



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of electricity and electronics [N1Energ2>PEiE1]

Course

Field of study

Power Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

0

Other

0

Tutorials

10

Projects/seminars

0

Number of credit points

4,00

Coordinators

dr inż. Jarosław Jajczyk

jaroslaw.jajczyk@put.poznan.pl

dr inż. Krzysztof Budnik

krzysztof.budnik@put.poznan.pl

Lecturers

Prerequisites

Students starting this subject should have knowledge in mathematics, physics at high school level.

Course objective

Introduction of physical quantities and basic laws and theorems in the field of electric engineering and electronics in direct current circuits and alternating current circuits one-phase. Introduction of analytical methods of calculations for electric circuits and rules of connection.

Course-related learning outcomes

Knowledge:

Is able to characterize electrical systems, describe and explain the laws and methods of their analysis for DC and AC circuits.

Skills:

Is able to recognize and select methods of analysis and testing of electrical circuits.

Social competences:

Understands the need for continuous training. He can work in a team.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: the knowledge acquired during the lecture is verified during a written test or on the eKursy platform, which consists of 25-35 questions (test and open) with various points. Passing threshold: 50% of points. The issues on the basis of which the questions are developed will be sent to students by e-mail using the university e-mail system.

The skills acquired during the auditorium exercises are verified on the basis of a final test, consisting of 3-4 tasks scored depending on the level of difficulty and on the basis of activity during classes. Passing threshold: 50% of points.

Programme content

Basic laws of electrical engineering. Electrical signals. Direct and sinusoidal alternating current circuits. Powers in electrical circuits. Basic electronic components.

Course topics

Lecture: Electric signals and classification, basic definitions in field of electrical engineering, elements of electric circuits, arrow convention for the voltage and the current, electric circuits laws, methods of analysis of direct current circuits and alternating current circuits (Kirchhoff's laws, Mesh-Current Method, Node-Voltage Method), circuits theorems: Norton's theorem, Thevenin's theorem, Tellegen's theorem), real power, reactive power and complex power, energy in electric circuits, maximum power transfer theorem, magnetic coupled circuits, resonance effect.

Principle of operation and parameters of the p-n junction, basic types of semiconductor diodes, rectifier systems and power supplies, transistors, passive elements (resistors, capacitors, inductive elements) in electronic systems.

Tutorials: Solving accounting tasks in the field of analysis of DC electrical circuits. Determination of equivalent resistance, Kirchhoff's law method, superposition principle/method, matching the receiver to the source for maximum power, mesh current and nodal potential method, Thevenin and Norton theorem/method, determination of active power and current flow.

Teaching methods

Lecture: Multimedia presentation (including drawings, photos, animations, films) supplemented with examples given on the board, taking into account various aspects of the issues presented, including: economic, ecological, legal, social and practical examples known to students in everyday life. Presenting a new topic preceded by a reminder of the content of the previous lecture. Presenting material in connection with other objects.

Tutorials: Solving tasks on the basics of electrical engineering on the blackboard, discussions and comments on how to solve tasks, and independent work with literature.

Bibliography

Basic:

1. Bolkowski S.: Teoria obwodów elektrycznych, WNT, Warszawa 1998.
2. Kurdziel R.: Podstawy elektrotechniki, WNT, Warszawa 1973.
3. Krakowski M.: Elektrotechnika teoretyczna, PWN, Warszawa 1973.
4. Bolkowski S., Brociek W., Rawa H., Teoria obwodów elektrycznych. Zadania., WNT, 2015.
5. Horowitz P., W. Hill, Sztuka elektroniki. Część 1 i 2, WKŁ, 2014.

Additional:

1. Chua L.O., Desoer C.A., Kuh E.S.: Linear and nonlinear circuits, McGraw-Hill Inc., New York 1987.
2. Rawa H., Bolkowski S., Brociek W.: Teoria obwodów elektrycznych. Zadania., PWN, Warszawa 2019.
3. Czarnywojtek P., Kozłowski J., Machczyński W.: Zbiór zadań z podstaw elektrotechniki, Wydawnictwo

Uczelni PWSZ w Kaliszu, Kalisz 2007.

4. Rutkowski J., Circuit theory, The Publishing House of the Silesian University of Technology, Gliwice 2006.

5. Jajczyk J., Stein Z., Zielińska M.: The problems of reactive power compensation in low-voltage network of an industrial plant provided with asymmetric receivers Poznań University of Technology. Academic Journals Electrical Engineering Issue 64 ISSN 1897-0737 V Published by Poznań University of Technology(2010). pp. 17-27.

Breakdown of average student's workload

	Hours	ECTS
Total workload	102	4,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50