

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

**SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE:** Grażyna Gryglewicz  
**DEPARTMENT:** Chemical Department  
**SCIENTIFIC DISCIPLINE:** Chemical Engineering

**COURSE CARD**

**Course name in Polish:** Nowe tworzywa i materiały  
**Course name in English:** Innovative and advanced materials  
**Course language Polish**

**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: CIQ100093W**

\* 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 of chemistry and materials science.

**COURSE OBJECTIVES**

- C1. Introduction to polymer and carbon materials and their composites, and metal composite coatings.  
C2. Familiarizing the students with new trends in electroplating, chemistry of natural oils and future perspectives for application of helium isotopes.  
C3. Knowledge transfer of synthetic lubricants.  
C4. Knowledge transfer of polymer membrane, application of polymers in medicine and diagnostic.  
C5. Familiarizing the students with nanostructured carbon materials.

**PROGRAM CONTENTS**

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<b>Form of classes – lecture (Lec)</b>		Number of hours
Lec1	Non-ferrous metal alloys	2
Lec2	Glassy metals	2
Lec3	New trends in electroplating	2
Lec4	Composite coatings	2
Lec5	Stimuli responsive polymers	2
Lec6	Innovative polymer membranes	2
Lec7	Polymers in medicine	2
Lec8	Production and application of helium	2
Lec9	Synthetic lubricant oils	2
Lec10	New trends in oleochemistry	2
Lec11	Carbon fibers and composites	2
Lec12	Nanostructured carbon materials: fullerenes	2
Lec13	Nanostructured carbon materials: carbon nanofibers and carbon nanotubes	2
Lec14	Nanostructured carbon materials: graphenes	2
Lec15	Exam	2
<b>Total hours:</b>		<b>30</b>

<b>TEACHING TOOLS USED</b>
N1. Lecture with multimedia presentation N2. Discussion with students

<b>ACHIEVED SUBJECT LEARNING OUTCOMES</b>		
Type of learning outcome	Kod składowika opisu efektu uczenia się	Assessment of learning outcome
Knowledge	PSU_W	- student competently quotes other authors in articles published and prepared for publication in peer-reviewed scientific journals, per-reviewed materials from international scientific conferences, and in book editions preceding
Knowledge	P8S_WG	- has an advanced knowledge fundamental to a field relevant to his/her research, including the most advanced methods of research and verification of results achieved
Skills	P8U_U	- is able to classify scientific publishers, including scientific journals, and scientific achievements according to accepted rules for: - journals included in international databases Scopus and Web of Science - impact factor (if), - quoting, - Hirsch index, - i 10-indicator
Skills	P8S_UW	- student has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained
Skills	P8S_UW	- is able to creatively interpret the results obtained and to search for their application

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Social competence	P8S_K	student knows which activities lead to the creation of achievements in violation of law, including copyright, or good practices in science and what constitutes grounds for resuming proceedings for the conferment of the academic degree of <i>doktor</i> and <i>doktor habilitowany</i> or the title of <i>profesor</i>
Social competence	P8S_KK	understands and accepts the functions of the doctoral student care in the process of research planning, implementation and analysis of research results

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

- [1] H. Galina, Fizykochemia polimerów, WPRz, 2000
- [2] Dobrzański L., Materiały inżynierskie i projektowanie materiałów, WNT, Warszawa, 2006.
- [3] T.D.Burchell (Ed.), Carbon Materials for Advanced Technologies, Pergamon, 1999.
- [4] Y. Gogotsi (Ed.), Carbon Nanomaterials, CRC, Taylor and Francis Group, 2006.
- [5] Rudnick L.R., Shubkin R.L., Synthetic Lubricants and High-Performance Functional Fluids, Marcel Dekker, New York, 1999.

**SECONDARY LITERATURE:**

- [1] Aktualne publikacje w czasopismach naukowych
- [2] Ashby M.F., Shercliff H., Cebon D, Materials: Engineering, Science, Processing and Design, third ed., Butterworth-Heinamann, Amsterdam, 2013.
- [3] H. Marsh, F. Rodriquez-Reinoso, Activated Carbon, Elsevier, Amsterdam, 2006.
- [4] N. Hilal, Membrane Fabrication, Elsevier, 2018.

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

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