

# System and Device Programming (OS internals) a.y. 2021/2022



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# Course structure

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Part I (5 credits, Cabodi):

Operating System Design (Operating System  
internals)

Part II (5 credits, Quer):

system calls, C++ language, concurrent  
programming)

The two parts (independend each other) are  
done in parallel.



# Operating Systems

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## Possible topics

- How to design/implement an OS
- How to do System Management
- How to interact with an OS
  - Script languages (e.g. bash)
  - API software (win32, Linux system calls)



# Operating Systems

Part I  
(Cabodi)

Possible topics

- How to design/implement an OS
- ~~How to do System Management~~
- ~~How to interact with an OS~~
  - ~~Script languages (e.g. bash)~~
  - API software (win32, Linux system calls)

Part II  
(Quer)



# Syllabus

## (Operating System Internals)

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- ❑ MEMORY MANAGEMENT
- ❑ FILE SYSTEM
- ❑ MASS STORAGE MANAGEMENT
- ❑ I/O SUBSYSTEM
- ❑ Examples from Unix/Linux
- ❑ **OS161 teaching operating system**  
(simplified, inspired to unix/linux)



# Syllabus (lab)

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## OS161:

Introduction, compiling/making and debugging the kernel

Handling kernel threads

Memory management

User processes and system calls

File system

other...

**Warning: C language !!!**



# OS/161

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Teaching operating system:

<http://os161.eecs.harvard.edu>

- Simple, editable source code, debuggable kernel
- Includes empty parts: TODOs to be completed/implemented by students!
- Why not LINUX ?
  - Too complex
  - Efficiency dominates on readability
  - Further complexity arises from multi-platform support



# Prerequisites

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- Operating Systems
- Computer Architectures
- C language





# Past experience

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- Low uniformity (high diversification) in previous knowledge and skills
- The (mandatory) course is closer to some areas/tracks of the MS programme (e.g. Automation, Cybersecurity, Embedded Systems, Graphics, ...) than to other ones.
- Problems hidden «from theory to practice», «from saying to doing» (labs, projects)
- The «percieved» workload (hours/credit) could be highly related to personal/individual aspects, especially when related to missing/partial prerequisites.



# Operating Systems

## (BS course)

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**Assumed as already done (partly revised by Prof. Quer)**

- ❑ Architecture of an Operating System
- ❑ System Calls
- ❑ File System
- ❑ Processes and Threads
- ❑ Process and Thread Synchronization
- ❑ Process (CPU) scheduling



# Text book (Op. Syst. Des.)

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- **Silberschatz A., Galvin. P. "Operating Systems", Addison-Wesley Publishing Company, 10th Ed.**
- **[www.os-book.com](http://www.os-book.com)** *(includes ppt slides used in lectures)*
- *Additional book (for extra reading):  
Tanenbaum, "Modern Operating Systems",  
Pearson*



# Course material

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On personal student's page (portale):

- Teaching material
- Examination rules
- Syllabus.

Dynamically updated: additional material, infos, exercices and old exams, etc.



# Material

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Slides taken from [www.os-book.com](http://www.os-book.com)

Other slides and files

Text and solutions of labs

# Instructor



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**Use Slack for better interaction**