

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

SUPERVISOR DECLARING/CONDUCTING COURSE: Halina Podbielska
DEPARTMENT: Faculty of Fundamental Problems of Technology
SCIENTIFIC DISCIPLINE: Biomedical Engineering

COURSE CARD

Course name in Polish: Najnowsze kierunki badań w Inżynierii Biomedycznej
Course name in English: The new research trends in Biomedical Engineering

Course language: ENGLISH

University-wide general course type*:

The course is intended for all PhD students: YES /NO

SPECIALISTIC COURSE

Subject code: IBQ100199W

* 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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. MSc degree in Technical Sciences, Medicine, Biology, Chemistry, Mathematics, Physics
2. English language in the upper intermediate level

COURSE OBJECTIVES

- C1 Getting acquainted with chosen aspects of contemporary Biomedical Engineering.
- C2 Getting knowledge about fundamentals of immunology, personalized medicine, bioinformatics and medical informatics, e-medicine, biophotonics, nanobiomedicine.
- C3 Gaining skills in obtaining, analysis and synthesis of information of chosen methods of Biomedical Engineering and technical solutions.

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PROGRAM CONTENTS

Content of classes		Number of hours
1.	Career opportunities in contemporary Biomedical Engineering – practical examples in e-medicine (Halina Podbielska, invited speaker Magdalena Głabińska, specialist in digital health and telemedicine)	2
2.	Personalized prediction, prevention and medical therapy (Halina Podbielska, invited lecturer Prof. Dr. Olga Golubnitschaja, Medical Faculty of the Friedrich-Wilhelms University in Bonn, Germany)	2
3.	Indirect methods of imaging the microstructural properties of the cornea ((D. Robert Iskander, invited lecturer Dr. Alejandra Consejo, University of Zaragoza)	2
4.	New aspects of optical coherence tomography(D. Robert Iskander, invited lecturer Dr. David Alonso-Caneiro, Queensland University of Technology)	2
5.	AlphaFold: a solution to a 50-year-old grand challenge in biology (Małgorzata Kotulska, invited lecturer Prof. Dr. J-C Nebel, Kingston University, UK)	2
6.	New trends in Bioinformatics (Małgorzata Kotulska, invited speaker t.b.a)	2
7.	Inborn privileges – Fundamentals of Immunology (Aleksandra Kaczorowska, invited lecturer dr hab. Wojciech Kałas, Professor of the Institute of Immunology and Experimental Therapy, Polish Academy of Sciences)	2
8.	Acquired and granted privileges – Advances in Immunology (Aleksandra Kaczorowska, invited lecturer dr hab. Wojciech Kałas, Professor of the Institute of Immunology and Experimental Therapy, Polish Academy of Sciences)	2
9.	Stent biofunctionalization in interventional cardiology (Marta Kopaczyńska, invited lecturer dr hab. Magdalena Wawrzyńska, Wrocław Medical University)	2
10.	Neural interface technologies (Tomasz Walski, invited speaker t.b.a.)	2
11.	Spectroscopic imaging for medical diagnostics (Marlena Gąsior-Głogowska, invited speaker t.b.a.)	2
12.	Investigating the human brain with magnetoencephalography (Cezary Sielużycki, invited lecturer Prof. Dr. Reinhard König, Research Group Comparative Neuroscience, Leibniz Institute for Neurobiology, Magdeburg, Germany)	2
13.	New trends in biomedical optical imaging techniques (Igor Buzalewicz, invited speaker t.b.a.)	2
14.	Theranostics as an emerging field of nanomedicine (Joanna Bauer, invited speaker t.b.a.)	2
15.	IR imaging as a tool of novel patient driven medicine (Joanna Bauer, invited speaker t.b.a.)	2
Total hours		30

TEACHING TOOLS USED

- N1. Online courses, communication platforms t.b.a.
- N2. Multimedia presentations
- N3. Remote quizzes, tests and elaborations
- N4. Activating methods of group works, flipped class method

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ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Range and depth – complexity of cognitive perspective and relationships	P8S_WG	Quiz online
Universal	P8U_U	Essay online
Evaluations – critical approach	P8S_KK	Group work – study on a given topic

PRIMARY AND SECONDARY LITERATURE
<p><u>PRIMARY LITERATURE:</u> Scientific publication from PubMed database, or published in highly ranked journals, as e.g.. Scientific Reports, EPMA Journal, Nature Biomedical Engineering, Investigative Ophthalmology & Visual Science, ACS Biomaterials-Science & Engineering, Biomedical Optics Express, Acta Ophthalmologica, International Journal of Molecular Sciences</p>
<p><u>SECONDARY LITERATURE:</u> Patents databases, others as recommended by the Lecturer</p>
<p>SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)</p>
<p>Halina Podbielska halina.podbielska@pwr.edu.pl</p>