Fundamentals of electrical engineering - course description

General information

Course name	Fundamentals of electrical engineering
Course ID	06.2-WE-ELEKTP-FofEE-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Electrical Engineering
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	2
ECTS credits to win	6
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. inż. Radosław Kłosiński, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Class	30	2	-	-	Credit with grade

Aim of the course

- Introducing students to the physical foundations of electrical engineering.
- Acquainting students with the basics of description and analysis of electrostatic field, flow field in conductors and magnetic field.
- Mastering methods of analysis of basic dielectric, resistive and magnetic structures.
- Mastering basic electrical circuits laws and to use them in simple circuits.

Prerequisites

Mathematical Analysis I and II, Linear Algebra with Analytical Geometry, Physics I

Scope

Basic concepts in the field of electrostatics. Electric charge, intensity of the electric field, electrical potential. Gaussian law. Radial and homogeneous electric field. Polarization of the dielectric. Capacitors capacity.

Conductivity of metals. Generalized Ohm and Joule's law. Amper's Law.

Intensity of the magnetic field. Magnetic induction. Magnetic stream. Diamagnetism. Paramagnetism. Ferromagnetism. Maxwell's equations. Electromagnetic induction.

Elements of electrical circuit, resistor, induction coil, capacitor, source.

Methods of circuit analysis. Superposition principle. Principle of reciprocity. Kirchhoff's laws. Principle of equivalent source. The node potential method. The mesh current method. Transform star-triangle and triangle-star. RLC circuits under sinusoidal supply. Symbolic method. Composite impedance. Vector charts. Active, passive and apparent powers.

Teaching methods

Lecture: conventional lecture, problem lecture, discussion
Exercises: computational exercises, consultations

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Knows and is able to apply the basic laws of electrical circuits.		• an evaluation test • an exam - oral, descriptive, test and other • an ongoing monitoring during classes	• Lecture • Class
Can calculate the parameters of moderately complex dielectric, resistive and magnetic structures.		• an evaluation test • an exam - oral, descriptive, test and other • an ongoing monitoring during classes	• Lecture • Class
Is able to analyze fundamental phenomena in the field of electrostatics, metal conductivity and magnetism.		• an evaluation test • an exam - oral, descriptive, test and other • an ongoing monitoring during classes	• Lecture • Class

Outcome description	Outcome symbols	Methods of verification	The class form
Student knows basic concepts and laws concerning electrical circuits.		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture: written or oral examination.

Exercises: the condition of pass is to obtain positive marks from tests or from the final colokwium.

Components of the final grade: lecture: 50% + exercises: 50%

Recommended reading

1. Michalski W .: Electricity and magnetism, vol. I, II, Wroclaw, 2003 (in Polish).
2. Rawa H .: Fundamentals of Electromagnetism, Publishing House of the Warsaw University of Technology, Warsaw, 2005 (in Polish).
3. Cichowska Z., Pasko M .: Tasks in theoretical electrical engineering. Script of Silesian University of Technology Gliwice 1994 (in Polish).
4. Cichowska Z., Pasko M .: Lectures in theoretical electrical engineering. Cz. I Basic sections. Cz. II sinusoidally variable currents. Silesian University of Technology Gliwice 1998 (in Polish).
5. Mikołajuk K., Trzaska Z .: A set of theoretical electrotechnical assignments. PWN Warsaw 1976 (in Polish).

Further reading

Bolkowski S., Brociek W., Rawa H .: Theory of electrical circuits, tasks. WNT Warsaw 2006 (in Polish).

Notes

Modified by dr hab. inż. Radosław Kłosiński, prof. UZ (last modification: 01-05-2017 12:53)