COURSE DESCRIPTION CARD

Course name	**New materials for sensor applications**				
Course type	**fakultatywny**	**Course code**	**----**	**ECTS credits**	**1**
Forms and number of hours	**lecture: 10 h**	**Scientific discipline**	**automation, electronics and electrical engineering, biomedical engineering, mechanical engineering**		
Course objectives	Defining the areas of application of modern functional materials. Presentation of issues related to modern methods of manufacturing and modifying the properties of materials. Low-dimensional structures. Fabrication of photonic and electronic sensor structures. Technologies and measurement methods - examples of sensor structures.				
Course content	1. Definition of functional materials. 2. Modern methods of manufacturing and characterization of materials. 3. Constructions of MEMS and MOEMS systems. 4. Nanometric materials and structures. 5. Production and characterization of photonic and electronic materials. 6. Optical and electronic detection methods used in sensor structures. 7. Examples of sensor structures.				
Teaching methods	The lecture with a discussion with the audience and short presentations from the audience.				
Assessment method	Exam				
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	defines the properties of functional materials in relation to the atomic structure and structure		SD_W1		Exam
LO2	discusses the methods of manufacturing and characterizing functional materials		SD_W3		Exam
LO3	presents the detection methods used in sensor structures		SD_W1		Exam
LO4	discusses modern sensor constructions		SD_W1		Exam

Student workload (in hours)	
Lecture	10
Consultations	1
The unassisted student work	11
Implementation of project tasks and preparation for and participation in exams/tests	5
Total	**27**
ECTS credits	**1**

Basic references	1. S. Bhattacharya, A.K. Agarwal, N. Chanda, A. Pandey, A.K. Sen, Environmental, chemical and medical sensors, Springer 2018 2. K. Żelachowska Nanotechnologia w praktyce, PWN Warszawa 2016 3. K. Kurzydłowski, M. Lewandowska, Nanomateriały inżynierskie konstrukcyjne i funkcjonalne. PWN, Warszawa 2010 4. S.-B. Choi, J. Kim, Smart materials actuators: recent advances in characterization and applications, Nova Science Pub Inc 2015
Supplementary references	1. G. Liu, B. Jacquier, Spectroscopic properties of rare earth in optical materials, Springer 2004 2. S. Bhattacharya, A. Kumar Agarwal, O. Prakash, S. Singh, Sensors for Automotive and Aerospace Applications Springer Singapore 2019 3. M. Schwartz, Smart Materials, CRC Press 2008 4. N. Koshida, Device applications of silicon nanocrystals and nanostructures, Springer 2009 5. E. Brzeziańska-Lasota, Biomedycyna – wybrane aspekty, Continuo 2020
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