



Subject card

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|---|--|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code | Microprocessor Engineering, PG_00038098 | | | | | | |
| Field of study | Automation, Robotics and Control Systems | | | | | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | | | 2025/2026 | | |
| Education level | first-cycle studies | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 2 | Language of instruction | | | Polish | | |
| Semester of study | 4 | ECTS credits | | | 5.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Control Engineering -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Andrzej Kopczyński | | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 30.0 | 0.0 | 0.0 | 60 |
| | 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 | 60 | 8.0 | | 57.0 | 125 | |
| Subject objectives | Understanding the basic concepts and issues concerning the operation of microcontrollers and microprocessor systems. Getting to know the methods and tools for programming microprocessors and their peripherals. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_W05] has basic knowledge of the principles of operation of basic electronic, energy and power electronic components and systems | Student explain the rules of microprocesor system work, distinguish base types of microprocesor systems architectures, describes base glases of memories and I/O uP system devices, knows base intefeaces. | | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | [K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions | Student is able to applicate a proper literature and developpe simpleprograms using C language an Assembler for microcomupers 8051 family and ARM Cortex M3. | | | [SU1] Assessment of task fulfilment | | |
| | [K6_K02] can work in a group taking on different roles in it | Student can work in group and use specialized tools for family 8051 and ARM microprocesors for creation and staring programs. | | | [SK1] Assessment of group work skills | | |

| Subject contents | <p>LECTURE Microprocessor - the idea and history. Methods of data representation in microprocessor systems. Data encoding standards. Basic arithmetic and logical operations on binary data. Microprocessor system, the basic components and architecture. Internal structure and operating principle of a typical microprocessor. Programming in assembler and C language. Tools to build and run the software. Implementation of embedded software in the system. Microcontrollers from 8051 family: internal structure, modes of operation, the list of instructions. Characteristics of integrated peripheral components: ports, time-counters, interrupt controller, serial transmission system. Memory of microprocessor systems - types, characteristics, structure. Principles of cooperation between central processing unit, memory and I/O devices. Coupling of typical peripheral devices to the microprocessor. Methods of parallel and serial data transmission. Methods of measuring time and frequency. A/C and C/A converters. Microcontrollers of other families: AVR, PIC, ARM. Examples of the use of microcontrollers in automation systems.</p> <p>LABORATORY The aim of the laboratory is to acquire the practical skills of microcontroller programming and knowledge of tools used for this purpose. Laboratory classes consist of the preparation and testing of simple programs written in C and Assembler. The programs are tested on evaluation boards with microcontrollers from 8051 and STM32F1 family and typical elements of the input/output.</p> | | | | | | | | | | | |
|--|--|--|--|--------------------------|-------------------|-------------------------------|--------------|-------|-------|--------------------|-------|-------|
| Prerequisites and co-requisites | <ol style="list-style-type: none"> 1. Basic knowledge of digital technology. 2. Ability to program in C language. | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1" data-bbox="451 611 1487 712"> <thead> <tr> <th data-bbox="451 611 794 645">Subject passing criteria</th> <th data-bbox="794 611 1137 645">Passing threshold</th> <th data-bbox="1137 611 1487 645">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 645 794 678">Written exam</td> <td data-bbox="794 645 1137 678">60.0%</td> <td data-bbox="1137 645 1487 678">50.0%</td> </tr> <tr> <td data-bbox="451 678 794 712">Practical exercise</td> <td data-bbox="794 678 1137 712">60.0%</td> <td data-bbox="1137 678 1487 712">50.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Written exam | 60.0% | 50.0% | Practical exercise | 60.0% | 50.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | |
| Written exam | 60.0% | 50.0% | | | | | | | | | | |
| Practical exercise | 60.0% | 50.0% | | | | | | | | | | |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Starecki T.: Mikrokontrolery 8051 w praktyce, Wydawnictwo BTC, Warszawa 2002 2. Bogusz J.: Programowanie mikrokontrolerów 8051 w języku C w praktyce, BTC, Warszawa 2005 3. Gałka P., Gałka P.: Podstawy programowania mikrokontrolera 8051, MIKOM, Warszawa 2002 4. Rydzewski A.: Mikrokomputery jednocukładowe rodziny MCS-51. WNT, Warszawa 1992 5. Paprocki P.: Mikrokontrolery STM32 w praktyce, BTC, Warszawa 2009 6. Galewski M.: STM32. Aplikacje i ćwiczenia w języku C, BTC, Warszawa 2011 | | | | | | | | | | |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Bogusz J.: Lokalne interfejsy szeregowo, BTC, Warszawa 2004 2. Daca W.: Mikrokontrolery - od układów 8-bitowych do 32-bitowych. Wydawnictwo MIKOM, Warszawa 1992 3. Hadam P.: Projektowanie systemów mikroprocesorowych, Wydawnictwo BTC, Warszawa 2004 | | | | | | | | | | |
| | eResources addresses | Adresy na platformie eNauczanie: | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <p>Sample topics of laboratory exercises:</p> <ol style="list-style-type: none"> 1. The use of the microcontroller input/output ports 2. Logic controller function implementation 3. 7-segment LED display driver implementation 4. The use of LCD alphanumeric display 5. The use of the microcontroller timers 6. Interrupts handling 7. Communication via UART interface | | | | | | | | | | | |
| Work placement | Not applicable | | | | | | | | | | | |