

DESCRIPTION OF THE COURSES

- Course code: ELR1211
- Course title: Magnetic material 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> | 1 | | | | 1 |
| <i>Number of hours/semester*</i> | 15 | | | | 15 |
| <i>Form of the course completion</i> | <i>w r i t t e n test</i> | | | | <i>control work</i> |
| ECTS credits | | | | | |
| Total Student's Workload | | | | | |

- Level of the course (basic/advanced): advanced
- Prerequisites: Physics, Fundamentals of Material Engineering, Electrotechnics.
- Name, first name and degree of the lecturer/supervisor: Leszek Woźny, PhD.
- Names, first names and degrees of the team's members: Jerzy Rutkowski, PhD.
- Year:.....I..... Semester:.....2.....
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course): The aim of the course is to achieving the knowledge about fundamental magnetic phenomena, magnetic properties of matter and acquaintance of modern ferromagnetic materials, their process of technology and applications.
- Form of the teaching (traditional/e-learning): traditional.
- Course description:

Problems of modern soft and hard ferromagnetic materials. Materials technology and application for magnetic core of machine and measuring instruments. Problems of magnetism theory, matter magnetism, physical fundamentals of ferromagnetism, anisotropy of crystal structures, magnetostriction and basic quantities of magnetism. Classification of modern crystalline and amorphous ferromagnetic materials and description and analysis of technological processes connected with magnetic core productions.

- Lecture:

| <i>Particular lectures contents</i> | <i>Number of hours</i> |
|---|------------------------|
| 1. Introduction, range of lecture | 1 |
| 2. Physical fundamentals of magnetism, magnetic phenomena | 1 |
| 3. Magnetism of matter | 1 |
| 4. Diamagnetic materials | 1 |
| 5. Paramagnetic materials | 1 |
| 6. Ferro-, ferri- i antiferromagnetic materials | 1 |
| 7. Ferromagnetism, magnetic bubbles structure, hysteresis of magnetic induction, its characteristic points, magnetisation characteristics | 2 |
| 8. Soft ferromagnetic materials, review, properties | 1 |

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| 9. Hard ferromagnetic materials, review, properties | 1 |
| 10. Amorphous magnetic materials. | 1 |
| 11. Anisotropy of ferromagnetics, magnetostriction. | 1 |
| 12. Influence of technology on properties of ferromagnetic products, ageing phenomena. | 1 |
| 13. Measurement methods of magnetic properties. | 1 |
| 14. Control work | 1 |

- Classes – the contents:
- Seminars – the contents: Seminar is concerned on current problems connected with manufacturing process of magnetic materials and their practical applications in technics, science, medicine and daily life range: modern soft and hard ferromagnetic materials and their application, generation and application of high magnetic fields, precise measurements of magnetic parameters, unconventional usage of phenomena and magnetic materials.
- Laboratory – the contents:
- Project – the contents:
- Basic literature:
 1. Matheisel Z, *Blachy elektrotechniczne walcowane na zimno*, WNT Warszawa 1973
 2. Morrish A.H., *Fizyczne podstawy magnetyzmu*, PWN Warszawa 1970
- Additional literature:
- Conditions of the course acceptance/creditation: Written test passed and control work prepared.

* - depending on a system of studies