COURSE DESCRIPTION CARD - SYLLABUS

Course name
X-ray structural analysis

Course

Field of study
Materials Science

Year/Semester
2/4

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
dr inż. Maciej Tuliński

e-mail: maciej.tulinski@put.poznan.pl

tel. 61 665 3628

Wydział Inżynierii Materiałowej i Fizyki Technicznej

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of physics, chemistry, materials science. Reasoning skills, use of information obtained from libraries and the Internet. Understanding the need for learning and acquiring new knowledge.

Course objective

Knowing the theoretical basis and practical implementation of the X-ray diffraction and it's use in the study of different materials.

Course-related learning outcomes

Knowledge

1. A student who has completed the course can determine the structure of the material and link it to data obtained by X-ray diffraction

2. A student who has completed the course can explain the purpose and scope of testing various materials using X-ray diffraction, he is also prepared to carry out research

3. A student who has completed the course is able to identify the impact of technology and processes of the preparation of materials on the structure of materials

Skills

1. A student who has completed the course can benefit from the indicated sources of knowledge (basic bibliography) and gain knowledge from other sources

2. A student who has completed the course can formulate simple conclusions on the basis of the results of calculations, measurements and conducted observations

3. A student who has completed the course can independently perform measurements using X-ray diffraction

Social competences

1. A student who has completed the course can actively engage in solving the set of problems, independently develop and expand skills

2. A student who has completed the course can work within a team, carry out the duties conferred on the division of labor in a team, demonstrate responsibility for own work and responsibility for the results of teamwork

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

W01	written test	3	50.1%-70.0%
		4	70.1%-90.0%
		5	od 90.1%

U01 reports on exercises, oral or written answers

Assessment based on the oral or written answers concerning the content of each exercise performed during laboratory, report after each laboratory exercise. To pass laboratories all the exercises must be positively evaluated.

Programme content

During course, different issues will be presented, e.g. X-Ray: spectrum, properties, diffraction and scattering. Methods of investigation of crystalline structures: Laue method, rotating- and oscillating-crystal method, goniometer methods, Debye-Scherrer-Hull method, Seemann-Bohlin method, Preston method, Bragg-Brentano method, Guinier method, X-ray diffractometer (construction, detectors,

adjustment and calibration etc). Qualitative and quantitative analysis. Indexing. Precision measurement of lattice constants. Measurement of macrostresses and microstresses. Crystallite-size determination. Determination of the texture. Investigations of different materials by X-ray diffraction.

Teaching methods

1. Lecture: presentation illustrated with examples given on the board, problem solving.

2. Laboratory exercises: conducting experiments, solving tasks, discussion

Bibliography

Basic

1. D. Senczyk, Rentgenowskie metody i techniki badania struktury materiałów, Wydawnictwo Politechniki Poznańskiej, Poznań, 1984.

2. D. Senczyk, Laboratorium z rentgenografii strukturalnej, Wydawnictwo Politechniki Poznańskiej, Poznań, 1982

3. D. Senczyk, Dyfraktometria rentgenowska w badaniach stanów naprężenia i własności sprężystych materiałów polikrystalicznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 1995.

4. C. Kittel, Wstęp do fizyki ciała stałego, Wydawnictwo Naukowe PWN, Warszawa, 1999

5. N.W. Ashcroft, N.D. Mermin, Fizyka ciała stałego, Państwowe Wydawnictwo Naukowe, Warszawa, 1986

Additional

1. M. Jurczyk, Nanomateriały, Wydawnictwo Politechniki Poznańskiej, Poznań 2001

2. L. A. Dobrzański, Wprowadzenie do nauki o materiałach, Wydawnictwo Politechniki Śląskiej, Gliwice 2007

3. M. Blicharski, Wstęp do inżynierii materiałowej, Wydawnictwo Naukowo-Techniczne, 2009

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	32	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	18	0,5

[1] delete or add other activities as appropriate