Laboratory of experimental techniques

Educational subject description sheet

Basic information

Study programme Fizyka (Physics of Advanced Materials for Energy Processing) **Speciality** - **Organizational unit** Faculty of Physics and Astronomy **Study level** Second-cycle programme **Study form** Full-time **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** 04FENS.21S.03233.24 **Lecture languages** English **Course type** Obligatory **Block** specialty subjects

Subject coordinator	Marcin Ziółek
Lecturer	Marcin Ziółek

Period	**Activities and hours**	**Number of ECTS points**
Semester 1	• Laboratories: 30, Graded credit	2

Goals

Code	Goal
C1	The aim of the course is to familiarize students with several basic experimental techniques used for material investigation at Faculty of Physics, AMU.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	knows the principles of selected optical spectroscopic and microscopic methods.	FEN_K2_W02	Report
W2	knows the principles of selected resonance spectroscopic methods (e.g. NMR, EPR).	FEN_K2_W02	Report
W3	knows the principles of selected methods of layers deposition.	FEN_K2_W02	Report
W4	knows the principles of operation of basic electronic elements.	FEN_K2_W01	Report
Skills – Student:			
U1	is able to analyze the results of experiments and prepare a report.	FEN_K2_U03, FEN_K2_U04	Report

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Use (or preparation of) several solid state samples for the measurements using stationary absorption and optical microscopy.	W1, W3, U1	Laboratories
2.	Use (or preparation of) several solid state samples for the measurements using NMR and/or EPR spectroscopy.	W2, W3, U1	Laboratories
3.	Basic experiments with electronic elements.	W4, U1	Laboratories

Additional information

Activities	Teaching and learning methods and activities
Laboratories	Laboratory method, Research method (scientific inquiry)

Activities	Credit conditions
Laboratories	The final score (0-100%) consists of average of the scores of the reports from certain experiements. The final score for each student will be determined with an accuracy of 1%. Very good (bdb; 5,0): 90-100% of final score Good plus (db+; 4,5): 80-89% of final score Good (db; 4,0): 70-79% of final score Satisfactory plus (dst+; 3,5): 60-69% of final score Satisfactory (dst; 3,0): 50-59% of final score Unsatisfactory (ndst; 2,0): 0-49% of final score

Literature

Obligatory

1. Materials will be provided by the teachers.

Optional

1. Materials will be provided by the teachers.

Calculation of ECTS points

Activities	**Activity hours***
Laboratories	30
Report preparation	20
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
FEN_K2_U03	The graduate can formulate and test hypotheses related to simple research problems in physics (plan and perform observations, experiments, theoretical calculations or computer simulations and critically evaluate and discuss the results obtained)
FEN_K2_U04	The graduate can prepare, for various audiences, oral presentations and written studies presenting specialized topics in the field of physical sciences in a communicative way, as well as debate on such topics
FEN_K2_W01	The graduate knows and understands in-depth selected facts, phenomena, concepts and theories specific to physics and complex relationships between them (constituting advanced general knowledge in the field of physical sciences and representing both key and other selected issues in the field of advanced detailed knowledge in this discipline)
FEN_K2_W02	The graduate knows and understands in-depth selected research methods and tools as well as mathematical models used in physics