

COURSE DESCRIPTION CARD

Course name	Laser measurement systems				
Course type	optional	Course code	SDPB0003	ECTS credits	2
Forms and number of hours	seminar: 20 h	Scientific discipline	automation, electronics and electrical engineering, biomedical engineering, mechanical engineering		
Course objectives	Introduction to the laser measurement systems using for advanced applications: 3D laser scanner, surface analyzer, chemical properties analyzer, low-level laser bio-stimulation and interferometry. Discussion of the optical and energy parameters of the laser radiation in relation to the metrology of material properties and spatial analysis of primitive objects.				
Course content	<ol style="list-style-type: none"> 1. Laser generation – phase and amplitude conditions, parameters of laser beam. 2. Triangulation methods in recognition of primitive 3D objects 3. Time-of- Flight technique for laser detection and ranging (LIDAR). 4. Laser interferometry. 5. Low-level laser therapy (LLLT) in biomedical applications 6. Laser induced breakdown spectroscopy (LIBS) 				
Teaching methods	Seminar with interactive discussion, case-study – based on scientific papers, short presentation of selected applications				
Assessment method	Discussion, oral presentation				
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	Knows and understands in detail issues related to the use of laser radiation in measuring systems.		SD_W1	Discussion, oral presentation	
LO2	Knows and understands the methodology of spectral measurements and analysis of material properties.		SD_W3	Discussion, oral presentation	
LO3	Based on innovative laser systems can plan/design a measurement method.		SD_U1	Discussion, oral presentation	
LO4	Can effectively analyze the available laser measurement technologies and propose their applications.		SD_U2	Discussion, oral presentation	

Student workload (in hours)	
Seminar	20
Consultations	2
The unassisted student work	15
Implementation of project tasks and preparation for and participation in exams/tests	10
Total	47
ECTS credits	2

Basic references	1. B. Ziętek, Lasery, UMK Toruń, 2009 2. A. Zając, Lasery włóknowe – Analiza i wymogi konstrukcyjne, WAT 2007 3. P. Fiedor, Zarys klinicznych zastosowań laserów, ANKAR 1995 4. W. Demtroder, Spektroskopia laserowa, PWN, 1997
Supplementary references	1. Y. Hu, Theory and Technology of Laser Imaging Based Target Detection, Springer, 2017 2. K. Iizuka, Elements of Photonics, Willey, 2002
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Date of issuing the programme	10.05.2021