COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of biomedical engineering

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
Measurement systems in industry and biomedical engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	0	0
Tutorials	Projects/seminars	
-	0	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
Prof. dr hab. inż. Anna Cysewska-Sobusiak

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Wydział Automatyki, Robotyki i Elektrotechniki

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Students should have basic knowledge in the scope of electrical engineering, physics, optoelectronics, and metrology. They should also have ability of efficient self-education, using information acquired from given sources, and ability to show readness to work as a team.

Course objective

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.

Course-related learning outcomes

Knowledge

1. has broadened knowledge in the field of measuring electrical quantities and selected non-electrical quantities; they have knowledge of how to work out the results of the experiment.

2. has expanded and in-depth knowledge in the field of modeling, analysis and synthesis of electronic elements and systems for the needs of modern industrial and biomedical applications.

Skills

1. is able to obtain information from literature, databases and other sources, perform their interpretation, assessment, critical analysis and synthesis, as well as formulate conclusions and justify opinions.

2. can read and understand professional literature, as well as prepare and deliver a presentation on the implementation of a project or research task.

Social competences

1. is aware of the need to develop professional achievements and adhere to the principles of professional ethics, fulfill social obligations and inspire and organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified during the written exam, which consists of 15-20 questions (mostly open), variously scored. Exam threshold: 60%. The issues on the basis of which questions are prepared are sent to students by e-mail using the university e-mail system.

Programme content

Areas of application of biomeasurements and biomedical engineering, current status and development trends. Selected elements of physiology and anatomy. Thermodynamics of biological systems. Physical basics of medical diagnostics. Modeling of biological processes. The influence of electromagnetic radiation on tissues and the basis for protecting the body against harmful factors. Medical applications of lasers and fiber optics. Biosensors and stents - selected issues. Basics of bioinformatics - metrological and technical aspects of DNA sequence recognition. Selected elements of medical statistics and computer science. Clinical engineering. Ethics of procedures used in medical examinations.

Teaching methods

Multimedia presentations (including drawings, photos, videos) expanded by examples given given on the board.

Bibliography

Basic

Biocybernetyka i Inżynieria Biomedyczna, red. Maciej Nałęcz, Akademicka Oficyna Wydawnicza Exit, Warszawa 2001-2003.

A. Cysewska-Sobusiak, Modelowanie i pomiary sygnałów biooptycznych, Wyd. Politechniki Poznańskiej, Poznań 2001.

A. Cysewska-Sobusiak, Podstawy metrologii i inżynierii pomiarowej, Wyd. Politechniki Poznańskiej, Poznań 2010.

A.Poliński, Obrazowanie medyczne, Wyd. Politechniki Gdańskiej, Gdańsk 2015.

A. Cysewska-Sobusiak, A. Sowier A., Zastosowanie wideoendoskopii w stentowaniu przewodu pokarmowego, Elektronika -technologie, konstrukcje, zastosowania, nr 4, 2013, s. 136-1396.

J. Marciniak i inni, Stenty w chirurgii małoinwazyjnej, Wyd. Politechniki Śląskiej, Gliwice 2006.

K. Szymczak, A. Cysewska-Sobusiak, Zastosowanie ultradźwięków w inżynierii biomedycznej, Poznań University of Technology Academic Journals, Electrical Engineering, Issue 79, 2014, s. 9-16.

A. Cysewska-Sobusiak, J. Parzych, D. Prokop, Wybrane zastosowania transiluminacji tkanek w metrologii biomedycznej, Poznan University of Technology Academic Journals, Electrical Engineering, Issue 88, 2016, s. 11-21.

Additional

W.Z. Traczyk, Fizjologia człowieka w zarysie, PZWL, Warszawa 1992.

T.T. Togawa, T.T. Tamura, P.A. Oberg, Biomedical sensors and instruments, CRC Press, Boca Raton 2011.

R.B. Northrop, Noninvasive instrumentation and measurement in medical diagnosis, CRC Press LLC, Boca Raton 2002.

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, ~~preparation for laboratory classes/tutorials,~~ preparation for ~~tests~~/exam, ~~project preparation~~) [1]	25	1,0

[1] delete or add other activities as appropriate