Name of the module/subject Microprocessor-based control and measurement systems Trofile of study (general academic, practical) (brak) Test / Gemester (general academic, practical) (brak) 1 / 2	STUDY MODULE DESCRIPTION FORM							
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Automatic Control and Robotics (general academic, practical) (brak) 1 / 2 Elective path/specialty - Subject offered in: Polish Course (compulsory, elective) obligatory Cycle of study: Form of study (full-time, part-time) Second-cycle studies full-time No. of hours Lecture: 45 Classes: - Laboratory: 30 Project/seminars: - 6 Status of the course in the study program (Basic, major, other) (brak) (brak) Education areas and fields of science and art ECTS distribution (number and %) Education areas and fields of science and art ECTS distribution (number and %) Responsible for subject / lecturer: Responsible for subject / lecturer: dr hab. inz. Tomasz Pajchrowski email: tomasz, pajchrowski@put, poznan, pl tel. 61 6662385 Faculty of Electrical Engineering in Projectives in terms of knowledge, skills and social competencies: 1 Knowledge He has ordered and expanded knowledge of the methods of analysis and design of control systems. He has specialized expertise in the field of remote systems, distributed real-time systems and networking techniques. 2 Skills Able to critically use the information literature, databases, and other sources, has the skills of self-education in order to improve and upgrade professional skills. Able to critically use the information interature, databases, and other sources, has the skills of self-education in order to improve and upgrade professional skills. Able to critically use the information literature, databases, and other sources, has the skills of self-education in order to improve and upgrade professional skills. Able to critically use the information interature, databases, and other sources, has the skills of self-education in order to improve and upgrade professional skills. Able to critically use the information interature, databases, and other sources, has the skills of self-education in order to improve and upgrade professional skills. Able to developed petities of occupational health and safety appropriate for the job automation and industrial electronics, especially in								
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Social competencies:								

Assessment methods of study outcomes

Lecture: written examination (theoretical knowledge test) in the field of programming content.

Laboratory: examining the practical skills of programming and microprocessor systems control and measurement, evaluation and reporting of tests.

Course description

Faculty of Electrical Engineering

Lecture with multimedia presentation (including: drawings, photos, animations, sound, films) supplemented by examples given on the board. The presented content relates to current technical aspects in close connection with practice.

Program content:

ARM architecture microcontrollers (STM32, Arduino (2017), Raspberry Pi (2017), signal processors for embedded control and data acquisition (SHARC). Construction of advanced measurement cards and collaboration with the environment (LabView). Selected issues for A / C and C / A converters. Selected methods of programming microprocessor and control and measurement systems. Methods of measuring selected physical quantities? voltage, current, speed, position, force and torque, temperature and other non-electrical values. Implementation of selected tasks in microprocessor systems: filters and regulators. Data transmission in control systems? Implementation of wired standards (CAN, RS-232/485, LIN (2017), MOST (2017), Byteflight (2017) and wireless (IrDA, ZigBee (2017), Bluetooth). Analysis of selected practical implementations? recorders, industrial process control systems, DC and AC motor control.

Lab. Laboratory classes are divided into two parts: the first students will learn about the construction and installation of a measuring card and software card in the LabView language. The second part of the software is an ARM (STM32) microcontroller in a high-level language, which measures the selected physical quantities and controls the drive systems. The work consists of team programming.

Basic bibliography:

- 1. Steven W. Smith: Cyfrowe przetwarzanie sygnałów. Wyd. BTC, Warszawa 2007
- 2. Steven W. Smith: Digital signal processing. Wyd. BTC, Warszawa 2007.
- 3. Dokumentacja techniczna dotycząca mikrokontrolerów o architekturze ARM typu Cortex
- 4. Nawrocki W. ?Komputerowe systemy pomiarowe?, WKŁ, Warszawa 2006

Additional bibliography:

- Dąbrowski A., (red.), Przetwarzanie sygnałów przy użyciu procesorów sygnałowych, Wyd. Politechniki Poznańskiej, Poznań 2000
- 2. Dąbrowski A., (red.), Przetwarzanie sygnałów przy użyciu procesorów sygnałowych, Wyd. Politechniki Poznańskiej, Poznań 2000

Result of average student's workload

Activity	Time (working hours)
1. Participation in lecture classes	45
2. Participation in laboratory activities	30
3. Participation in consultation	10
4. Preparation for laboratory	18
5. Develop reports on tests and measurements	15
6. Exam Preparation	30
7. Participation in the exam	2

Student's workload

Source of workload	hours	ECTS
Total workload	150	6
Contact hours	87	3
Practical activities	45	2