

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Measurements and analisys of biological signals</b>		Code <b>1010324381010324819</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 8</b>
Elective path/specialty <b>Measurement Systems in Industry and</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time,part-time) <b>part-time</b>	
No. of hours Lecture: - Classes: - Laboratory: <b>18</b> Project/seminars: -		No. of credits <b>2</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>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Michał Bołtrukiewicz email: <a href="mailto:michal.boltrukiewicz@put.poznan.pl">michal.boltrukiewicz@put.poznan.pl</a> tel. 61 665 61 665 2032 Elektryczny ul. Piotrowo 3a, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge in the scope of algebra, mathematical analysis, electronic analog circuits, digital technique, and digital processing of signals
2	<b>Skills</b>	Ability of the efficient self-education in the area concerned with the chosen field and speciality of studies
3	<b>Social competencies</b>	Awareness of the necessity of broadening of the competence in the field of electrical engineering and willingness to cooperate in a team
<b>Assumptions and objectives of the course:</b> Knowledge of modern methods of the measurements, processing and analysis of biological signals		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Ability to explain the principles and techniques of measuring signals acquisition for biomesurements - [K_W05+, K_W14 +]		
<b>Skills:</b> 1. Ability to work independently and as a team in laboratories, research centres, and medical facilities - [K_U05 ++, K_U09 +, K_U23 +]		
<b>Social competencies:</b> 1. Ability to think and act enterprisingly in the area of biomedical engineering - [K_K04 +, K_K05 +]		
<b>Assessment methods of study outcomes</b>		
- Tests and awarding the increase in knowledge necessary to realize the laboratory tasks, - Continuous estimation during all classes and awarding the increase in skills of using the get principles and methods, - The evaluation of knowledge and skills connected with the measuring tasks and prepared reports		
<b>Course description</b>		

<p>Updating 2017:                  Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports.</p> <p>Laboratory:                  Detailed reviewing of particular exercises reports. Realization of laboratory tasks in teams, taking into account the specific computational experiments covering:</p> <ul style="list-style-type: none"> <li>- Analog conditioners of signals.</li> <li>- Cooperation of operational amplifiers with measuring sensors.</li> <li>- Kinds and specificity of biological signals.</li> <li>- Examples of noninvasive techniques of biomedical signals acquisition.</li> <li>- Sampling of measuring signals.</li> <li>- Aliasing and choice of the proper filter.</li> <li>- Comparison of analog and digital filters properties.</li> <li>- Basic mathematical operations using the collected samples of biosignals.</li> <li>- Digital Fourier Transform and fundamentals of spectrum analysis.</li> <li>- Selected problems concerned with Laplace's transform and introduction to NOI digital filters.</li> <li>- Selected questions of the statistical methods of measuring data analysis.</li> </ul>		
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. J.T. Białasiewicz, Falki i aproksymacje, WNT, Warszawa 2000</li> <li>2. Biocybernetyka i inżynieria biomedyczna, red. M. Nałęcz, Akademicka Oficyna Wyd. EXIT, Warszawa 2001-2002</li> <li>3. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2001</li> <li>4. T. Zieliński, Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, WKŁ, Warszawa 2007</li> </ol>		
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. J. Jakubiec, J. Roj, Pomiarowe przetwarzanie próbkujące, Wyd. Politechniki Śląskiej, Gliwice 2000</li> <li>2. J. Moczko, L. Kramer, Cyfrowe metody przetwarzania sygnałów biomedycznych, Wyd. UAM, Poznań 2001</li> <li>3. J. Szabatin, Teoria sygnałów, WKŁ, Warszawa 2000</li> </ol>		
<p><b>Result of average student's workload</b></p>		
<p><b>Activity</b></p>		<p><b>Time (working hours)</b></p>
1. Participation in laboratory exercises		18
2. Participation in consulting with the lecturer		3
3. Preparation to laboratory exercises and preparation of the reports		23
<p><b>Student's workload</b></p>		
<p><b>Source of workload</b></p>	<p><b>hours</b></p>	<p><b>ECTS</b></p>
Total workload	44	2
Contact hours	21	1
Practical activities	41	1