COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical engineering and electronics [S1ETI2>EiE]

Course

Field of study
Education in Technology and Informatics

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
15

Number of credit points

5,00

Coordinators

Lecturers

Prerequisites

Knowledge in the field of mathematics and physics at the secondary school level. Knowledge of basic quantities describing electrical circuits. Ability to understand and interpret the information conveyed and effective self-education in the field related to the chosen field of study.

Course objective

Getting to know theoretical and practical issues related to electronics and electrical engineering, construction, principles of operation and possibilities of application of electrical and electronic devices. Presentation of new possibilities in the field of electricity generation and processing.

Course-related learning outcomes

Knowledge:
has elementary knowledge of electrical engineering, electronics and the basics of control and automation
has basic knowledge of the operation and diagnostics of technical systems, including the life cycle of devices
has knowledge about the ecological aspects of undertaken technical activities

Skills:

can use the acquired mathematical knowledge to describe processes, create models and other activities in the field of materials engineering, mechanics, machine design, electrical engineering, electronics and computer science
can identify a technical problem, determine its level of complexity, and propose a plan for its analysis and solution
has the ability to self-educate and understands the need for learning throughout professional life

Social competences:
is aware of the social role of a technical university graduate, and especially understands the need to formulate and provide society with information and opinions regarding technical and IT achievements acts in accordance with the principles of professional ethics and is responsible

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: - assessment of knowledge and skills demonstrated in a written exam of a problem-based nature (it is allowed to conduct the test in electronic form on the university's educational platform eKursy).
Tutorials: - tests and colloquia in written form, - rewarding activity and creativity in solving the tasks on an ongoing basis.
Grading rules (for credit for lectures and tutorials):
5.0 - over 90% of points
4.5 - 80%-90% of points
4.0 - 70%-80% of points
3.5 - 60%-70% of points
3.0 - 50%-60% of points
2.0 - less than 50% of points

Programme content

The module program covers the following topics:
1) Basic laws, phenomena and theorems in DC and AC electrical circuits,
2) Circuits with non-sinusoidal signals,
3) Transients in electrical circuits,
4) Three-phase systems,
5) Electric crosses and filters,
6) Basic electronic components and devices.

Course topics

Lecture: Basic concepts in the field of electrical engineering, basics of electrostatics, circuit elements, laws of electrical circuits, matching a receiver to a source for maximum power, basics of magnetism and electromagnetism, types of materials due to electrical and magnetic interactions, formation of sinusoidal alternating voltage, physical quantities and electrical parameters in alternating current circuits, methods of analysis of direct and sinusoidal alternating current circuits (methods: laws Kirchhoff, superposition, ring currents, nodal potentials), circuit theorems (Thevenin, Norton, Tellegen, on reciprocity and compensation), power and energy in sinusoidal alternating circuits, RLC elements (phasor diagrams), resonance of voltages and currents, reactive power compensation, power and energy measurements in electrical circuits. Formation and properties of three-phase systems. Analysis of systems in the case of deformed excitations (use of the Fourier series, effective value of current and voltage, powers: active, reactive, apparent, deformation, higher harmonics). Basic electronic components: diodes, transistors, thyristor, hall effector, thermistor, varistor, photo-optical elements. Selected electronic circuits: rectifiers and filters, amplifiers, vibration generators, power supplies, etc. Instruments and measurement methods in electrical engineering. Measurements of selected non-electrical quantities by electrical methods (sensors and their applications in industry and vehicles). Electromagnetic interactions of devices - electromagnetic compatibility (outline of the problem). Transformers and rotating machines - design, principle of operation, design solutions, functional properties. Energy storage. Quality and reliability of electricity supply - guaranteed power supply systems.
Tutorials (calculation tasks): Determination of equivalent resistance and impedance, voltage and current

sources, time and complex form of sinusoidal alternating currents and voltages, calculation of currents and voltages in branched circuits, Kirchhoff's law method, principle/method of superposition, matching a load to a source for maximum power, method of ring currents and nodal potentials, Thevenin and Norton's theorem/method, determination of active, reactive and apparent power, reactive power compensation, voltage and current resonance, magnetically coupled circuits.

Teaching methods

Lecture: Lecture with whiteboard or multimedia presentation (including: drawings, photos, animations, videos). Taking into account various aspects of the issues presented, including: economic, ecological, legal, social and practical examples known to students from everyday life. The implementation of a new topic is preceded by a reminder of the content from the previous lecture. Presenting parts of the material in connection with other objects.
Tutorials: Solving problems related to the basics of electrical engineering on the board, discussions and comments on solving problems, student's own work.

Bibliography

Basic:
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Additional:
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Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	48	2,00