(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: FUNDAMENTALS OF ELECTRICAL ENGINEERING	**2. Course code**
3. Validity of course description: 2018/2019	
4. Level of studies: BSc programme	
5. Mode of studies: intramural studies	
6. Field of study: COMPUTER SCIENCE	AEII
7. Profile of studies: general academic	
8. Programme:	
9. Semester: 1, 2	
10. Faculty teaching the course: Institute of Electronics, RAu3	
11. Course instructor: prof. zw. dr hab. inż. Jerzy Rutkowski	
12. Course classification: common subjects	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: It is assumed that before starting the course, the student has preparation in the field of: mathematics (including the ability to solve algebraic equations, actions on complex numbers, differentiation and integration of basic functions), basic physics (knowledge of elementary concepts and laws, among others in the field of electrostatics, familiarity with basic units of measurement, in particular electric quantities).	
16. Course objectives: PE I: The aim of the course is to present theoretical foundations of the science of linear and non-linear DC circuits. The lecture should create the basis for the analysis of these circuits and, subsequently, the basis of the AC analysis. PE II: The aim of the course is to familiarize students with the basic concepts of AC circuits and methods of analysis of these circuits in the case of transient analysis under aperiodic stimulation and in the case of analysis of sinusoidal circuits in steady state.	

17. Description of learning outcomes:

N0	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
W1	The student knows the basic laws of electrical circuits	Exam	Lectures,	K1A_W03
W2	The student knows the methods of analysis of linear and nonlinear DC circuits as well as linear circuits of alternating current	Exam	Lectures,	K1A_W05,
W3	The student has a basic knowledge of a long line in a transient state and three-phase circuits	Exam	Lectures,	K1A_W06
U1	Student is able to analyze linear and non-linear circuits	mid-term exam	Classes	K1A_W07
U2	The student is able to determine the frequency characteristics of the basic cross pieces	mid-term exam	Classes	K1A_U12

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Lecture 30 h., Class 30 h

19. Syllabus description:

Lectures:

PE I

1. Basic concepts and definitions

Definitions of basic physical quantities. General classification of circuit elements and their description. Ohm's law and Kirchhoff's law. Power and energy. Analysis of simple circuits.

2. Methods for analyzing linear circuits

Generalized methods of Kirchhoff's laws. The node potential method.

3. Theorems / principles of linear circuits

The principle of superposition. Thevenin and Norton theorems - conditions of energy fit. The principle of separation.

4. Multipoles

Description of multipolars.

5. Methods of analysis of nonlinear circuits

Graphic method, segment linearization method.

6. Equations of elements in the field of time

Capacitor. Coil.

PE II

1. Analysis of transient states

Basics of the operator method. Analysis of 1st order circuits. Analysis of higher order circuits - Heaviside's formula.

2. Analysis of sinusoidal circuits

Basics of the symbolic method. Power and energy. Actual elements L, C. The phenomenon of resonance. Frequency filters - amplitude characteristics on a logarithmic scale. Vector and topographic charts. Perfect transformer.

3. Long line

Analysis of a transient state in a long line.

4. Three-phase circuits

Ways of mating three-phase circuits. Measurement of power transmitted to a three-phase receiver.

Classes:

PE I

1. Simple linear circuits of direct current. The ideal source of voltage and current. Substitute resistance. Application of Ohm's law and Kirchhoff's laws.
2. DC circuits with real sources. Ammeter and voltmeter - perfect and real.
3. Complex linear circuits. The node potential method.
4. Thevenin and Norton theorem. Superposition method. The principle of extraction.
5. Non-linear elements. Circuits with non-linear elements. Graphic method; segmental linearization method.

PE II

6. Transient states in first order circuits. Laplace operator method. Solving circuits with a simplified method.
7. Circuits with non-zero initial conditions.
8. Transient states in response to aperiodic extortion.
9. AC circuits: symbolic method. Vector charts.
10. Power in AC circuits.
11. Frequency characteristics. Filters. The phenomenon of resonance.
12. Circuits with fixed constants (long line). Transients in the long line.

20. Examination: Yes, test

21. Primary sources:

1. Macura A., Teoria Obwodów - Obwody prądu stałego, Wydawnictwo Politechniki Śląskiej, Skrypt nr 1789, Gliwice 1994.
2. Rutkowski J., Circuit Theory, Wydawnictwo Politechniki Śląskiej, Gliwice 2006.
3. Chojcan J., przy współpracy L. Karwana i in., Zbiór Zadań z Teorii Obwodów I, Wydawnictwo Politechniki Śląskiej, Skrypt nr 2091, Gliwice 1998.
4. Macura A., Teoria Obwodów - Obwody prądu zmiennego część I, Wydawnictwo Politechniki Śląskiej, Skrypt nr 2007, Gliwice 1997.
5. Chojcan J., Drygajło A., i in. Zbiór zadań z Teorii Obwodów II, Wydawnictwo Politechniki Śląskiej, Skrypt nr 1702, Gliwice 1992.

22. Secondary sources:

1 Cichowska Z., Pasko M., Litwinowicz E., Przykłady i zadania z elektrotechniki teoretycznej. Część I: Działy podstawowe, Wydawnictwo Politechniki Śląskiej, Gliwice 2004.
2. Cichowska Z., Pasko M., Przykłady i zadania z elektrotechniki teoretycznej. Część II: Prądy sinusoidalnie zmienne, Wydawnictwo Politechniki Śląskiej, Gliwice 2004.
3. Chua L.O., Lin P.M., Komputerowa analiza układów elektronicznych, WNT, Warszawa 1981.
4. Osowski S., Siwek K., Śmiałek M., Teoria Obwodów, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
5. Osiowski J., Szabatin J., Podstawy teorii obwodów, WNT, Warszawa 1993.
6. http://platforma.polsl.pl/rau3

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	45/30
2	Classes	30/30
3	Laboratory	0/0
4	Project	0/0
5	BA/ MA Seminar	0/0
6	Other	15/20
	Total number of hours	90/80

24. Total hours:170

25. Number of ECTS credits: 8

26. Number of ECTS credits allocated for contact hours: 4

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):1

26. Comments:

Approved:

…….
(date, Instructor's signature)

……
(*date , the Director of the Faculty Unit signature)*