COURSE DESCRIPTION CARD - SYLLABUS

Course name
Non-destructive investigation methods [S2ETI1>MBN]

Course

Field of study
Education in Technology and Informatics

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr Krzysztof Łapsa
krzysztof.lapsa@put.poznan.pl

dr hab. Tomasz Runka prof. PP
tomasz.runka@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of physics acquired during engineering studies. The ability to solve basic problems in physics based on the acquired knowledge, the ability to obtain information from the indicated sources. The student understands the necessity of expanding his competences, willingness to cooperate within the team.

Course objective

The aim of the course is to familiarize students with non-destructive investigation methods and measuring equipment used in industry, science and medicine.

Course-related learning outcomes

Knowledge:
1. she/he can explain the construction and operation of basic research and measurement devices k2_w06
2. she/he has knowledge of the basic methods and measurement techniques used in fields related to the field of study as well as development trends and the most important achievements in the field of

experimental techniques appropriate for the field of study - k2_w12

Skills:
1. she/he is able to assess the usefulness and possibility of using both routine and new experimental techniques in the field of study - k2_u13
2. she/he is able to assess the suitability and use of methods and tools for solving an engineering task characteristic for the studied field of study, as well as propose and design improvements to the technical solutions existing in the laboratory - k2_u20

Social competences:
1. she/he is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions made - k2_k02
2. she/he is aware of the social role of a technical university graduate, understands the need to formulate and convey to the society, in particular through the mass media, information and opinions on technological achievements and other aspects of engineering activities; makes efforts to provide such information and opinions in a commonly understandable manner, justifying different points of view - k2_k07

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Efect Form of evaluation Evaluation criteria
W06, W12 written tests (2 tests) 3 50.1%-70.0%
4 70.1%-90.0%
5 od 90.1%
U13, U20 written tests (2 tests) 3 50.1%-70.0%
4 70.1%-90.0%
5 od 90.1%
K02, K07 Assessment of the student"s competences acquired 3 50.1%-70.0%
during the lecture and exercises 4 70.1%-90.0%
5 od 90.1%

Programme content

The content of the lecture includes information on a number of investigation methods belonging to the group of non-destructive invetsigations, such as:
- ultrasonography
- thermography
- X-ray and neutron diffraction
- electron microscopy and spectroscopy
- scanning probe microscopy
- nuclear magnetic resonance
- electron spin resonance
- Raman and infrared absorption spectroscopy

Discussion of the physical basis of the above-mentioned methods.
Presentation of the construction and principles of operation of an exemplary apparatus for non-destructive investigations.
A broad discussion of examples of the use of the above methods in industry, research and medicine.

Teaching methods

Lecture: multimedia presentation illustrated with graphic examples, animations and films.

Bibliography

Basic
1. Andrzej Oleś, „Metody doświadczalne fizyki ciała stałego”, WNT, Warszawa 1998.
2. Zbigniew Kęcki, „Podstawy spektroskopii molekularnej”, Wydawnictwo Naukowe PWN, Warszawa 1992.

3. Antoni Śliwiński, „Ultradźwięki i ich zastosowania” Wydawnictwa Naukowo-Techniczne, Warszawa 2001.
4. Mirosław Drozdowski, „Spektroskopia ciała stałego”, Wydawnictwo Politechniki Poznańskiej, Poznań 1996.
5. Zygmunt Trzaska Durski, Hanna Trzaska Durska, „Podstawy krystalografii strukturalnej i rentgenowskiej”, Wydawnictwo Naukowe PWN, Warszawa 1994.
Additional
1. Charles Kittel, „Wstęp do fizyki ciała stałego”, Wydawnictwo Naukowe PWN, Warszawa 2012.
2. George Turell, Jacques Corset, „Raman microscopy – Developments and Applications”, Elsevier Academic Press, London 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	54	2,00
Classes requiring direct contact with the teacher	34	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00