

DESCRIPTION OF THE COURSES

- Course code: ELR1216
- Course title: **FUNDAMENTALS OF MATERIALS ENGINEERING I**
- 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				
<i>Number of hours/semester*</i>	30				
<i>Form of the course completion</i>	<i>Written test</i>				
<i>ECTS credits</i>	5				
<i>Total Student's Workload</i>	150				

- 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: Ryszard Kacprzyk, dr hab. inż.
- Names, first names and degrees of the team's members:
 Anna Kisiel, dr inż.
 Bożena Łowkis, dr inż.
 Jerzy Rutkowski, dr inż.
 Adam Tymań, dr inż.
 Leszek Woźny, dr inż.
 Jan Ziaja, dr inż.
 Paweł Żyłka, dr inż.
- Year:.....I..... Semester:.....1.....
- 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. Requirements. Solid state structure.	2
2. Crystalline bodies structure.	2
3. Electrical conductivity of metals.	2
4. Alloys and their properties. Heat treatment of materials, materials properties. Binders and solders. Thermal bimetals.	2
5. Resistance, contact, special and thermoelectric materials.	2
6. Material corrosion and protection principles.	2
7. Semiconductivity. Intrinsic and doped semiconductors.	2
8. Dielectrics - properties. Gases, vacuum, liquids.	2
9. Inorganic insulating materials - ceramic, glass, mica materials.	2
10 . Polymers. Thermo-plastic and thermo-setting insulating materials.	2
11 . Modification of polymers properties. Polymers in electrical devices.	2
12. Selected methods for testing properties of conducting, dielectric and magnetic materials.	1
13. Magnetism materials, fundamental characteristics.	2
14. Nanotechnology.	1
14. Optoelectronic materials.. Memory elements for data processing.	2
15. Direction of materials science development. Colloquium.	2

- Classes – the contents:

- Seminars – the contents:

- Laboratory – the contents:

- Project – the contents:

- Basic literature:

1. Celiński Z., Materiałoznawstwo elektrotechniczne, Oficyna Wyd. Politechniki Warszawskiej, W-wa, 2005, 1998.
2. Blicharski M., Wstęp do inżynierii materiałowej, Wyd. AGH, Kraków, 2003.
3. Kolbiński K., Słowikowski J., Materiałoznawstwo elektrotechniczne, WNY, 1988
4. Podstawy inżynierii materiałowej. Laboratorium. Oficyna Wyd. Politechniki Wrocławskiej 2005.

- Additional literature:

- Conditions of the course acceptance/creditation: Successful test completion.

* - depending on a system of studies