



## Subject card

|   |   |  |                                     |            |  |         |     |
|---|---|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code                       | Embedded Systems and Microprocessors, PG_00058917   |  |                                     |            |  |         |     |
| Field of study                              | Informatics   |  |                                     |            |  |         |     |
| Date of commencement of studies             | October 2023  | Academic year of realisation of subject                  |                                     |            | 2024/2025  |         |     |
| Education level                             | first-cycle studies   | Subject group  |                                     |            | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |         |     |
| Mode of study                               | Part-time studies   | Mode of delivery   |                                     |            | at the university  |         |     |
| Year of study                               | 2   | Language of instruction                                  |                                     |            | Polish   |         |     |
| Semester of study                           | 4   | ECTS credits   |                                     |            | 4.0  |         |     |
| Learning profile                            | general academic profile  | Assessment form  |                                     |            | assessment   |         |     |
| Conducting unit                             | Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics   |  |                                     |            |  |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr inż. Maciej Kokot                                     |                                     |            |  |         |     |
|   | Teachers  | dr inż. Maciej Kokot                                     |                                     |            |  |         |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture  | Tutorial                            | Laboratory | Project  | Seminar | SUM |
|   | Number of study hours   | 15.0   | 0.0                                 | 15.0       | 0.0  | 0.0     | 30  |
|   | E-learning hours included: 0.0  |  |                                     |            |  |         |     |
| Learning activity and number of study hours | Learning activity   | Participation in didactic classes included in study plan | Participation in consultation hours |            | Self-study   | SUM     |     |
|   | Number of study hours   | 30   | 4.0                                 |            | 66.0   | 100     |     |
| Subject objectives                          | Getting familiar with architectures, construction and examples of nowadays microprocessors and microcontrollers<br><br>Acquire skills programming PIC microcontrollers. |  |                                     |            |  |         |     |

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| Learning outcomes  | Course outcome   | Subject outcome  | Method of verification  |
|  | [K6_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices   | Student knows development trends and specific character of microprocessors, microcontrollers and embedded systems. Student s familiar with programming of PIC 10F202, 16F877A.   | [SW1] Assessment of factual knowledge   |
|  | [K6_W05] Knows and understands, to an advanced extent, methods of supporting processes and functions, specific to the field of study   | Student knows development trends and specific character of microprocessors, microcontrollers and embedded systems. Student s familiar with programming of PIC 10F202, 16F877A.   | [SW1] Assessment of factual knowledge   |
|  | [K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study   | Student programs the PIC family of microcontrollers in assembler code.   | [SU4] Assessment of ability to use methods and tools<br>[SU1] Assessment of task fulfilment |
|  | [K6_W02] Knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study  | Student knows development trends and specific character of microprocessors, microcontrollers and embedded systems. Student s familiar with programming of PIC 10F202, 16F877A.   | [SW1] Assessment of factual knowledge   |
|  | [K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment   | Student programs the PIC family of microcontrollers in assembler code.   | [SU4] Assessment of ability to use methods and tools<br>[SU1] Assessment of task fulfilment |
| Subject contents   | Microprocessor. History and development of microprocessors. Basic functional components of microprocessor. Programming model of microprocessor. Von Neumann and Harvard architectures. CISC and RISC processors, assembler programming. Intel/AMD, IA-32, AMD64 (x86-64), IA-64, Itanium microprocessors family. Explicitly Parallel Instruction Computing. Branch Predication. ARM, POWER, SPARC microprocessors family. Performance improvement techniques: pipeline processing, cache memory, multithreading, multicore, parallel processing of instructions and data Microcontrollers. Architecture and usage. Microcontrollers families. Microchip's PIC microcontrollers family. Instruction set, examples of code, memory architecture, special registers. Serial communication ports, SPI, I2C, RS232, CAN, USB. Program and EEPROM memory. A/D and D/A converters, interrupts, timers and counters. |  |   |
| Prerequisites and co-requisites                                |  |  |   |
| Assessment methods and criteria                                | Subject passing criteria   | Passing threshold  | Percentage of the final grade   |
|  | Midterm colloquium   | 50.0%  | 33.0%   |
|  | Practical exercise   | 50.0%  | 67.0%   |
| Recommended reading  | Basic literature   | 1. J. Crisp: Introduction to Microprocessors and Microcontrollers. Newnes 2004 2. Pietraszek S.: Mikrokprocesory jednokładowe PIC. Wyd. Helion, Gliwice 2002. 3. J. Bogusz: Lokalne interfejsy szeregowo. BTC, Warszawa, 2004. |   |
|  | Supplementary literature   | 1. www.microchip.com   |   |
|  | eResources addresses   | Adresy na platformie eNauczanie:   |   |
| Example issues/<br>example questions/<br>tasks being completed |  |  |   |

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| Work placement | Not applicable |
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