

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Fundamentals of biomedical engineering		Code 1010325241010326097
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty Measurement Systems in Industry and	Subject offered in: polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time,part-time) part-time	
No. of hours Lecture: 18 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: Prof. dr hab. inż. Anna Cysewska-Sobusiak email: anna.cysewska-sobusiak@put.poznan.pl tel. 616652633 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the scope of electrotechnics, physics, optoelectronics, and metrology.
2	Skills	Ability of the efficient self-education in the area concerned with the module
3	Social competencies	Awareness of the necessity of competence broadening and ability to show readiness to work as a team
Assumptions and objectives of the course: Knowledge in the scope of physical and medical bases of biomeasurements and medical engineering to understand the methods and systems applied for measurements and diagnostics.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Ability to describe the application areas and potential of the modern measurement systems - [K_W11 +++] 2. Ability to explain the principles and techniques of the measurement signals acquisition and processing for the needs of current industrial and biomedical applications - [K_W11 ++ K_W12 +]		
Skills:		
1. Ability to design creatively the modern measurement systems, with the use of possibilities offered by available technologies, taking into account the limitations of present status of knowledge and technique - [K_U01 +] 2. Ability to work independently and as a team in the design and construction companies, research laboratories and industrial centers - [K_U05 +]		
Social competencies:		
1. Understanding a need of the broad popularization of the knowledge in the area of simple and complex measurement systems used in industry and biomedical engineering - [K_K02 +]		
Assessment methods of study outcomes		

<p>Lectures:</p> <ul style="list-style-type: none"> - evaluation of the knowledge with a written exam related to the content of lectures (test, computational and problem questions), - continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception). 		
Course description		
<ul style="list-style-type: none"> - Biomeasurements and biomedical engineering: applications, classification, specificity, the state-of-the-art and tendency to development. - Selected elements of physiology and anatomy. - Thermodynamics of biological systems. - Physical background of medical diagnostics. - Modeling of biological processes. - Influence of electromagnetic radiation on tissues; human organism protection from harmful factors. - Medical applications of lasers and fiber optics technique. - Biosensors and stents. - Selected elements of bioinformatics ? metrological and technical aspects of recognition of DNA sequences. - Selected questions of statistics and medical informatics. - Clinical engineering. Ethics of procedures used in medical examinations. 		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Biocybernetyka i Inżynieria Biomedyczna, red. Maciej Nałęcz, Akademicka Oficyna Wydawnicza Exit, Warszawa 2001-2003. 2. A. Cysewska-Sobusiak, Modelowanie i pomiary sygnałów biooptycznych, wyd. Politechniki Poznańskiej, Poznań 2001. 3. R. Tadeusiewicz, Informatyka medyczna, red. R. Tadeusiewicz, W. Wajs, Uczelniane Wyd. AGH, Kraków 1999. 4. G. Pawlicki, Podstawy inżynierii medycznej, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1997. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. K. Booth, S. Hill, Optoelektronika, WKŁ, Warszawa 2001. 2. W.Z. Traczyk, Fizjologia człowieka w zarysie, PZWL, Warszawa 1992. 3. J. Szabatin, Podstawy teorii sygnałów, wyd. 3, WKŁ, Warszawa 2000. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	18	
2. Participation in consulting with the lecturer	5	
3. Preparation to the exam	15	
4. Participation in the exam	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	41	2
Contact hours	26	1
Practical activities	0	0