COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical engineering and electronics [S1ETI1>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
26

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of physics and mathematics (general level). Knows and understands the mathematical apparatus necessary to describe and analyze the basic problems of electrical engineering and electronics, including: linear algebra, basics of differential and integral calculus, elements of mathematical logic, statistics and numerical methods. K1_W01 (P6S_WG (S / T). Is able to use acquired mathematical knowledge to describe processes, create models, write algorithms and other activities in the field of technology and computer science. K1_U04 (P6S_UW) (S / T) Is aware of the importance of engineering and non-technical activities aspects, including environmental impact. K1_K06 (P6S_KK) (general).

Course objective

1. Provision of knowledge in electrical engineering and electronics to students specializing in the area of IT and Technical Education. Acquainting students with the construction, principles of operation and application possibilities of electrical and electronic devices (lecture). 2. Developing students" skills to achieve optimal solutions, analyze the results of computer simulations, prepare research reports and publicly present the results and discuss them in the forum (exercises). 3. Shaping students" teamwork skills (exercises). 4. Presentation of new possibilities in the field of electricity conversion (lecture).

Course-related learning outcomes

Knowledge:
1. has knowledge of the ecological aspects of technical activities undertaken. k1_w05.
2. has elementary knowledge of electrical engineering and electronics. k1_w13.
3. has basic knowledge of the operation and diagnostics of technical systems, including the life cycle of devices. k1_w19.

Skills:
1. can obtain information from literature, databases and other properly selected sources, integrate them, interpret them and draw conclusions, formulate and justify opinions. (k1_u01).
2. can work individually and in a team, including managing his own time as well as making and keeping commitments. (k1_u05).
3. can correctly choose analytical or numerical tools to solve technical problems; can evaluate the results of numerical analysis. (k1_u08).
4. can identify a technical problem, define its complexity level, and then propose a diagram of its analysis and solution. (k1_u16).
5. when formulating and solving engineering tasks, can see their social, economic, ecological and legal aspects. (k1_u25).

Social competences:
1. can work on a designated task independently and work in a team taking different roles in it; demonstrates professionalism and responsibility for the decisions made. (k1_k01).
2. can think and act in an entrepreneurial and innovative way. (k1_k08).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Effect Form of evaluation Assessment criteria
W05,W13,W19 Lecture. Written or oral exam. Additionally, continuous assessment 50.1%-70.0% (3)
(rewarding activity and quality of perception during classes). 70.1%-90.0% (4)
U01,U05,U08, U13, U25 from 90.1% (5)
K01, K08
Auditorium exercises:
Assessment (completion)
Assessment of knowledge and skills related to the implementation 50.1%-70.0% (3)
of a computational task, assessment of answers to questions, 70.1%-90.0% (4)
ability to analyze results and draw conclusions. od 90.1% (5)

Programme content

Lecture:
Basic concepts in the field of electrotechnics, basics of electrostatics, circuit elements, laws of electric circuits, matching the receiver to the source for maximum power, basics of magnetism and electromagnetism, types of materials due to electrical and magnetic interactions, the formation of sinusoidal voltage, physical quantities and electrical parameters in AC circuits, methods of analysis of DC and sinusoidal current circuits (methods: Kirchhoff"s laws, superposition, loop currents, nodal potentials), circuit theorems (Thevenin, Norton, Tellegen, on reciprocity and compensation), power and energy in sinusoidal variable circuits, RLC elements (phasor diagrams), voltage and current resonance, reactive power compensation, power and energy measurements in electric circuits. Creation and properties of three-phase systems. System analysis in the case of distorted excitations (application of the Fourier series, RMS current and voltage, powers: active, reactive, apparent, distortion, harmonics). Basic electronic components: diodes, transistors, thyristor, hall effect sensor, thermistor, varistor, photo-optical elements. Selected electronic systems: rectifiers and filters, amplifiers, vibration generators, power supplies, etc. Measuring instruments and methods in electrical engineering. Measurements of selected non-electrical quantities using electrical methods (sensors and their applications in industry and vehicles). Mutual electromagnetic interactions of devices – electromagnetic compatibility (problem outline). Transformers and rotating machines – structure, principle of operation, design solutions, functional properties. Energy storage. Quality and reliability of electricity supply – uninterruptible power supply systems.
Auditorium exercises (computational tasks):

Determination of equivalent resistance and impedance, voltage and current sources, time and complex form of sinusoidal currents and voltages, calculation of currents and voltages in branched circuits, Kirchhoff"s law method, superposition principle / method, matching the receiver to the source for maximum power, the loop current method and nodal potentials, Thevenin and Norton theorem / method, determination of active, reactive and apparent power, reactive power compensation, voltage and current resonance, magnetically coupled circuits.

Teaching methods

Lecture:
The lecture with blackboard or multimedia presentation (including drawings, photos, animations, films), 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.
Auditorium exercises:
Solving tasks related to the basics of electrical engineering on the board, discussions and comments on how to solve tasks.

Bibliography

Basic
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Additional
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Breakdown of average student's workload

	Hours	ECTS
Total workload	124	5,00
Classes requiring direct contact with the teacher	66	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	94	3,00