GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Applications of Embedded Systems, PG_00053906		
Field of study	Informatics		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Bikonis	
	Teachers	dr inż. Krzysztof Bikonis dr inż. Andrzej Kwiatkowski mgr inż. Tobiasz Dryjański dr inż. Jerzy Demkowicz	

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	10.0	55.0	125

Subject objectives

The aim of the course is to acquaint the student with the application areas and directions of the development of embedded systems and embedded systems programming methods performing certain tasks.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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, compiles, runs and tests programs on the embedded system performing specific tasks.	[SU2] Assessment of ability to analyse information
[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	The student knows and understands the principles of programming embedded systems performing specific tasks on the example of programmable PSoC systems (CY3271, CY8CKIT-003), STR910-Eval system, iMX system, JN5148 system (wireless embedded modules), ADISUSBZ system (sensors from the iSensors ADIS 16300 series, ADIS 16400).	[SW1] Assessment of factual knowledge
[K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.	The student knows and understands the areas of application and development directions of embedded systems.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>1. Areas of application and development directions of embedded systems.
2. Characteristics of single-board computers used in embedded systems (Raspberry Pi)
3. Selected processor architectures in embedded systems (DSP, ARM, MIPS).
4. Dedicated systems programmed in the hardware description language (ASIC, PLD, FPGA) .
5. Mass storage in embedded systems (disks, file systems).
6. Inertial sensors in embedded systems.
7. Wireless data exchange in embedded systems (Bluetooth, Zigbee).
8. ATM networks.
9. Sensor and sensor networks based on embedded systems.
10. Selected technologies for producing touch screens.
11. Multitasking in embedded systems (threads, processes).
12. Methods for increasing the performance of embedded systems, multiprocessor systems.
13. Design methods for embedded time-based systems (HRT-HOOD).
14. Embedded systems in industry and automotive (PLC, SCADA, CAN).
15. Embedded systems in home entertainment (video game consoles).
16. Mobile telephony as an example of embedded mobile systems.
17. The process of compiling the embedded system from the point of view of programming tools.
18. Microframes and operating systems for embedded systems. Similarities and differences.
19. Examples of embedded operating systems (CFR). Methods of selecting CFR from the point of view of matching it to specific applications.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Passing the course "Embedded Systems and Microprocessors"</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Midterm colloquium</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Practical exercise</td><td>51.0%</td><td>50.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. S. Monk, Raspberry Pi, Receptury, Helion 2020
2. A. S. Berger, Embedded Systems Design: An Introduction to Processes, Tools and Techniques, CMP Books, 2002
3. J. Majewski, P. Zbysiński, Układy FPGA w przykładach, BTC, 2007
4. M. Barr, A. Massa, Programming Embedded Systems: With C and GNU Development Tools, 2nd Edition, O"Reilly, 2008
5. T. Noergaard, Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers (Embedded Technology), Elsevier, 2005</td></tr>
<tr><td>Supplementary literature</td><td>1. R. Santos, S. Santos, 20 prostych projektów Raspberry Pi, PWN, 2019
2. .L. Sah, M. O'Hanlon, Create Graphical User Interfaces with Python, Raspberry Pi Press, 2020
3. G. Halfacree,The Official Raspberry Pi Beginners Guide, Raspberry Pi Press, 2019
4. Manuals for modules used during laboratory classes</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Aplikacje Systemów Wbudowanych 2023 - Moodle ID: 32813
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32813</td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>