



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Applications of intelligent materials

Course

Field of study

Mechatronics

Area of study (specialization)

-

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1 / 1

Profile of study

practical

Course offered in

polish

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

Lecturers

Responsible for the course/lecturer:

dr inż. D. Sędziak

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tel. 61 665 22 55

Responsible for the course/lecturer:

Wydział Inżynierii Mechanicznej

ul. Piotrowo 3, 60-965 Poznań

tel.: 061 665 23 62

Prerequisites

The student learned the basics of the basics of machine and automation construction, electronic components, and basic knowledge in the field of material science.

Course objective

Getting to know modern materials with controlled parameters and properties. Acquiring the ability to use intelligent materials in technology

Course-related learning outcomes

Knowledge

Student is able to characterize generally materials from the group of intelligent, has the basis to model



the selected device with such materials. Learns the applications and typical operating parameters of selected material groups

Skills

The student is able to identify applications and pre-design a device using intelligent materials. Can model the basic properties of devices with intelligent materials

Social competences

The student understands the need for lifelong learning; can inspire and organize the learning process of others. Is aware of the role of this type of material in the modern economy and its importance for society and the environment. Is able to set priorities for the implementation of a specific task.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Credit based on a written exam consisting of 3-4 general questions in the subject (<50% - ndst, 50-60%: dst 60-70% -dst +, 70-80: db, 80-90: db +, > 90% - very good)

Project: Assessment based on the evaluation of the implementation of the project topic tasks set for a group of students and assessment of the involvement of individuals in the implementation of part of the project.

Programme content

General characteristics and classification of controllable materials. Electro- (ER) and magnetorheological (MR) fluids: structure and theoretical models. Mathematical description of shear, compression and valve mode. Basics of designing devices with ER and MR liquids. Sample constructions. Magnetic circuit design. Electronic control systems for devices with ER and MR liquids. Piezo elements: construction, types, characteristics. Designs of mini drives with piezo elements. Shape memory materials: structure, characteristics and applications. Electro- and magnetostrictive elements. Electro- and magnetorheological elastomers. Other materials with variable properties. Materials with different luminescence sources, their characteristics and applications

Teaching methods

Lecture: multimedia presentation illustrated with examples

Laboratory: Topics implemented in groups in teaching positions

Bibliography

Basic

1. Milecki A., Ciecze elektro- i magnetoolegiczne oraz ich zastosowania w technice, Wydawnictwo Politechniki Poznańskiej, Poznań, 2010

Additional

1. Materiały dodatkowe, udostępniane przez producentów materiałów i urządzeń inteligentnych, np. Designing with MR Fluids (Lord), Designing with Piezoelectrics (Pi Ceramic)



Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	45	1,5

¹ delete or add other activities as appropriate