

EE 468 Introduction to Operating Systems

Credits: 3

Categorization of credits: Engineering topic

Instructor's or course coordinator: Galen Sasaki, Jan. 9, 2021.

Textbook and Other Required Materials: Thomas Anderson and Michael Dahlin, *Operating Systems: Principles & Practice, Second Edition*, Publisher Recursive Books

Designation: Required for Computer Engineering, Elective for Electrical Engineering

Catalog Description:

Computer system organization; multiprocessor systems, memory hierarchies, assemblers, compilers, operating systems, virtual machine, memory management, processor management; information management. Pre: 361 (or concurrent) and 367 or consent.

Pre-requisites: EE 361 Digital Systems and Computer Design and EE 367 Computer Data Structures and Algorithms (EE 367), or consent.

Class/Lab Schedule: Three 1-hour lectures per week

Topics Covered:

- Kernel Abstraction (3 hrs)
- Programming Interface (2 hrs)
- Concurrency and Threads (3 hrs)
- Synchronizing Access to Shared Objects (4 hrs)
- Multi-Object Synchronization (4 hrs)
- Scheduling (4 hrs)
- Address Translation (4 hrs)
- Caching and Virtual Memory (3 hr)
- Advanced Memory Management (1 hr)
- File Systems: Introduction and Overview (2 hrs)
- Storage Devices (1 hr)
- File and Directories (4 hrs)
- Reliable Storage (3 hrs)

Course Objectives and Their Relationship to Program Objectives:

The students should understand modern operating system structure and system functionality. They are trained to be able to design, implement and evaluate the performance of modern operating systems.

Program objectives this course addresses are 1, 2, 3, 4, and 5.

Course Outcomes and Their Relationship to Program Outcomes

The following are the course outcomes and the subset of Program Outcomes (numbered 1-8 in square braces "[]") they address:

Understand modern operating systems structure [1,3]
Understand process management concepts, and be able to design, implement and evaluate multiprocessing and multithreading systems [1,2,3,5,7]
Understand memory management concepts, and be able to design, implement and evaluate virtual memory organizations. [1,2,3,5,7,8]
Understand file systems and I/O mechanisms. [1,2,3,7]
Understand multiprocessor architectures, and be able to design and evaluate the performance multiprocessor operating systems. [1,2,3,5,4,7,8]
Understand real-time system scheduling mechanism. [1,2,3,4,7,8]
Understand system protection and security concepts [1,2,7,8]

Contribution of Course to Meeting the Professional Component

Engineering topics: 100%. Technical writing: 40%.

Computer Usage: Students use available software tools, programming languages (C and C++, as needed), operating systems (Linux), and Internet to prepare their projects and present the results. About 30% of assignments are software projects and homework and exam problems that require programming. Written research reports account for 40% of the grade, and the students use Internet for research and word processing to prepare reports.

Design Credits and Features:

EE468 has 1.5 design credits. At least 30% of the projects design and implement software algorithms and subsystems, and evaluate of the overall operating system. Written research reports account for 40% of the grade. There are four reports covering current topics such as embedded systems, mobile computing, cloud computing, and research papers, as published in major conferences.