COURSE DESCRIPTION CARD - SYLLABUS

Course name

Systemy operacyjne - Operating systems

Course

Field of study
Teleinformatics

Year/Semester
2/3

Area of study (specialization)

Profile of study
general academic

Level of study
first-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)

Tutorials
0

Projects/seminars
0/0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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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

Provide students with basic knowledge of the basics of the operation of a computer system. Developing students' skills in solving basic engineering problems related to the design of multi-threaded software. Shaping students' skills in acquiring knowledge about currently implemented solutions, extensions and changes in libraries and programming languages.

Course-related learning outcomes

Knowledge

1. Has knowledge of the architecture of computers and computer systems, the operation of peripheral systems, and the management of computer resources such as memory, processor time, and disk by operating systems.
2. Has a structured knowledge of architecture and operating principles of microprocessors and computers. He knows how the processor has been adapted to support the operating system.

Skills

Has the ability to analyze problems related to operating systems and apply appropriate algorithms for the effective management of computer systems resources.

Social competences

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.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge gained during the lectures is verified by the test carried out at the last lecture. The test consists of 5 open-ended questions. Each question is scored from 0 to 5 points (graded 1 point). 50% pass mark. Passing issues, based on which the questions are developed, will be sent to students by e-mail using the university's e-mail system.
The knowledge acquired during the laboratory exercises is verified by a test carried out in the last class. The test consists of 4 open-ended questions, with different scores depending on their difficulty. The pass mark is 50%. The issues based on which the questions are developed corresponding to the program content carried out during the laboratory exercises.

Programme content

Lectures: Issues related to the history, construction, operation, and maintenance of operating systems
Laboratory exercises: Linux system operation

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.
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 optiamalization.
8. Storage management
File concept. File attributes. Access methods. Directory, disk structure and optimalization. Storage mamagement and file systems in Linux.
9. Embeded systems
General characteristics of embedded systems.
10. Real time systems
Characteristics of real-time systems: requirements, structure, properties.

Laboratory exercises:
1. Managing virtual machines
2. Operating system administration - user management, file, and directory system management
3. Management of access rights in the operating system
4. Process management in the operating system
5. Pipeline processing and application of filters in the operating system
6. BASH shell script programming

Teaching methods

Lecture: multimedia presentation supplemented with examples and additional explanations on the blackboard.
Laboratory exercises: multimedia presentation and work with virtual machines running Linux.

Bibliography

Basic

1. Silberschatz A., Galvin P.B.: „Podstawy systemów operacyjnych”, WNT 2006
2. Negus C.: „Linux. Biblia", Helion 2021

Additional

Sosna Ł.: Linux. Komendy i polecenia, Helion 2022
Flynt C., Lakshman S., Tushar S.: „Skrypty powłoki systemu Linux Receptury", Helion 2018
Tanenbaum A.: „Rozproszone systemy operacyjne", PWN 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	116	4.0
Classes requiring direct contact with the teacher	60	2.0
Student's own work (preparation for tests, preparation for laboratory classes, literature studies)	56	2.0