

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Microprocessor Technology		Code 1010642221010322511
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Mechatronics	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 1 Classes: - Laboratory: - Project/seminars: 1		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Grzegorz Trzmiel email: Grzegorz.Trzmiel@put.poznan.pl tel. 61 665 2693 Wydział Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Elementary knowledge of electrical engineering, electronics and digital technology.
2	Skills	Ability to: - acquiring, integrating and interpreting information from the literature and other sources, - interpretation, documentation and presentation of the results of their own solutions on a project, - formulating algorithms for simple engineering problems.
3	Social competencies	Thinking and acting in an entrepreneurial manner while maintaining professional ethics and social diversity opinions.
Assumptions and objectives of the course: In-depth knowledge of the theoretical problems associated with the construction, operating principle components, sub-assemblies and microprocessor systems and the basis of their programming and design.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He has ordered and in-depth knowledge of digital technology and microprocessor. - [K2A_W01] 2. He has ordered and in-depth knowledge of control systems. - [K2A_W05] 3. He has ordered knowledge of the components and subassemblies included in the digital devices and microprocessor. - [K2A_W05] 4. He has knowledge of the principles of design of microprocessor control systems exemplary processes and devices. - [K2A_W05]		
Skills:		
1. He can formulate and justify a critical evaluation and opinions. - [K2A_U08] 2. He can prepare and give a presentation and lead a discussion on the project or research task. - [K2A_U16] 3. He can plan and execute the processes of design, simulation and testing of digital circuits and microprocessors for specific applications. - [K2A_U16]		
Social competencies:		
1. He understands the need to think and act creatively and enterprising, including working together as a team. - [K2A_K03] 2. He is aware of the validity of the transfer of knowledge and solutions through the media. - [K2A_K06]		

Assessment methods of study outcomes		
Lecture: written tests, presentations own concept solutions, written exam / oral examination.		
Course description		
<p>Lecture: The idea of pipelining. Architecture microprocessors. Construction, types (classifications), features and basic functionality of a microcontroller. Microcontrollers closed (embedded). The microprocessor core. The oscillator and clock signal distribution systems. Methods for power reduction. Special modes microcontroller. RESET. Sources RESET. Systems supervising the correct operation of the microcontroller. Watchdog. Methods of cooperation with peripherals. Systems interrupts. Programming nested. Basic programming languages. Commissioning and testing programs. CAN interface: features, systems, types of frames (without detailed structures), model of communication, error detection mechanisms, concepts construction node, electromagnetic interference advantages. LIN interface. Profibus.</p> <p>Project: Getting to know the architecture of an exemplary microcontroller and microcontroller programming in C in terms of handling internal and external devices. Basics of C51 language specification, implementation programs, use of selected internal systems, among others, timers and interrupt system, serial, AC transducer. Implementation of external devices, among others, LCD, LED, matrix keyboard. Implementation of the exemplary cooperation project microprocessor system with an external device.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> Jabłoński T., Pławiak K., Programowanie mikrokontrolerów PIC w języku C, BTC, Warszawa 2005. Krzyżanowski R., Układy mikroprocesorowe, Mikom, Warszawa 2004. Pietraszek S., Mikroprocesory jednocukładowe PIC, Wyd. Helion, Gliwice, 2002. 		
Additional bibliography:		
<ol style="list-style-type: none"> Jabłoński T., Mikrokontrolery PIC16F8x w praktyce, Wyd. BTC, Warszawa, 2002. Francuz T., Język C dla mikrokontrolerów, od podstaw do zaawansowanych aplikacji, Helion, Gliwice 2011, Prace dyplomowe IEiEP Internet. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in class lecture	13	
2. Consultation on the lecture	2	
3. Preparation for discussion (active form) in lectures	4	
4. Preparation to pass	4	
5. Pass of the lecture	2	
6. Participation in projects	13	
7. Preparation for projects	6	
8. Preparation for pass the laboratory	6	
9. Pass of the project	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	52	2
Contact hours	32	1
Practical activities	27	1