

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**SUPERVISOR DECLARING/CONDUCTING COURSE:** Andrzej Szczurek  
**DEPARTMENT:** Faculty of Environmental Engineering W7  
**SCIENTIFIC DISCIPLINE:** Environmental Engineering, Mining and Energy

**COURSE CARD**

**Course name in Polish:** Czujniki wielkości fizycznych i chemicznych

**Course name in English:** Sensors of physical and chemical quantities

**Course language Polish / English\***

**University-wide general course type\*:**

**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: IGQ100027W**

\* 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	<b>0</b>			

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

Basic knowledge in mathematics, physics and chemistry.

**COURSE OBJECTIVES**

C1 The course provides information about the principles of operation of sensors of various physical and chemical quantities, sensor systems and their applications.

**PROGRAM CONTENTS**

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<b>Form of classes – lecture (Lec)</b>		Number of hours
Lec 1	Introduction – definitions and fundamentals	2
Lec 2	Principle of sensor operation	2
Lec 3	Temperature sensors	2
Lec 4	Pressure sensors	2
Lec 5	Sensors of level	2
Lec 6	Velocity and flow sensors	2
Lec 7	Vibration sensors	2
Lec 8	Sound sensors	2
Lec 9	Humidity sensors	2
Lec 10 Lec 11	Sensors of chemical composition of liquid	4
Lec 12 Lec 13	Sensors of chemical composition of gases	4
Lec 14, Lec 15	Measurement systems based on sensors	4
Total hours:		<b>30</b>

<b>TEACHING TOOLS USED</b>
N1. Information lecture N2. Subject lecture.

<b>ACHIEVED SUBJECT LEARNING OUTCOMES</b>		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	PS8_WG	<ul style="list-style-type: none"> <li>- Student has advanced knowledge of directional subjects in a given discipline or in interdisciplinary subjects;</li> <li>- has knowledge at an advanced level of discipline and subject matter relevant to the field of research carried out, including the most recent research findings and scientific achievements</li> </ul>
Skills	PS8_UW	Student has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained

<b>PRIMARY AND SECONDARY LITERATURE</b>
<p><b><u>PRIMARY LITERATURE:</u></b></p> <p>[1] W. Nawrocki: Sensory i systemy pomiarowe, Wydawnictwo Politechniki Poznańskiej, 2006            [2] J. Piotrowski: Pomiary. Czujniki i metody pomiarowe wybranych wielkości fizycznych i składu chemicznego, WNT, 2009</p>

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<b>SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)</b>
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<b>Andrzej Szczurek (andrzej.szczurek@pwr.edu.pl)</b>
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