



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Embedded systems

Course

Field of study

Electronics and telecommunications

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Sławomir Hanczewski

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Responsible for the course/lecturer:

mgr inż. Michał Weissenberg

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Prerequisites

Student has basic knowledge of programming, of the basics of computer construction and microprocessors. He should also understand the need to expand his competences and have the ability to obtain information from specified sources.

Course objective

Presentation the theoretical and practical issues related to embedded systems.

Course-related learning outcomes

Knowledge

1. Student has organized knowledge with theoretical foundations of computer architecture, principles of operation of embedded systems and management of embedded systems resources i.e. processor, memory, storage.

2. Has knowledge of the network communication of embedded systems.



Skills

Student is able to do critical analysis of embedded system. Student is able to use appropriate algorithms for management of embedded system resources.

Social competences

1. Student is aware of the changes that occur with the evolution of embedded systems. Knows the limitations of his own knowledge and understands the need for continuous updating. Is open to the possibility of continuous training.
2. Student shows professional approach to solving problems related to embedded systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Knowledge is verified by a test, which has a written part. The test consists of 5 open questions, scored depending on their difficulty (1-5 points). Passing threshold is 50%. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

Tutorials:

Tutorials are evaluated based on a test (written or oral depending on the size of the group). The test consists of four open questions scored depending on their difficulty. Passing threshold is 50%. The issues on the basis of which the questions are developed correspond to the content presented during the exercises.

Programme content

Lectures:

1. Introduction

Computer history and the division of operating systems. Overview of the most important functions of the operating system.

2. Modern operating systems

The idea of open source software, commercial software. The basics of the bash console shell. The most important tools in Linux. Processes, thread. Process and thread management. Memory.

3. Real-time systems

Characteristics of real-time systems: requirements, structure, properties.

4. Communication

Communication in embedded systems.

5. Examples of embedded systems



Routers as network embedded systems.

6. Processors used in embedded systems

Architecture and characteristics of processors in embedded systems.

7.Characteristics of network operating system

8. Virtualization

Virtualization of network nodes and hosts, network virtualization - tools, sample solutions.

9. Network communication.

Remote access, security, tests.

Tutorials:

1. IPv4 and IPv6 addressing.
2. Process scheduling algorithm in embeded systems.
3. Memory management algorithm.
4. Deadlock detection and deadlock avoidance algorithms.

Teaching methods

Lecture: multimedia presentation supplemented with examples and additional explanations on the board. Lectures are conducted in accordance with the principles of traditional lecture, in justified cases taking the form of a conversational lecture.

Tutorials: multimedia presentation, presentation illustrated with examples given on a blackboard

Bibliography

Basic

1. Silberschatz A., Galvin P.B., „Podstawy systemów operacyjnych”, WNT 2006.
2. Bis M., Linux w systemach embedded, BTC 2011.

Additional

1. Wtallings W., Systemy operacyjne : architektura, funkcjonowanie i projektowanie, Helion 2018



Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	30	1,0

¹ delete or add other activities as appropriate