(*faculty stamp*)

Z1-PU7	WYDANIE N1	Strona 1 z 2

COURSE DESCRIPTION

1. Course title: ELECTROTECHNICS AND ELECTRONICS	**2. Course code**
3. Validity of course description: 2012/2013	
4. Level of studies: BA, BSc programme / MA,MSc programme or **1st cycle** / 2nd cycle of higher education	
5. Mode of studies: intramural studies / extramural studies	
6. Field of study: POWER ENGINEERING	(FACULTY SYMBOL) RIE
7. Profile of studies: academic	
8. Programme: SUSTAINABLE ENERGY ENGINEERING (SEE)	
9. Semester: 2	
10. Faculty teaching the course: Institute of Power Engineering and Turbomachinery	
11. Course instructor: dr inż. Daniel Węcel	
12. Course classification: specialty subjects	
13. Course status: compulsory /elective	
14. Language of instruction: English	
15. Pre-requisite qualifications: Physics and Mathematics (knowledge of concepts of electromagnetism and solid-state physics, the ability of complex numbers).	
16. Course objectives: The transfer of knowledge and skills in the description, measurement, and analysis of the basic components and electrical and electronic circuits.	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Understand the issues related to electricity and electronics.	Exam	Lecture, Class and Laboratory	K_W08, K_W12, K_W14,
2.	It knows the methods of measurement of electrical quantities.	Rating preparations for laboratory classes ("initial" test)	Lecture, Class and Laboratory	K_W14, K_U09,
3.	It can make simple measurements of electrical, developed and presented the results in a clear manner.	Observation of the course laboratory classes, evaluation and "defense" of laboratory reports	Laboratory	K_U09, K_W03, K_W14
4.	It can solve simple problems of electrical power engineering	Check test	Lecture and Class	K_U16, K_W08,
5.	It understands the need for learning throughout life, especially in order to improve their professional and personal competence. It is able to interact and work in a group, taking in the different roles.	Evaluation of the work effects in the laboratory sections and exercise groups and its analysis	Class and Laboratory	K_K01, K_K03

18. Teaching modes and hours

30 Lecture / BA /MA Seminar / 15 Class / Project / 30 Laboratory

19. Syllabus description:

Lecture:

Electrotechnics. Direct current. Elements and parameters of the electric circuit. Ohm's, Kirchoff's and Joule's law. Total resistance. Thévenin's and Norton's theorem. Analysis of DC circuits. Bridge. Compensator. Parallel operations of sources. Nonlinear elements. Alternating current parameters. Passive elements of RLC. Reactance. Impedance. Symbolic method. Phase vector. Active, reactive, apparent and complex power. Power factor. Analysis of alternating current circuit. Series and parallel resonance. Magnetic coupling. Electromagnetic induction. Mutual inductance. Rotating field. Three-phase current generators and receivers. Voltages, currents and power in three-phase circuits. Short-circuits. **Electronics**. Physical phenomena in semiconductor. Semi-conductive passive elements. Bipolar and unipolar electronic devices (diodes, transistors, thyristores). Four-terminal networks and four-terminal networks parameters. Integrated circuits. Operational amplifier. Power amplifiers and generators. Switches. Logical gates and triggers. Digital systems. Multiplexers. Memories. Analog-to-digital conversion methods.

Class

1. Real sources. Total resistance. Potentiometer, divider, shunt.
2. Solving of branched circuits using Kirchoff's equations method. Power.
3. The method of replacement source, superposition and transformation. Nonlinear circuits.
4. Alternating current parameters. Two-terminal network single element R, L, C. Symbolic method.

5. Series and parallel connection of R, L, C elements. Resonance of voltages and currents.
6. Complex circuits. Vector charts. Power and power factor. Various tasks.
7. Magnetically coupled circuits. Three-phase systems.

Laboratory:

Laboratory exercises with the following topics::

8. Linear circuits. Kirchhoff law
9. Nonlinear elements and circuits
10. Series and parallel resonance
11. Magnetically coupled circuits
12. Impedance and powers of AC receivers (loads)
13. Testing of semiconductor diodes
14. Testing of bipolar transistors
15. Testing of thyristors
16. (Circuit) Elements of digital technology
17. Analog-to-Digital converters

20. Examination: yes

21. Primary sources:

1. Praca zbiorowa - Elektrotechnika i elektronika dla nieelektryków – WNT W-wa 2007 wyd. 6
2. Paul Horowitz, Winfield Hill – The Art of Electronics – Press Syndicate of the University of Cambridge, New York, USA 1993.
3. Brenner E., Javid M. – Analysis of Electric Circuits – Mc Graw-Hill, New York USA
4. Markiewicz Aleksy - Zbiór zadań z elektrotechniki – WSP W-wa 2006 wyd. XVII.
5. Ogulewicz Włodzimierz - Laboratoria elektryczne dla studentów Wydziału Inżynierii Środowiska i Energetyki Wyd. Pol. Śl. Gliwice 2007

22. Secondary sources:

1. Bolkowski Stanisław – Teoria obwodów elektrycznych WN-T – W-wa 2008 wyd. IX zm.
2. Tietze Ulrich, Schenk Christoph – Układy półprzewodnikowe WN-T – W-wa 1997 wyd 3 zm.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/20
2	Classes	15/40
3	Laboratory	30/45
4	Project	/
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	75/105

24. Total hours: 180

25. Number of ECTS credits: 6

26. Number of ECTS credits allocated for contact hours: 3

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 3

26. Comments: Learning content can be corrected to the needs of learning outcomes matrix

Approved:

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(date, Instructor's signature)

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