DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: dr hab. inż. Rafał Walczak, prof. uczelni
DEPARTMENT: Faculty of Microsystem Electronics and Photonics W12
SCIENTIFIC DISCIPLINE: Automation, Electronics and Electrical Engineering

COURSE CARD

Course name in Polish: Mikrosystemy i mikroinżynieria
Course name in English: Microsystems and microengineering
Course language ~~Polish /~~ **English***
The course is intended for all PhD students: YES / NO
1) BASIC COURSE
2) SPECIALIST COURSE
3) SEMINAR
4) HUMANISTIC COURSE
5) LANGUAGE

Subject code: AEQ100234W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30			
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes
Number of ECTS points	**0**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1.   Knowledge about state-of-the-art and new trends of modern electronics and microsystems technique.
2. Ability to improve competences in interdisciplinary fields of science and research.

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COURSE OBJECTIVES
C1 Familiarizing with the newest technical and technological trends related to microsystems and microengineering.
C2 Analyse and discussion about actual and developing fields of application of microsystems in research and industry.

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PROGRAM CONTENTS

Form of classes – lecture (Lec)		Number of hours
Lec1	Introduction to microsystems (MEMS)	2
Lec2	Microengineering in mems technique	2
Lec3	3D printing for MEMS	2
Lec4	4D printing	2
Lec5	Multilayer lamination	2
Lec6	Printed electronics	2
Lec7	Microsystem in medicine	2
Lec8	Analytical microsystems	2
Lec9	Automotive microsystems	2
Lec10	Optical microsystems (MOEMS)	2
Lec11	Micromechatronics	2
Lec12	MEMS for energy harvesting	2
Lec13	MEMS for IoT and Industry 4.0	2
Lec14	Vacuum nanoelectronics	2
Lec15	Review of worldwide market of microsystems	2
	Total hours:	**30**

Form of classes – foreign language course (Lng)		Number of hours
Lng1		
	Total hours:	

Form of classes – seminar (Sem)		Number of hours
Sem1		
	Total hours:	

Form of classes – mixed forms (mix)		Number of hours
Mix1		
	Total hours	

TEACHING TOOLS USED
N1.Lecture N2.Multimedia presentation N3.Probematic discussion

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome

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Knowledge	P8U_W, P8S_WG	Final written exam.
Skills	P8U_U, P8S_UW P8S_UK,	Assessment of ability to perform discussion on selected subject related to the course.
Social competence	P8U_K, P8S_KK, P8S_KO, P8S_KR	Cooperation with the group during discussions.

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] R. Walczak, Laboratoria chipowe z detekcją optyczną, konstrukcja, technologia i przykłady wykorzystania, Oficyna Wydawnicza PWr, 2014 [2] [3] [4] **SECONDARY LITERATURE:** [1] Scientific journals in the field: Journal of Micromechanics and Microengineering, Sensors and Actuators A/B, LabChip Journal, Micromachines, BioChip Journal etc [2] [3]
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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