SYLLABUS

Name: ***Specialized Operating Systems (InfAAu>SI6SOS19)***
Name in Polish:
Name in English: ***Specialized Operating Systems***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau2/course/view.php?id=1075

Short description:

The goal of the course is to introduce students into the topics related to a key characteristics, architecture and services of specific operating systems such as distributed operating systems (including peer-to-peer and blockchain) or real-time operating systems and virtual machine monitors. Laboratory classes are focused on solving advanced problems are related to configuration, administration and management of server operating systems. The students attending to the course should have knowledge about basic concepts and problems related to operating systems and theory of computer science. Pre-requisite subjects are operating systems, theory of computer science and fundamentals of computer programming.

Description:

ECTS: 3
Total hours: 75 h (60 hours of contact hours, 15 student's own work hours)

Forms of contact hours:
Lecture 30h
Laboratory 30h

Student's own work: preparation for classes, analysis of laboratory results, preparation for tests.

Lectures
The aim of the course is to introduce students to the concepts of general and specific-purpose operating systems, their functions, architectures, resource management methods, process synchronization, file systems and communication protocols. Subject covers the basic concepts of distributed systems (including peer-to-peer and blockchain) and specific-purpose systems such as virtualization systems, real-time operating systems, multimedia operating systems and embedded systems.

In particular, the following aspects of operating systems are discussed:
1. Problems of time management in distributed, real-time and multimedia operating systems.
2. Techniques of clock synchronization in computer systems.
3. Resource management methods, scheduling and synchronization in distributed and specific-tasks operating systems.
4. Issues related to security and reliability of operating systems.
5. Real-time processes and processing time requirements.
6. Selected algorithms dedicated to processor and memory management in real-time and distributed systems.
7. QNX as an example of real-time operating system.
8. Basic concepts related to multimedia and embedded operating systems.
9. Concepts of virtualization systems including details about Xen Hypervisor.
10. Peer-to-peer networks and blockchain.

Laboratory:
1. PowerShell (Windows)
2. Xwindow (Linux)
3. LIN Kernel (Linux)
4. Docker – part 1 (Linux)
5. Docker – part 2 (Linux)
6. Advanced Network Configuration (Linux)
7. Pentesting basics (Linux)
8. Programming in LIN (Linux)
9. MPI – Parallel programming (Linux)
10. Monitoring System Calls (Linux)
11. Windows System Programming (Windows)
12. Volume Space Managing (Linux)

Bibliography:

[1]A. S. Tanenbaum and M. van Steen, Distributed Systems: Principles and Paradigms. Createspace Independent Publishing Platform, 2016.
[2]G. Coulouris, J. Dollimore, T. Kindberg, and G. Blair, Distributed Systems: International Edition. Pearson Education, 2013.
[3]G. Buttazzo, Hard Real-Time Computing Systems: Predictable Scheduling Algorithms and Applications. Springer US, 2013.
[4]G. C. Buttazzo, G. Lipari, L. Abeni, and M. Caccamo, Soft Real-Time Systems: Predictability vs. Efficiency: Predictability vs. Efficiency. Springer Science & Business Media, 2006.
[5]D. Chisnall, The Definitive Guide to the Xen Hypervisor. Pearson Education, 2007.

Learning outcomes:

Knowledge:
Student acquires knowledge on fundamentals of specific and distributed operating systems.
[K1A_W13, K1A_W14, K1A_U29]

Skills:
1. Student acquires practical knowledge about Linux and Windows operating systems.
2. Student acquires practical knowledge and basic skills in configuring operating systems for server-related tasks.
3. Student acquires knowledge and basic skills in administer and managing server operating systems.
4. Student acquires knowledge and basic skills in reading reference literature and technical documentation.
[K1A_U10, K1A_U19, K1A_U29]

Assessment methods and assessment criteria:

Lecture:
Written test with open questions or multiple choice questions
Passing criteria: minimum 50% of correct answers

Lab:
Written test with open questions or multiple choice questions
Passing criteria: minimum 50% of correct answers

The syllabus is valid from academic year 2025/26 and its content cannot be changed during the semester.

Course credits in various terms:

Informatics, full-time first degree engineering studies 7 sem. (InfAAu-SI7)

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2020/2021-L	