

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Selected issues of the theory of circuits</b>		Code <b>1010322311010324872</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  Prof. dr hab. inż. Ryszard Nawrowski email: ryszard.nawrowski@put.poznan.pl tel. 616652788 Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic information form math and physics at level of first degree studies.
2	<b>Skills</b>	Skills in enhanced understanding and interpretation of information and effective self-education in range of Science related with chosen field of study.
3	<b>Social competencies</b>	Student should have enhanced consciousness of necessity of improving his competences, readiness to work individual and cooperate within groups.
<b>Assumptions and objectives of the course:</b> Presentation of: passive and active filters, nonlinear elements of circuits, nonlinear electric and magnetic circuits, ferroresonance, signals and theory of signals flow, signals flow graphs, structure matrix. Presentation of enhanced analytic methods of solving electric circuits.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. describe electric filters, nonlinear circuits and signals, describe and explain laws and methods of: analysis of filters, nonlinear electric circuits and electric signals - [K_W02++, K_W04+, K_W06+++, K_W09++] 2. recognize and select proper methods of enhanced electric circuits analysis - [K_W02++, K_W04+]		
<b>Skills:</b> 1. use knowledge in field of enhanced theory of electric and electronic circuits, necessary to determine parameters of circuits, such as : attenuation, characteristic impedance, static and dynamic resistance, signals transfer function etc. - [K_U01++, K_U02++, K_U07+] 2. get specialized information from literature and web, work individual and in workgroups, solve exercises in field of enhanced theory of circuits by his own and within workgroup - [K_U01++, K_U02++, K_U07+]		
<b>Social competencies:</b> 1. think and operate in enterprising way in the field of enhanced analysis of basic electric circuits - [K_K01++, K_K02+]		
<b>Assessment methods of study outcomes</b>		

<p>Lecture:</p> <ul style="list-style-type: none"> <li>- assess the knowledge and skills listed on the written and oral exam of enhanced knowledge of electrical engineering.</li> </ul> <p>Ćwiczeni audytorijne:</p> <ul style="list-style-type: none"> <li>- assess skills of solving advance accounting exercises in field of analysis of electric circuits ? verification skills on every exercises and two tests during the semester.</li> </ul> <p>Obtaining additional points activity during exercises, in particular way for:</p> <ul style="list-style-type: none"> <li>- proposing to discuss additional aspects of the subject,</li> <li>- effective use of knowledge obtained during solving of given problem,</li> <li>- comments related to improve teaching material,</li> <li>- aesthetics of solved problems and reports ? within self education.</li> </ul>	
<b>Course description</b>	
<p>Signals block diagrams: creation, conversion and simplification of block diagrams, transfer function determination, signal flow graphs, rules of reduction of signal flow graphs, cascade connection, inversion of branches, passive and active filter, ? and ? and X type filters, band-pass filters, nonlinear, direct and alternating current, circuits, techniques of analysis, branched and unbranched magnetic circuits, solving magnetic circuits, nonlinear circuits with ferromagnetic elements, phenomenon of feroresonance, oscillations in non linear circuits.</p> <p>Updated 2017: Learning methods used:</p> <p>A) lectures:</p> <ul style="list-style-type: none"> <li>- lecture with multimedia presentation (including: drawings, photos, animations, sound, films) supplemented with examples given on the board;</li> <li>- initiate discussion during the lecture;</li> <li>- theory presented in connection with current knowledge of students;</li> <li>- presenting a new topic preceded by a reminder of related content known to students from other subjects;</li> </ul> <p>B) exercises:</p> <ul style="list-style-type: none"> <li>- solving example tasks on the board;</li> <li>- reminding basic theoretical information needed to solve the task;</li> <li>- discussions and comments on how to solve tasks;</li> <li>- Detailed review of the exercise by the instructor.</li> </ul>	
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Kurdziel R., Podstawy elektrotechniki, WNT, Warszawa 1973</li> <li>2. Bolkowski S., Teoria obwodów elektrycznych, WNT, Warszawa 2008</li> <li>3. Szabatin J., Śliwa E., Zbiór zadań z teorii obwodów. Część 2, Wydawnictwo Politechniki Warszawskiej, Warszawa 2015</li> <li>4. Mikołajuk K., Trzaska Z., Zbiór zadań z elektrotechniki teoretycznej, WNT, Warszawa 1978</li> </ol>	
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Krakowski M., Elektrotechnika teoretyczna, PWN, Warszawa 1995</li> <li>2. Chua L. O., Desoer C. A., Kuh E. S., Linear and nonlinear circuits, McGraw-Hill Inc., New York 1987</li> <li>3. Jastrzębska G., Nawrowski R., Zbiór zadań z podstaw elektrotechniki, Wydawnictwo Politechniki Poznańskiej, Poznań 2000</li> </ol>	
<b>Result of average student's workload</b>	
<b>Activity</b>	<b>Time (working hours)</b>
1. Participation in the lectures	30
2. Participation in the auditorium exercises	15
3. Participation in consultations on the lecture	2
4. Participation in consultations on the auditorium exercises	4
5. Preparation for the auditorium exercises	6
6. Homeworks	8
7. Preparation for the exam	12
8. Preparation for the auditorium exercises pass	10
9. Participation in the exam	3
10. Participation in the colloquium	3
<b>Student's workload</b>	

Source of workload	hours	ECTS
Total workload	93	4
Contact hours	57	2
Practical activities	0	0