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	Badania nieniszczące w inżynierii materiałowej
Name of the course in English	Non-destructive testing in materials engineering
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Choosable
Field of education	Engineering and technology
Discipline of education	Materials engineering
Person responsible for the course Contact	Janusz Jaglarz, *doctor habilitatus,* prof. of CUT jjaglarz@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	Introduction to the physical phenomena used in non-destructive testing
Objective 2	Introduction to image and point methods
Objective 3	Acquiring the ability to evaluate materials using a type of selected research

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 knows the basic research methods in materials science	E_W01, E_W02	Involvement in class activities, a presentation.
EUW2	The doctoral student knows the basic physical quantities determined with the use of modern research methods	E_W01	Involvement in class activities, a presentation

OUTCOMES RELATED TO SKILLS			
EUU1	The doctoral student is able to assess what measurement techniques are optimal for his materials	E_U01	Presentation, discussion.
EUU2	The doctoral student is able to interpret the results of non-destructive research methods	E_U01	Discussion.
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is able to use the literature relating to the description of matter with the use of modern research methods	E_K01, E_K03	Discussion.

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Electron microscopy methods: SEM, TEM, HRTEM, mass spectrometry, Mossbauer spectroscopy	EKW1	3
W2	X-ray analysis methods, powder and rotating crystal methods, XRD, XRR, EDS, XPS	EKW1	3
W3	Optical methods of examining surfaces and thin layers, optical spectroscopy in the field of UV-VIS-NIR, spectroscopic ellipsometry, optical profilometry, optical microscopy, confocal microscopy	EKW1	3
W4	Measurements of mechanical and thermodynamic quantities, AFM microscopy, DTA and DSC methods	EKW1, EKW2	3
W5	Methods of non-destructive testing complementary to the basic methods	EKW1, EKW2	3

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	
Independent study of the course contents	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	Knowledge of the physical phenomena used to measure the tested materials
2	Basic knowledge of physics

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	75% attendance in class.
2	Presentation of a paper.
METHOD OF THE FINAL GRADE CALCULATION	
Average grade for the presentation.	

Additional information

The thematic scope of the lecture, including the level of advancement in presentation and modelling, takes into account the initial preparation and knowledge of the subject by doctoral students.

The course reading list

1	Cygański, Metody spektroskopowe w chemii analitycznej, PWN Warszawa, 2022
2	W. Kubiński, Wybrane metody badania materiałów, PWN Warszawa 2016
3	M. Korzyński, Metodyka eksperymentu, PWN, PWN Warszawa 2017