STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Electrical engineering		**1010334121010325179**

Field of study	Profile of study (general academic, practical)	Year /Semester
Automatic Control and Robotics	**(brak)**	**1 / 2**
Elective path/specialty	**Subject offered in:**	**Course (compulsory, elective)**
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**part-time**

No. of hours				No. of credits
Lecture: **36**	Classes: **22**	Laboratory: **-**	Project/seminars: **-**	**6**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**6 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics and physics.
2	**Skills**	Ability to use literature, solving linear equations, ability to operate on complex numbers, ability to observe and draw conclusions.
3	**Social competencies**	Ability to work in a team, attention to improving their own competence.

Assumptions and objectives of the course:

Theoretical and practical knowledge of electrical problems. Acquire the skills to analyze selected electrical circuits for AC and DC.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. He has ordered knowledge of the theory of electrical circuits and electrical DC and AC circuits, including the three-phase. - [K_W08 +++]
2. It has a basic knowledge of the theory of signals and information processing methods in the field of time and frequency. - [K_W05 +]
3. It has a basic knowledge of the principles of measurement of electrical quantities, knows and understands the methods of measurement of electrical, familiar with computational methods and tools necessary to analyze the results of the experiment. - [K_W11 +++]

Skills:

1. He can use the basic methods of signal processing and analysis in the time domain and frequency and extract information in the analyzed signals. - [K_U19 +++]
2. Able to work independently and in a team, is able to estimate the time needed to carry out the tasks commissioned. - [K_U02 ++]
3. . It can be used properly chosen methods and measuring instruments and measure the relevant signals and based on them to designate the characteristics of electrical and information about their essential properties. - [K_U15 +++]
4. Able to develop the documentation and give a presentation on the results of a laboratory task. - [K_U03 ++]

Social competencies:

1. Understand the effects of non-technical aspects and engineering activities including its impact on the environment and the associated responsibility for decisions. - [K_K02 ++]

Assessment methods of study outcomes

Lecture:

- assess the knowledge and skills listed on the written exam of a problematic.

Exercises auditorium:

- tests and final exam in writing,
- keep rewarding activity and creativity in solving the set tasks.

Course description

Lecture:

Basic concepts of electric circuit, mathematical models of electric circuit components, rules for determining the voltage and current, circuitry law, solving DC circuits. The method of loop currents and of nodal, Thevenin and Norton's theorems, energy and electrical power, instantaneous value, average and RMS current and voltage. Basic laws of the electromagnetic field. Sinusoidal alternating current circuits. The method of complex numbers, Vector charts, active, reactive and apparent power, RLC circuit analysis, correction the power factor, resonance voltages and currents, transients in electrical circuits, three-phase circuits, circuits with non-sinusoidal periodic waveforms, networks and filters.

Exercises auditorium:

Solving the basic tasks of the current circuits using laws, theorems and methods of peripheral, power calculation circuit, balance of power, calculation of meter indications. Solving the RLC circuit with sinusoidal excitations - symbolic method, calculate active, reactive and apparent power, calculation circuitry capable of resonance voltages and currents. Solving circuits in transient states - classical method. Solving three-phase circuits, power calculation - Aron measuring system.

Update 2017:

Applied methods of education:

lecture - lecture using the board supplemented by multimedia presentation (including: drawings, photos, animations, sound, films); Presenting a new topic preceded by a reminder of related content, known to students from other subjects; Taking into account various aspects of the presented issues, including: economic, ecological, legal, social, etc.

exercises - solving example tasks on the board; Detailed review of task solutions by the facilitator and discussions on comments.

Basic bibliography:

1. Bolkowski S., Elektrotechnika teoretyczna, Wyd. 6, WNT, Warszawa 2001.
2. Krakowski M., Elektrotechnika teoretyczna, tom 1 ? Teoria obwodów (tom 2 - Pole elektromagnetyczne), PWN, Warszawa 1999.
3. Kurdziel R.: Podstawy elektrotechniki, WNT, Warszawa 1973.
4. Czarnywojtek P., Kozłowski J., Machczyński W.: Zbiór zadań z podstaw elektrotechniki, Wydawnictwo PWSZ, Kalisz, 2007.
5. Majerowska Z., Majerowski A., Elektrotechnika ogólna w zadaniach, PWN, W-wa 1999
6. Jastrzębska G., Nawrowski R., Zbiór zadań z elektrotechniki ogólnej, Wydawnictwo Politechniki Poznańskiej, Poznań 1995.

Additional bibliography:

1. Krakowski M.: Elektrotechnika teoretyczna. Tom 1. Obwody liniowe i nieliniowe?, PWN, Warszawa 1995.
2. Szabatin J., Śliwa E., Zbiór zadań z teorii obwodów, Wyd. Pol. Warsz., W-wa 2003.
3. Bolkowski S., Brociek W., Rawa H.: Teoria obwodów elektrycznych. Zadania, WNT, Warszawa 1995.
4. Bolkowski S.: Teoria Obwodów Elektrycznych, WNT, Warszawa 1998.
5. Bednarek K., Kompensacja mocy biernej i praca hybrydowa w systemach zasilania gwarantowanego (UPS), Poznan University of Technology Academic Journals, Electrical Engineering, No 74, Poznan 2013, p. 33-41.
6. Kasprzyk L., Bednarek K., Elektromagnetyzm a zagadnienia gromadzenia energii, Przeglad Elektrotechniczny, No 12 (90), 2014, s. 221-224, nr DOI: 10.12915/pe.2014.12.55.

Result of average student's workload

Activity	Time (working hours)
1. participation in class lectures	36
2. participated in exercises auditorium	22
3. participate in the consultations	16
4. exam preparation	32
5. preparation for colloquia	42
6. participation in the exam	4

Student’s workload

Source of workload	hours	ECTS
Total workload	152	6
Contact hours	78	2
Practical activities	0	0