite optical link, quality parameters, inter-satellite optical link quality parameters. Long distance optical communication: detection and tracking. VLC systems. Comparison of radio frequency and optical communication systems. Short range optical communication: types, laser sources and receivers, noise.				
Course content	1. Propagation of optical signals in the atmosphere, the maximum range of the link in various weather conditions, optical power budget, 2. Optical inter-satellite links. Long distance optical communication: detection and tracking. 3. Comparison of radio frequency and optical transmission parameters. 4. Short-range optical communication: types and structures of links, sources and receivers, noise sources 5. Trends in the development of optical transmission systems in open space				
Teaching methods	Lecture with discussion with the students. Students' own studies based on the indicated literature sources				
Assessment method	Lecture: assessment				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	PhD student analyzes the propagation of an electromagnetic wave in the atmosphere	SD_W1	assessment
LO2	PhD student lists and describes the operation of satellite optical links	SD_W1	assessment
LO3	PhD student describes the parameters of optical links in the free space in comparison to radio frequency and optical fiber links	SD_W1	assessment
LO4	PhD student indicates trends in the development of optical transmission systems in free space	SD_W2	assessment

Student workload (in hours)	
Lecture	10
Consultations	1
The unassisted student work	10
Implementation of project tasks and preparation for and participation in exams/tests	5
Total	**26**
ECTS credits	**2**

Basic references	1. L. Dong, B. Samson, *Fiber Lasers Basics, Technology, and Applications*, CRC Press 2016. 2. Valerii (Vartan) Ter-Mikirtychev, *Fundamentals of Fiber Lasers and Fiber Amplifiers,* Springer 2014
Supplementary references	1. Didactic materials in the form of scientific articles provided by the teacher
Author of the programme	Marcin Kochanowicz, PhD, DSc, assoc. prof.
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