POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of advanced measurement techniques

Course

Field of study	Year/Semester
Mathematics in technology	3/6
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	polish
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr inż. Zbigniew Krawiecki

email: zbigniew.krawiecki@put.poznan.pl

tel. 61 665 2546

Faculty of Control, Robotics and Electrical
Engineering

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge in the scope of mathematics, electrotechnics, computer science. Ability of the efficient self-education in the area concerned with a chosen field of studies. Awareness of the necessity of competence broadening and ability to show a readiness to work as a team.

Course objective

Acquainting with modern techniques of obtaining signals in a multi-channel measuring system and processing these signals using typical mathematical methods.

Course-related learning outcomes

Knowledge

Ability to characterize the importance and application possibilities of the simple modern measuring

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systems. Basic knowledge of engineering technologies used in the construction of measuring stations with open architecture as well as signal acquisition and processing.

Skills

Ability to work independently and as a team. Ability to create a simple measurement path and the use of basic methods of signal processing and analysis. Ability to design the basic measuring systems creatively, using possibilities offered by new technologies.

Social competences

Ability to think and act enterprisingly in the area of the measuring systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: evaluation of the knowledge related to the content of lectures (open, closed and problem questions, 50% pass mark). Bonus activity and quality of perception during the lecture.

Laboratories: evaluation of knowledge and skills related to the implementation of measurement task and evaluation of the report made in class or at home. Evaluation of degree of completed tasks and rewarding of activity.

Programme content

Lecture: introduction to advanced measurement techniques, software, modular apparatus. Interference in the measurement path, reduction of signal interference. Examples of path entry blocks for measuring selected physical and electrical quantities. Pre-processing of the measuring signal. Multi-channel signal measurement, processing, presentation and archiving. Interpretation of measurement results obtained using a modular device, determination of the minimum, maximum, average, effective, median, modal, standard deviation, etc.

Laboratory: planning and implementation of tasks from the basics of advanced measurement techniques, implementation of exercises in the preparation of the initial track to obtain the electrical signal, configuration of input blocks of the modular device, single and multi-channel configuration of the measuring track with A / C processing, analysis, presentation and archiving of measurement results, application mathematical algorithms.

Teaching methods

Lecture with multimedia presentation supplemented by examples on the board, initiation of discussions in relation to the subject, presentation of a new topic preceded by a reminder of the previous lecture (main issues).

Laboratory: groups of students work as teams. Discussion on different methods and aspects of problem solutions. Detailed reviewing of particular tasks documentation.

Bibliography

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Basic

1. Świsulski D., Komputerowa technika pomiarowa, oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW, Agenda Wydawnicza PAK, 2005

2. Maj P., Wirtualne systemy kontrolno-pomiarowe, Wydawnictwo AGH, 2011

3. Nawrocki W., Komputerowe systemy pomiarowe, WKŁ, 2007

4. Chruściel M., LabVIEW w praktyce, Wydawnictwo BTC, 2008

5. Winiecki W., Organizacja komputerowych systemów pomiarowych, Oficyna Wydawnicza Politechniki Warszawskiej, 2006

Additional

1. Nawrocki R., Rozproszone systemy pomiarowe, WKŁ, 2006

2. Rak R., Wirtualny przyrząd pomiarowy. Realne narzędzie współczesnej metrologii, Oficyna Wydawnicza Politechniki Warszawskiej, 2003

3. Tłaczała W., Środowisko LabViewTM w eksperymencie wspomaganym komputerowo, Wydawnictwo WNT, 2014

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/~~tutorials~~, preparation for ~~tests~~/exam, laboratory report/~~project~~ preparation) [1]	35	1,0

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[1] delete or add other activities as appropriate