



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Operating 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 operating systems.

### Course-related learning outcomes

Knowledge

1. Student has organized knowledge with theoretical foundations of computer architecture, principles of operation of operating systems and types of operating systems.
2. Has knowledge of the algorithms used by operating systems to manage the resources of computer systems, allowing for their effective use.



### Skills

1. Student is able to do critical analysis of computer hardware operations and operating system.
2. Student is able to use algorithms for effective computer system resource management.

### Social competences

1. Student is aware of the changes that occur with the evolution of operating 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 operating systems.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

Knowledge is verified by an test, which has a written. The test consists of 5 open questions, scored depending on their difficulty (1-5points). 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.

##### 3. Processes

The principle of multi-tasking. Process concept. Processor time allocation algorithms. Process scheduling.

##### 4. Process and thread management



The principle of operation of threads. Process / thread management in Linux. Creation of processes. Pthread library.

#### 5. Process synchronization

Inter process communication. Process synchronization algorithms. Synchronization Hardware. Deadlocks.

#### 6. Memory management

Continuous memory allocation. Algorithms. Memory management: paging and segmentation.

#### 7. Virtual memory

Virtual memory optimization.

#### 8. Storage management

File concept. File attributes. Access methods. Directory, disk structure and optimization. Storage management and file systems in Linux.

#### 9. Embedded systems

General characteristics of embedded systems.

#### 10. Real time systems

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

Tutorials:

1. Process scheduling algorithm.
2. Memory management algorithm.
3. Page replacement algorithms.
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. Tanenbaum A. S., Systemy operacyjne, Helion 2010
3. Wtallings W., Systemy operacyjne : architektura, funkcjonowanie i projektowanie, Helion 2018

Additional

1. Sobaniec C., System operacyjny LINUX : przewodnik użytkownika, Nakom 2002

**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) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate