GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Programming of ARM microcontrollers, PG_00031366 | | |
| Field of study | Electrical Engineering | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | 2023/2024 |
| Education level | first-cycle studies | Subject group | |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish |
| Semester of study | 6 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Filip Wilczyński | |
| | Teachers | dr inż. Filip Wilczyński | |

**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 | 5.0 | 35.0 | 100 |

**Subject objectives**

The aim of the course is to provide the ARM-core microcontrollers. The aim of the course is the discussion of the ARM architecture and its possible applications in automation and electrical engineering as well as in everyday life. Deepening programming skills in C by developing control functions. Programing by student the peripheral interface with STM32F407 processor allows to education programming skills of modern electronic devices.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_W10 | The student has knowledge of the basics of electricity conversion and the basics of electric traction | [SW3] Assessment of knowledge contained in written work and projects<br>[SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge |
| K6_K01 | The student has the need and awareness for self-education in microcontroller programming | [SK1] Assessment of group work skills<br>[SK5] Assessment of ability to solve problems that arise in practice |
| K6_U09 | The student is able to select equipment for the load and short-circuit conditions | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| K6_K05 | The student has knowledge in the field of occupational health and safety and is able to respond appropriately in a situation that threatens health and life | [SK3] Assessment of ability to organize work<br>[SK4] Assessment of communication skills, including language correctness<br>[SK5] Assessment of ability to solve problems that arise in practice |

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| Subject contents | 1. ARM architecture<br><br>2. ARM architecture<br><br>3. Input/Output ports<br><br>4. Programming in C<br><br>5. Series and paraller microcontroller interfeces (RS232, USART...)<br><br>6. A/C, C/A transducer<br><br>7. A/C, C/A transducer<br><br>8. Interruptions, timers, clocks...<br><br>9. The examples of the program functions<br><br>10. The examples of the program functions<br><br>11. Microcontroller cooperation with FPGA<br><br>12. The wire and wireless interfaces (I2C, I2S, CAN)<br><br>13. The wire and wireless interfaces (I2C, I2S, CAN)<br><br>14. Example applications<br><br>15. Example applications |
| Prerequisites and co-requisites | The basic level of C/C++ programming skill. |
| Assessment methods and criteria | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| The laboratory reports | 60.0% | 80.0% |
| Project | 60.0% | 20.0% |

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| Recommended reading | Basic literature | 1.Pełka R.: "Mikrokontrolery - architektura, programowanie, zastosowania". Wydawnictwa Komunikacji i Łączności, Warszawa 2003.<br><br>2.Baranowski R.: "Mikrokontrolery AVR ATmega w praktyce", BTC, Warszawa 2006.<br><br>3. Doliński J.: "Mikrokontrolery AVR w praktyce". BTC, Warszawa, 2004.<br><br>4. Paprocki K. "Mikrokontrolery STM32 w praktyce", Wydawnictwo BTC 2009.<br><br>5. www.arm.com<br><br>6. www.st.com<br><br>7. Yiu J.:The Definitive Guide to ARM® Cortex®-M3 and Cortex®-M4 Processors, Third Edition 2013. |
| | Supplementary literature | The internet resources, e.g.:<br><br>www.st.com<br><br>www.arm.com<br><br>http://stm32f4-discovery.com<br><br>https://my.st.com |
| | eResources addresses | Adresy na platformie eNauczanie:<br>PROGRAMOWANIE MIKROKONTROLERÓW [2022/23] - Moodle ID: 28469<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28469 |
| Example issues/ example questions/ tasks being completed | 1. I/O ports programming<br><br>2. Timers, clocks and PWM programming<br><br>3. A/C transducer<br><br>4. USART communication<br><br>5. Interrupt controller | |
| Work placement | Not applicable | |