STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Microprocessor-based control and measurement systems	**1010332221010335633**

Field of study	Profile of study (general academic, practical)	Year /Semester
Automatic Control and Robotics	**general academic**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **45** Classes: **-** Laboratory: **30** Project/seminars: **-**	**6**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**from field**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**100 6%**

Responsible for subject / lecturer:

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Prerequisites 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 develop detailed documentation, analyze the results and give a presentation on the implementation of the tasks of design and research. K_U15: Able to apply the principles of occupational health and safety appropriate for the job automation and robotics.
3	**Social competencies**	Is aware of and understands the importance and impact of non-technical aspects of engineering including its impact on the environment, and hence the responsibility for decisions.

Assumptions and objectives of the course:

The aim of the course is to familiarize students with current microprocessor systems and peripheral systems used in automation and industrial electronics, especially in control systems, control and measurement.

Study outcomes and reference to the educational results for a field of study

Knowledge:

Skills:

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

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: Architecture of ARM microcontrollers (based on STM32) and signal processors for built-in control and acquisition systems. 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 measurement of selected physical quantities - voltage and current, speed and displacement, force and moment of force, temperature and other non-electrical quantities. Implementation in microprocessor systems of selected tasks: filters and regulators, data transmission in control systems - implementation of standard wires (CAN, RS-232/485, LIN, MOST, Byteflight) and wireless (IrDA, Bluetooth, Zigbee). Analysis of selected practical realizations - recorders, industrial process control systems, control of DC and AC motors.

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. In the second part, the STM32 microcontroller is programmed in a high level language to measure selected physical quantities and drive the drive system.

Basic bibliography:

1. Steven W. Smith: Digital signal processing.Wyd. BTC, Warszawa 2007.

2. Nawrocki W. ?Komputerowe systemy pomiarowe?, WKŁ, Warszawa 2006

3. The technical documentation for microcontrollers with ARM Cortex-type

Additional bibliography:

1. 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