COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical engineering [S1IBio1>Elekt]

Course

Field of study
Biomedical Engineering

Year/Semester
1/2

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
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in mathematics, physics and chemistry. Systematized theoretical knowledge in the field of study. The student knows how to operate on complex variables, solve systems of linear equations and use literature (gaining new knowledge from the indicated sources) and the Internet.

Course objective

Acquiring knowledge about the principle of operation of electrical machines and devices, ability to analyze and solve equations describing simple electrical systems.

Course-related learning outcomes

Knowledge:
student has knowledge in the field of electrical engineering used for the design and analysis of electric drive systems and machine control systems

Skills:
1. student has the ability to self-study, incl. to "raise" professional competences.
2. student is able to measure basic physical quantities, analysis of physical phenomena and solve

technical issues on the basis of the laws of physics.
3. stude is able to design and analyze electric drive systems and machine control systems.

Social competences:
student is aware of the social role of a technical university graduate, and in particular understands the need for formulation and transfer to the public, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activities; endeavors to provide such information and opinions in a generally understandable way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Written exam covering theoretical knowledge with computational elements of DC and AC circuit in the form of multiple-choice test with 10-15 questions. Assessment: 3,0 <50%;60%), 3,5 <60%;70%), 4,0<70%;80%), 4,5<80%;90%), 5,0 <90%;100%).
Current control of preparation for laboratories, final test from the laboratory consisting of 5-7 multiple-choice questions. Ratings: 3.0 <50%; 60%), 3.5 <60%; 70%), 4.0 <70%; 80%), 4.5 <80%; 90%), 5.0 < 90%, 100%).

Programme content

Basic quantities and phenomena related to electric and magnetic fields, electric signals and their classification, topics in electric circuits, methods of analyzing direct current and sinusoidal alternating current circuits.
Power supplies and regulators for receivers.
The impact of current on the human body and protective measures against electric shock.

Course topics

Electric current and basic phenomena, signals and their classification. Basic laws used for the analysis and calculation of electrical circuits. Ideal and real sources of current and voltage, state of energy matching. Connections of elements in electrical circuits. Methods of analysis and calculation of direct current circuits. Alternating current description of basic quantities (amplitudes, half-period average values, RMS, period, frequency, initial angle, phase angle, Lissajous curves, time and pointer diagrams). Methods of analysis and calculation of alternating current circuits (trigonometric and with complex numbers resistance, reactance, impedance, conductance, susceptance, and admittance). Power in alternating current circuits (active, reactive and apparent, constant component and variable component). Electrical resonance (voltage and current, wave impedance, quality of the resonant circuit).
Methods of measuring current, voltage and resistance, frequency and phase angle.
Single and three-phase transformer power supplies controlled and uncontrolled.
Power regulators (phase, group and PWM).
The effect of current on the human body, and elements of electric shock protection.
Laboratory:
Familiarization with measuring apparatus and methods of making measurements, learning the correct connection of electrical circuits and the proper connection of measuring devices to circuits, practical verification of basic theorems, testing of linear and nonlinear elements in direct current circuits, testing of R L C elements in sinusoidally varying current circuits, testing of semiconductor rectifying and filtering systems. Testing of electric motors, power regulators, and power supplies.

Teaching methods

Lecture: presentation, solving electrical circuits calculation examples.
Laboratory: laboratory exercises in groups, class reports.

Bibliography

Basic
1. W. Opydo, Elektrotechnika i elektronika dla studentów wydziałów nieelektrycznych, WPP, Poznań, 2012 r.
2. S. Bolkowski, Elektrotechnika 4, WSiP, 1995 r.

Additional
1. W. Orlik, Egzamin kwalifikacyjny elektryka w pytaniach i odpowiedziach
2. B. Miedziński, Elektrotechnika. Podstawy i instalacje elektryczne, Wydawnictwo Naukowe PWN, Warszawa 1997 r.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00