

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Microprocessor technology		Code 1010332521010331118
Field of study Information Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Information Technologies	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: 15 Classes: - Laboratory: 30 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr inż. Krzysztof Walas email: krzysztof.walas@put.poznan.pl tel. 61 665 2809 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge from microprocessor technology, electronics and digital circuits. Acquaintance with programming in C/c++ and assembler.
2	Skills	Skills in programming in C and assembler and ability to compile and link programs.
3	Social competencies	Has a competency to work in a team and to solve the problems seen for the first time.
Assumptions and objectives of the course: To master the theoretical and practical skills related to design, building and usage of microprocessor systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. has a deeper knowledge in the scope of the microprocessor technology - [K_W04]		
Skills:		
1. is able to gather the knowledge from literature, databases and other sources; is able to integrate obtained information and to interpret it to give the critical assessment; is able to draw conclusions and to justify thoroughly justify own opinion. - [K_U01]		
Social competencies:		
1. is able to think in creative and entrepreneurial way - [K_K01]		
Assessment methods of study outcomes		
Written examination, tests written/oral, projects.		
Course description		

Lecture: Learning new designs of processors and microprocessors ? comparison of RISC and CISC architectures. Survey of operating systems for the ARM architecture computer processors family. Description of microprocessor peripherals and communication interfaces. Low-level access to the peripherals from operating system. Examples of mobile, information science and robotics applications: based on ARM processors.

Lab: Introduction to structure of microprocessors based on ARM architecture. Usage of basic programming tools for C and assembler language. Writing computer programs for handling with microprocessor peripherals (I/O ports, A/D & D/A converter). Programming the communication interfaces between microprocessor and sensors (I2C, SPI, RS-232). Multithread and network programming (TCP/IP). Interfacing selected devices: camera, touch display, bluetooth module.

Basic bibliography:

1. Bryndza L.: Mikrokontrolery z rdzeniem ARM9 w przyk?adach, BTC Legionowo 2009r.
2. Robinson A., Cook M.: Raspberry Pi. Najlepsze projekty, Helion Gliwice 2014r.
3. Prat S. Język C. Szko?a programowania, Wydanie V, Helion 2006r.

Additional bibliography:

1. Upton E., Halfacree G.: Raspberry Pi User Guide, John Wiley & Sons Ltd The Atrium Chichester, 2012
2. Update 2017: D. Belter and K. Walas, A Compact Walking Robot ? Flexible Research and Development Platform, in Recent Advances in Automation, Robotics and Measuring Techniques, ser. Advances in Intelligent Systems and Computing, R. Szewczyk, C. Zieliński, and M. Kaliczyńska, Eds., vol. 267, Springer International Publishing, 2014, pp. 343?352.
3. BCM2835 datasheet
4. Internet

Result of average student's workload

Activity	Time (working hours)	
1. Lectures	15	
2. Laboratories	30	
3. Tutorials	5	
4. Preparation to the laboratory	15	
5. Raports from laboratories	10	
6. Preparation of own projects	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	90	3
Contact hours	60	2
Practical activities	60	2