COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronic measuring and actuating systems

Course

Field of study

Biomedical engineering

Area of study (specialization)

Construction and operation of medical devices

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

15

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

A student starting this subject should have a basic knowledge enabling the use of computer aided

software and systems for engineering work in biomedical engineering and technology. He should also have the ability to effectively self-study, using information obtained from the indicated sources, and show willingness to cooperate within a team.

Course objective

To introduce students to the properties of selected electronic transducers and the principles of their use in measuring systems. Developing students' skills in designing, assembling and starting selected electronic systems.

Course-related learning outcomes

Knowledge

1. has basic knowledge enabling the use of computer aided software and systems for engineering work in biomedical engineering and technology.

2. has basic knowledge of electrical engineering and electronics, thanks to which he can describe DC and AC electric circuits, digital and logic circuits.

3. has knowledge of sensors and measurements of non-electrical quantities.

Skills

1. is able to apply knowledge of electrical engineering and electronics to design and analyze electrical and electronic systems.

2. is able to plan and carry out experiments, including computer measurements and simulations, interpret obtained results and draw conclusions.

3. can obtain information from literature, databases and other properly selected sources

Social competences

1. is able to interact and work in a group, assuming different roles in it, and set priorities for the implementation of the task specified by him or others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified on a written test, which consists of 10-15 questions (mostly open), variously scored. Test pass threshold: 60%. The issues on the basis of which questions are prepared are sent to students by e-mail using the university's e-mail system.

Skills acquired as part of the laboratory are verified on the basis of continuous assessment related to the implementation of tasks during each class and evaluation of the report of exercises performed.

Skills acquired as part of the project classes are verified at each class and based on the assessment of the completed project.

Programme content

Lecture: AC voltage detectors. Static and dynamic parameters of measuring amplifiers. Analog converters of electrical signals based on an operational amplifier. Elements of sensor technology. Examples of transducers and sensors. Cooperation of operational amplifier with measuring sensors.

Laboratory: Static and dynamic parameters of optocouplers. Properties of an industrial fiber optic link. Characteristics of voltage - current and current - voltage transducers based on an operational amplifier. Static and dynamic parameters of maximum value detectors. AC voltage measurement.

Projects: Basics of electronic executive design. Assumptions applicable during the assembly and commissioning of electronic systems. Construction of measuring systems using PLC controllers. Programming languages of PLC controllers: ladder diagrams, list of instructions. Examples of configuration of measuring systems using a PLC controller.

Teaching methods

1. Lecture: presentation illustrated with examples given on the board, problem solving.

2. Laboratory exercises: conducting experiments, teamwork, discussion.

3. Projects: solving practical tasks, teamwork, discussion.

Bibliography

Basic

1. J. Kasprzyk, Programowanie sterowników przemysłowych, WNT, Warszawa 2006.

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

3. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2009.

4. P. Horowitz, W. Hill, Sztuka elektroniki, WKŁ, Warszawa 1996.

Additional

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

2. A. Guziński, Liniowe elektroniczne układy analogowe, WNT, Warszawa 1994.

3. Z. Kulka, M. Nadachowski, Analogowe układy scalone, WKŁ, Warszawa 1985.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	15	0,5

[1] delete or add other activities as appropriate