Operating systems - course description

General information

Course name	Operating systems
Course ID	11.3-WE-INFP-OperSyst-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Computer Science
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	3
ECTS credits to win	6
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. inż. Krzysztof Patan

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	30	2	-	-	Exam
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- To provide basic knowledge about operating system design, operating systems tasks and operating systems types.
- To give basic skills in operating system configuration and management
- To provide basic knowledge about structure and principles of operating of UNIX-like systems.
- To give scripting programming skills.

Prerequisites

Principles of programming, Computer architectures I and II, Algorithms and data structures

Scope

1. *Computer system structure:* Operating memory, CPU, I/O devices, idea of the interrupt, dual model of system operation.
2. *Operating systems types*: Batch systems, multiprogramming systems, time-sharing (multi-tasking) systems, parallel systems, distributed systems, networked systems, real-time operating systems.
3. *Operating systems design.* Basic components of operating systems. Operating systems services. Kernel based systems, virtual machines. System calls.
4. *CPU scheduling*. Scheduling criteria, scheduling algorithms. Evaluation of scheduling algorithms. Round robin, priority scheduling, preemptive scheduling.
5. *Memory management.* Logical and physical addresses space. Contiguous allocation. Fragmentation: external and internal. Packing. Paging. Segmentation.
6. *Virtual memory.* Demand paging. Page replacement. Performance of demand paging. Algorithms of page replacement. Allocation of frames. Demand segmentation.
7. *File system.* File concept. Directory structure. File system structure. Allocation methods. Free-space management. File system structure.
8. *Windows 10 Professional,* system configuration, administration tasks, administration tools. Managing files and directories. User accounts, group accounts. Rights to files, directories and system components. Audit of system components. Monitoring operating system. Analysis of system components. Programming in command line and PowerShell.
9. *Linux*. Operating in file system. Fundamental system commands. Configuration files. Environment variables. Basic scripting. Bash programming language. Command line parameters. Pipes and redirection. Quoting and globbing. Regular expressions.

Teaching methods

Wykład: classical lecture.

Laboratorium: laboratory exercises using computer equipment.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form

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Student knows and can apply commands and tools of the operating system and write a shell script		• a quiz	• Laboratory
Is aware of the dynamic development of the discipline.		• a multiple choice and open questions test	• Lecture
Can carry out computer hardware and software configuration process and analyze and verify current OS configuration		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Can apply and analyze processor timing queuing algorithms, operational memory allocation and explain file system operation rules		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Student can name computer system sub-components and define operating systems tasks		• a multiple choice and open questions test	• Lecture
Is open to new technologies and is ready to implement them		• a multiple choice and open questions test	• Lecture

Assignment conditions

Lecture – the passing condition is to obtain a positive mark from the final test.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Calculation of the final grade: lecture 50% + laboratory 50%

Recommended reading

1. Silberschatz A., Galvin P.B., Gagne G.: *Operating system concepts. Seventh Edition*, Wiley, 2005.
2. Tanenbaum A.: *Modern operating systems*, Prentice Hall, 2001.
3. Stallings W.: *Operating Systems: Internals and Design Principles, Fourth Edition*, Prentice Hall, 2000.
4. Shotts W. E.: The Linux Command Line: A Complete Introduction 1st Edition, No Starch Press, Incorporated, 2012.

Further reading

Notes

Modified by prof. dr hab. inż. Krzysztof Patan (last modification: 14-07-2021 10:54)