GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Sensing Materials, PG_00068251		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Radosław Pomećko	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	4.0	26.0	75

Subject objectives

Getting to know the different methods of determination the level and kinds of analytes using electrochemical sensors. Understanding the mechanisms that describe the operation of those sensors. The acquisition of practical abillity in the construction and operation of chemical sensors. To acquaint students with the miniaturization of sensors and new materials to make them. Design of new technical solutions relating to the broad range of chemical sensors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W10] knows and understands, to an advanced extent, the parameters, functions, and methods of analysis, design, and optimization of electronic circuits and systems, the definitions of error and measurement uncertainty, measurement methods, including time, frequency, and phase measurements, the properties of converters, and methods of digital signal processing, as well as the basic processes occurring in the life cycle of technical devices, objects, and systems, and methods of supporting processes and functions, specific to the field of study	The student is able to properly analyze assigned tasks and skillfully solve them using the available tools.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U52] can determine properties of materials and biomaterials used in biomedical engineering	Student has the knowledge to determine the key properties of applied sensor materials	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture
Classification of chemical sensors. Basics of molecular recognition.

Prerequisites and co-requisites

Basics of physical chemistry and electrochemistry

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical tasks</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Exam</td><td>55.0%</td><td>50.0%</td></tr>
<tr><td>Project</td><td>60.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Z. Brzóska, W. Wróblewski: Sensory chemiczne, wyd. PW 1999

2. J. Wang: Analytical electrochemistry, J. Wiley&Sons, New Jersey 2006

3. Praca zbiorowa: Elektroanaliza w ochronie środowiska natur, pod red. R. Kalvody (tł. K. Sykut)

4. Materiały wykładowe</td></tr>
<tr><td>Supplementary literature</td><td>1. M. J. Sienko, R.A. Plane: Chemia, podstawy i własności, WN-T Warszawa 1980, 1-sze wyd. polskie
2. A. Kisza: Elektrochemia II, Elektrodyka, WN-T W-wa 2001
3. A. Sharma, K.R.Rogers: Biosensors, artykuł przeglądowy w Meas. Sci.
Techno. 461-472 (1994)

4. Marek Blicharski, Inżynieria materiałowa, Wydawnictwo Naukowe PWN, WNT, Warszawa 2019 (wydanie IV)

5.Jan Pielichowski, Andrzej Puszyński, Chemia polimerów, Fosze, Rzeszów 2015</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Computational methods used in potentiometry

2. Knowledge of the structure and properties of ISE

3. Issues optimalization

4. Review of biosensors for use in biomedical engineering

5. Construction and operation of optical sensors</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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