COURSE DESCRIPTION CARD - SYLLABUS

Course name
Composites [S1IMat1>Kom]

Course

Field of study
Materials Engineering

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of chemistry, physics, materials science, mechanics. Logical thinking skills, using information obtained from library and the Internet resorces.

Course objective

Getting the knowledge of the types, structure, production methods, application and operating conditions of composite materials.

Course-related learning outcomes

Knowledge:
1. students have knowledge of the basic types of composite materials and their components - [k_w03, k_w08, k_w10].
2. students have knowledge of the methods of composites manufacturing. - [k_w10, k_w12].
3. students have knowledge of the process of destruction and distribution of loading force in composite materials during theirs operation. - [k_w09].
4. students have knowledge of the use of composite materials and the principles of their selection for practical applications. - [k_w14].

Skills:
1. students can choose the right composite material for a given application. - [k_u01, k_u14, k_u16, k_u21].
2. students are able to choose the method of material formation, appropriate for a given application, as well as its composition and structure. - [k_u01, k_u03, k_u04, k_u05, k_u16, k_u21].
3. students are able to identify defects and destruction mechanisms of elements made of composites using microscopic methods. - [k_u03, k_u04, k_u10].

Social competences:
1. students are able to work in a group. - [k_k03].
2. students are aware of the importance of the proper selection of composite materials for specific applications and the importance of their choice for the environment, economic development and implementation of innovative solutions. - [k_k02].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: Credit based on the final test of the content presented in the lectures. You will pass when you get more than 50% of the points.
Laboratory: Assessment based on an oral or written answer concerning the content of each performed laboratory exercise, a report on each laboratory exercise according to the instructions of the laboratory teacher. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

Lectures:
1. Basic information, definitions, the importance of composites as structural and functional materials, directions of development of composite materials, examples of applications.
2. Fibers and their properties: types, structures, properties, production, comparison of particular types of fibers.
3. Matrixes in composites, their role, types and properties; polymer, metal and ceramic matrices.
4. Construction of composites, connection of the matrix with the reinforcing phase.
5. Mechanics of composite materials.
6. Technologies used for composites production.
7.Nanocomposites.
Laboratories:
1. Metal matrix composites.
2. Products with continuous fibers.
3. Polymer matrix composites.
4.Production of composites with a polymer matrix 1.
5. Production of composites with a polymer matrix 2.

Teaching methods

Lecture: multimedia presentation
Laboratory exercises: practical exercises, performing experiments, discussion, team work, case studies.

Bibliography

Basic
1. W. Królikowski, Polimerowe kompozyty konstrukcyjne, PWN Warszawa 2012.
2. K. Konopka, A. Miazga, Kompozyty ceramika-metal, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2017.
Additional
1. A. Boczkowska, Kompozyty, Wydawnictwo Politechniki Warszawskiej 2000.
2. J. Śleziona, Podstawy technologii kompozytów, Wydawnictwo Politechniki Śląskiej 1998.
3. H. Leda, Kompozyty polimerowe z włóknami ciągłymi, Wydawnictwo Politechniki Poznańskiej, 2000.
4. J. Nowacki, Spiekane metale i kompozyty z osnową metalową, WNT 2005.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00