GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Programming of Microcontrollers, PG_00057832		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Artur Cichowski	
	Teachers	dr inż. Artur Cichowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	20.0	10.0	0.0	40

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	40	5.0	30.0	75

Subject objectives

The aim of the course is to expand the knowledge and competences in the field of programming microcontrollers.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U05	The student knows the basic safety rules when working with electrical devices.	[SU1] Assessment of task fulfilment
K6_W09	The student is able to control a buck converter.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
K6_W10		
K6_K01	The student appreciates the importance of self-expanding knowledge in the field of microcontroller programming. He is aware of the very rapid progress in the development of microprocessor technology in the world.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK2] Assessment of progress of work

Subject contents

ATmega128 microcontroller programming in C language. Interrupt handling. Communication interface software: SPI, I2C, RS-232, 1-wire, optical-RC5. Using a microcontroller to control a step-down converter with a load current regulator. Programmable operation of the DS18B20 temperature sensor with a 1-wire interface. Software support for the real time clock DS1305 with SPI interface. Software support for the MCP4921 digital-to-analog converter with the SPI interface. Programmatic support for the LGMBG12864D6WLW graphic display with the T6963C driver. Communication between two microcontrollers using the RS-232 interface. Communication between the PC and the microcontroller via the USB interface. Implementation of projects in groups of two or possibly three people.

Prerequisites and co-requisites

Continuation of the course Microprocessor Techniques (code PG_00038402) from the fourth semester.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Software projects	60.0%	100.0%

Recommended reading	Basic literature	1. Kernighan B. W., Rietchie D. M. Język ANSI C. WNT, Warszawa 1998 2. Witkowski A.: Mikrokontrolery AVR programowanie w języku C przykłady zastosowań, Katowice 2006 3. M. Kardaś: Mikrokontrolery AVR Język C Podstawy programowania wyd. II, Atnel Szczecin 2013
	Supplementary literature	1. T. Francuz: Język C dla mikrokontrolerów AVR. Od podstaw do zaawansowanych aplikacji. Wydanie II, Helion 2015 2. T. Francuz: AVR. Praktyczne projekty, Helion 2013 3. Cichowski A., Śleszyński W., Szczepankowski P.: Technika cyfrowa i mikroprocesorowa, Politechnika Gdańska, Wydział Elektrotechniki i Automatyki, Gdańsk 2010. 4. Documentation of electronic modules 5. Microchip Technology documentations (datascheet ATmega128)
	eResources addresses	Adresy na platformie eNauczanie: PROGRAMOWANIE MIKROKONTROLERÓW [Niestacjonarne] [2022/23] - Moodle ID: 28468 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28468
Example issues/ example questions/ tasks being completed	1. Development of software enabling: • setting configurable current reference values for a current regulator that regulates the output current of the buck converter to which the power LED is connected. • switching current references • changes of the reference values in a cyclical manner with the possibility of configuring the duration of specific values of the set current. 1. Software support for the real-time clock DS1305 with SPI interface. 2. Software support for the MCP4921 digital-to-analog converter with the SPI interface 3. Programmable operation of the DS18B20 temperature sensor with a 1-wire interface.	
Work placement	Not applicable	