

Cracow University of Technology

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies
in the academic year 2022/2023

Information on the course

Name of the course in Polish	Materiały funkcjonalne
Name of the course in English	Functional materials
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Mandatory / Choosable
Field of education	Engineering and technology
Discipline of education	Materials engineering
Person responsible for the course Contact	Bożena Tylińczak, <i>doctor habilitatus</i> , prof. of CUT bozena.tylińczak@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical classes	Laboratory	Computer Lab	Project Class	Seminar
2, 3, 4, 5	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Expanding knowledge about modern functional materials and their production methods
Objective 2	Expanding knowledge in the field of testing methods for advanced functional materials
Objective 3	Acquisition of the ability to select the appropriate functional materials for industrial applications

Learning outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUD DS	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	The doctoral student has extensive knowledge of the structure and properties of functional materials	E_W01, E_W02	Involvement in class activities, a paper
EUW2	The doctoral student is able to define the basic types of functional materials, knows the methods of their production and areas of their application	E_W01, E_W02	Involvement in class activities, a paper
OUTCOMES RELATED TO SKILLS			

EUU1	The doctoral student is able to choose the appropriate methods of testing functional materials	E_U01	A paper, a presentation
EUU2	The doctoral student is able to design and conduct a study of functional materials	E_U01	A paper, a presentation
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is able to refer to the methods of designing, obtaining and testing functional materials known in the literature and occurring in an issue related to the implementation of the doctoral dissertation, and is able to justify the methods they use or the lack of the need to use them.	E_K01, E_K03	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Criteria for the division and classification of materials (construction materials, functional materials - active and passive). Smart materials (including: photopolymers, alloys and shape memory polymers). Functional materials (including conductive materials, friction materials). Advanced composite and polymer materials for structural applications. Carbon materials (fibers, fullerenes, nanotubes). Nanopolymers and nanocomposites. Polymer materials and composites used in medicine and dentistry.	EUW1, EUW2, EUU1	7
W2	Physical and chemical properties of functional materials. Properties of mechanical functional materials.	EUW1, EUW2, EUU1	4
W3	Selected methods of laboratory tests and in situ tests, taking into account the specificity of materials.	EUW2, EUU2, EUK1	4

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH AN ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF AN ACADEMIC TEACHER	
Samodzielne studiowanie tematyki zajęć	8
Preparation of a paper, a report, a project, a presentation, a discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	None specified
2	

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	80% attendance in class. Presentation of a paper.
METHOD OF THE FINAL GRADE CALCULATION	
Weighted average grade for the presentation	

Additional information

None specified

The course reading list

1	Editor(s):Ashutosh Tiwari, Lokman Uzun „Advanced Functional Materials” 2015, Scrivener Publishing LLC
2	Leszek Dobrzański „Materiały inżynierskie i projektowanie materiałowe” 2006, WNT