Embedded systems - course description

General information

Course name	Embedded systems
Course ID	11.9-WE-INFP-EmS-Er
Faculty	Faculty of Engineering and Technical Sciences
Field of study	Computer Science
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	5
ECTS credits to win	6
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. inż. Alexander Barkalov

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Exam
Laboratory	30	2	-	-	Credit with grade
Project	15	1	-	-	Credit with grade

Aim of the course

- familiarizing students with basic technologies related to embedded systems
- shaping the skills of designing simple embedded systems

Prerequisites

Logic for IT specialists, Computer architecture I, Algorithms and data structures

Scope

Introductory information: characteristics, organization, system design requirements
prisoners; real time, reactivity. Designing: specification, modeling, verification, implementation; formal specification models - FSM, CFSM, state diagram; integrated hardware and software design. Real-time systems: time requirements, process status, priorities, task scheduling, shared resources, races, critical regions. Concurrent processes: processes and communication, transmission of information, shared resources, deadlocks, semaphores, monitors. Interfaces and communication: bus, ports, protocol concept, interrupt and interrupt-controlled, DMA, bus arbitration, serial protocols, parallel protocols, wireless protocols. Printed circuits: development of schematic diagrams, connection lists, enclosures, circuit design printed, circuit making technologies, assembly.

Teaching methods

lecture: conventional lecture
laboratory: laboratory exercises
project: project method

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
He can design a simple embedded system and real-time system		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory • Project
He can handle selected tools supporting the design of embedded systems		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory • Project
He can propose a functionality description method of embedded systems		• an exam - oral, descriptive, test and other	• Lecture
Is open to technological innovations in the field embedded systems		• an exam - oral, descriptive, test and other • an ongoing monitoring during classes	• Lecture • Laboratory • Project
The student can name and characterize the basic concepts regarding embedded systems		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture - The condition for passing is to get a positive grade from the exam
in writing. The condition to take the exam is a positive grade from lab.
Laboratory - the condition for passing is to get positive grades from everyone laboratory exercises planned for implementation as part of the laboratory program (80%) and active participation in classes (20%).
Project - the condition for passing is to get a positive evaluation from the project Components of the final grade = lecture: 40% + laboratory: 30% + project: 30%

Recommended reading

1. Vahid F., Givargis T.: Embedded System Design: A Unified Hardware/Software Introduction, Wiley, 2002, ISBN: 978-0-471-38678-0
2. Douglass B., Real Time UML Workshop for Embedded Systems, Newnes, 2006
3. Sass R., Schmidt A, Embedded Systems Design with Platform FPGAs, Morgan Kaufmann, 2010

Further reading

Notes

Modified by prof. dr hab. inż. Andrzej Obuchowicz (last modification: 18-07-2021 16:18)