

DESCRIPTION OF THE COURSES

- Course code: ARR1202
- Course title: **FUNDAMENTALS OF MATERIALS ENGINEERING**
- Language of the lecturer: Polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	2		1		
<i>Number of hours/semester*</i>	30		15		
<i>Form of the course completion</i>	<i>written test</i>		<i>reports</i>		
ECTS credits	2		1		
Total Student's Workload	60		30		

- Level of the course (basic/advanced): basic
- Prerequisites: Knowledge of physics and chemistry concerning the structure of matter at high school level.
- Name, first name and degree of the lecturer/supervisor: Bolesław Mazurek, Prof. Dsc, Ph. D.
- Names, first names and degrees of the team's members:
 1. Ryszard Kacprzyk Dsc, Ph. D.
 2. Anna Kisiel Ph. D.
 3. Bożena Łowkis Ph. D.
 4. Adam Tymań Ph. D.
 5. Leszek Woźny Ph. D.
 6. Jan Ziaja Ph. D.
 7. Paweł Żyłka Ph. D.
 8. Zbigniew Zubel Ph. D.
- Year:.....II..... Semester:.....3.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course):

Understanding of physical phenomena which take place in materials, ability to join knowledge of structure and technological processes of materials manufacturing with their application to modern construction in electrical engineering.

- Form of the teaching (traditional/e-learning): traditional
- Course description:

Physicochemical basis of the structure of matter and relationships between the properties of materials and their molecular structure as well as micro- and macro-structure. Physical phenomena observed in materials due to electric, thermal and mechanical stresses. Basic properties characterizing conducting materials, semiconductors, dielectrics and magnetic and their functional dependencies. A short characteristic of the particular groups of materials and their applications. Methods of testing basic properties of electrochemical materials.

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Introduction. Scope of the course lecture. Requirements. Materials review, their classification and general properties.	2
2. Crystalline and amorphous bodies structure. Defects of crystalline structure and their influence on material properties.	2
3. Liquid crystals, properties, applications rules, future trends.	2
4. Electrical conductivity of metals. Modern cryogenic materials.	2
5. Resistance, contact, special and thermoelectric materials.	2
6. Application of thermoelectric phenomena: temperature measurement, cooling.	2
7. Semiconductive materials and their applications	2
8. Dielectrics structure. Electrical conductance, polarization, dielectric losses, dielectric strength.	2
9. Sensors – properties and applications.	2
10. Polymer structure. Insulating materials. Thermo-plastic and thermo-setting insulating materials	2
11. Piezo- and pyroelectric polymeric materials - properties and application.	2
12. Conductive polymers, electromagnetic screens, smart glasses, elastic displays, artificial muscles, accumulators.	2
13. Electroreological and magnetoreological materials – properties and applications.	2
14. Materials for optoelectronics.	2
15. Essence of magnetism. Characteristic parameters of magnetic materials.	2

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:

Particular acquaintance with materials as well as normalized and unconventional methods of testing their properties. Acquiring skill in using Polish standards and evaluating of materials. Examination of the basic electric, magnetic, chemical, mechanical and thermal properties of materials and their arrangements.

- Project – the contents:
- Basic literature:
 1. Celiński Z., Materiałoznawstwo elektrotechniczne, Oficyna Wyd. Politechniki Warszawskiej, W-wa, 1998
 2. Blicharski M., Wstęp do inżynierii materiałowej, Wyd. AGH, Kraków, 1998.
 3. Normy polskie
- Additional literature:
 1. Instrukcje do ćwiczeń
 2. Szarras S., Budowa ciała stałego, WNT, 1974.
 3. Kolbiński K., Słowikowski J., Materiałoznawstwo elektrotechniczne, WNY, 1988
- Conditions of the course acceptance/creditation:

* - depending on a system of studies