



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technologia materiałów specjalnego przeznaczenia i nanomateriałów I (Technology of Special Purpose Materials and Nanomaterials I)

Course

Field of study

Technologia Chemiczna (Chemical Technology)

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge of chemistry, physics and mathematics. The ability to acquire information from literature, database, other carefully selected sources. Understanding the need for further education and improve their professional competences.



Course objective

Knowledge related to structure, method of preparation and unique properties of materials, biomaterials and nanomaterials. Knowledge related to the properties and latest technologies of advanced materials and nanomaterials

Course-related learning outcomes

Knowledge

1. Student has a well-established knowledge in the field of structure and applications of materials with special properties, biomaterials and nanomaterials. - [K_W09]
2. Student has a well-established knowledge in the field of technology of advanced materials, biomaterials, and nanomaterials. - [K_W13]
3. The student has knowledge in the field the latest technology of materials with special properties and nanomaterials. - [K_W09]

Skills

1. Student has a well-established knowledge in the field of technology solutions for advanced materials, biomaterials, and nanomaterials - [K_U12]
2. The student can explain the basic phenomena associated with technological processes of preparation of materials with special properties and also can explain phenomenon during their functioning - [K_U16]

Social competences

1. Student is conscious of limitation of his knowledge and understands the need of further continuous education. - [K_K01]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Stationary: A written colloquium consisting of 25 - 30 open and test questions, concerning the issues presented during the lecturer (the student obtains a pass by achieving at least 51% of the points).

Online: written colloquium consisting of 25 - 30 open and test questions conducted online in real time via eKursy platform.

Programme content

Definitions and types of materials with special properties. Special-purpose materials that are used in electronics, aerospace, printing, aerospace, medicine, classical and digital photography. Technology of materials used in photolithography. Resist polymer using photocrosslinking reactions, photodegradation and transformation of functional groups. Negative and positive photoresists. The application of polymer resists. Technology of integrated circuits and printed circuit boards. Self-organizing materials and their application in the preparation of thin films and liquid crystal displays. Technology of materials used in optoelectronics. Technologies of thermochromic and photochromic materials. Properties and application of thermochromic and photochromic materials. Electroluminescent and photoluminescent materials. Engineering intelligent materials. Intelligent gels. Technology of piezoelectric and pyroelectric materials. Types of piezoelectric materials. Application of piezoelectric and pyroelectric materials. The



technology of liquid crystal materials. The liquid crystal compounds in the electric field. Liquid crystal thermography. Application of liquid crystal materials. Biomedical materials. Types of biomedical materials. General information on biomedical materials. Basic information on nanomaterials – definition, types, properties, and applications. microcapsules and microspheres. Nanomaterials: types. Properties and application. Methodological basis of nanotechnology - the method of preparation, classification and characterization of nanostructures. Nanometals. Nanoceramics. Nanolayers. Nanofibers. Nanotubes. Nanocomposites. Powder nanomaterials. Methods for the preparation of nanomaterials. Preparation and types of nanostructures. Characterization of nanostructures.

Teaching methods

Lecture with multimedia presentation

Bibliography

Basic

1. Z. Floriańczyk, S. Penczek, Chemia Polimerów, t.III, Polimery naturalne i polimery o specjalnych właściwościach, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001
2. K. Kurzydłowski, M. Lewandowska, Nanomateriały inżynierskie konstrukcyjne i funkcjonalne, PWN, Warszawa 2010
3. A. Graja, Niskowymiarowe przewodniki organiczne, WNT, Warszawa 1989.
4. W. Królikowski, Polimerowe materiały specjalne., Wyd. Politechniki Szczecińskiej, 1909.

Additional

1. A.L. Dobrzański, Materiały inżynierskie i projektowanie materiałowe., WNT, Warszawa 2006
2. F. Wojtkun, J.P. Sołncew, Materiały specjalnego przeznaczenia, Wyd. Polit. Radomskiej, 2001.

Breakdown of average student's workload

	Hours	ECTS
Total workload	40	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for test) ¹	20	1,0

¹ delete or add other activities as appropriate