STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Fundamentals of electricity and electronics		**1010311421010325572**

Field of study	Profile of study (general academic, practical)	Year /Semester
Power Engineering	**general academic**	**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	**full-time**

No. of hours					No. of credits
Lecture: **30**	Classes: **15**	Laboratory: **30**	Project/seminars: **-**		**5**

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

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**5 100%**
Technical sciences	**5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic information form mathematics, physics, circuits theory at level of first semester of Energetics.
2	**Skills**	Skills in understanding and interpretation of information and effective self-education in field of science related with chosen academic discipline.
3	**Social competencies**	Student should have consciousness of necessity of improving his competences, readiness to work individual and cooperate within groups.

Assumptions and objectives of the course:

Theoretical and practical usage of knowledge related to: 3-phase AC circuits, 1- and 3-phase non-sinusoidal AC circuits, transient responses in linear RLC circuits, two-port network, LC and RC filters as well as simple electronic circuits. The acquisition of practical skills in connecting, testing and measurement of DC and AC circuits (including one-phase or three-phase systems, and simple analog electronics circuit).

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

Knowledge:

1. explain the basic concepts of two-port networks, basic elements and the electronics and transients RLC circuits - [K_W01++, K_W02++, K_W17+++]
2. identify and select methods of analysis and testing of two-port networks and circuits in transient states - [K_W01++, K_W02++]

Skills:

1. obtain information from the literature and the Internet, work individually and independently solve problems, connect and carry out measurements of electrical quantities of the basics of electrical engineering (including field theory) and electronics - [K_U01++, K_U02++, K_U06+, K_U10++]
2. investigate, interpret frequency characteristics of filters LC and RC, apply the basic knowledge of transients, compare properties and the possibility of using simple electronic circuits - [K_U01++, K_U02++, K_U06+, K_U10++]

Social competencies:

1. able to think and act in an entrepreneurial way in the area of analysis of electric and electronic systems - [K_K01+, K_K02+, K_K04+]

Assessment methods of study outcomes

Lecture:

- assess the knowledge and skills listed on the written and oral exam of basics of electrical engineering and electronics.

Auditorium exercises:

- assess skills of solving accounting exercises in range of analysis of electric and electronic circuits ? verification skills on every exercises and two tests during the semester.

Lab classes:

- verification of knowledge necessary to realize exercise,
- verification of skill of connecting electric and electronic circuits,
- verification of skill of carry on measurements and necessary calculations,
- assess of reports from done exercise.

Obtaining additional points for activity during exercises, in particular way for:

- proposing to discuss additional aspects of the subject,
- effective use of knowledge obtained during solving of given problem,
- comments related to improve teaching material,
- aesthetics of solved problems and reports ? within homework.

Course description

The analysis of 3-phase AC circuits (including symmetrical and asymmetrical circuits, powers: active, reactive and apparent power, active power measurements), the analysis 1- and 3-phase circuits for deformed forcing signal (with the usage of Fourier series, the effective value of current and voltage, powers: active, reactive, apparen, distortion), four-terminal network and methods of crosses and methods of their analysis (schematic and basic relations, types of equations, reversibility and symmetry terminal network, the method of connecting two-port networks, the parameters, wave adjustment), LC and RC filters RC (the transmission loss, diagrams of filters, frequency characteristics, application), analysis of transient responses in linear RLC (integral-differential equations of electrical circuits, the initial conditions and overall conditions of the transient occurrence, the laws of switching, time constant, classical analysis of RC and RL circuits), basic components and electronics: diodes, transistors, integrated rectifying one- and two-half-, operational amplifiers and their application (amplification, feedback), basic system generators.

Applied methods of education:

Lectures - Lecture with multimedia presentations (including: drawings, photos, animations, videos) supplemented by examples given on the board; having regard to (taking into account) the various aspects of the presented issues, including: economic, environmental, legal and social; presenting a new topic preceded by a reminder of related content, known to students from other subjects,

Exercises - solving sample tasks on the board, initiating discussion about solutions,

Laboratory - instructors detailed review of the reports and discussions about comments , demonstrations, work in teams.

Basic bibliography:

1. Bolkowski S.: "Teoria obwodów elektrycznych", WNT, Warszawa 1998.

2. Chua L. O., Desoer C. A., Kuh E. S.: "Linear and nonlinear circuits", McGraw-Hill Inc., New York 1987.

3. Szabatin J., Śliwa E.: "Zbiór zadań z teorii obwodów. Część 1", Wydawnictwo Politechniki Warszawskiej, Warszawa 1997.

4. Mikołajuk K., Trzaska Z.: "Zbiór zadań z elektrotechniki teoretycznej", WNT, Warszawa 1978.

Additional bibliography:

1. Krakowski M.: "Elektrotechnika teoretyczna", PWN, Warszawa 1973.

2. Jastrzębska G., Nawrowski R.: "Zbiór zadań z podstaw elektrotechniki", Wydawnictwo Politechniki Poznańskiej, Poznań 2000.

3. Frąckowiak J., Nawrowski R., Zielińska M.: "Podstawy elektrotechniki. Laboratorium", Wydawnictwo Politechniki Poznańskiej, Poznań 2011.

Result of average student's workload

Activity	Time (working hours)

1. participation in the lectures	30
2. participation in the auditorium exercises	15
3. participation in lab exercises	30
4. participation in consultations on the lecture	5
5. participation in consultations on the auditorium exercises	5
6. participation in consultations on the lab classes	5
7. preparation for the auditorium exercises	10
8. homeworks	10
9. preparation for the lab classes and making reports	25
10. preparation for the exam	20
11. preparation for the auditorium exercises pass	10
12. participation in the exam	5

Student's workload

Source of workload	hours	ECTS
Total workload	177	5
Contact hours	102	4
Practical activities	65	3