UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Operating Systems and Networks (blended)

2122-2-E3101Q110

Aims

The student shall learn the basic architectural elements and technical components of a modern Operating System, as well as the architecture and protocols employed in a TCP/IP network, up to the transport layer. The student will be able to understand and develop simple software functions which can be part of an Operating System kernel.

Contents

Architecture of an Operating System, Threads and Processes, Scheduling and Synchronization, Memory Hierarchy, Virtual Memory, File System, Transport Layer, Network Layer, LAN, Wireless LAN, Physical Layer basics.

Detailed program

Operating Systems

1: The architecture of an Operating System:

- functions of the Operating System

- structure of the Operating System

- system calls

2: Processes and Threads:

- processes and their management

- interprocess communication

- threads and multithreading programming

3: Scheduling and Synchronization:

- CPU scheduling algorithms

- critical sections and synchronization

- semaphores and synchronization problems

4: Memory Hierarchy and Virtual Memory:

- memory hierarchy

- main memory management and paging

- virtual memory

5: File System:

- the file concept and attributes

- file system structure and implementation

- mass storage structure

Networks

6: Transport layer:

- functions of the transport layer

- UDP protocol

- TCP protocol

- congestion control

7: Network layer:

- functions of the network layer

- IP addressing

- routing algorithms

8: LAN, Wireless LAN, physical layer basics:

- link layer functions

- CSMA/CD and Ethernet LANs

- radio communication issues

- 802.11 WLAN

Prerequisites

The fundamental concepts taught in the following courses: Computer Architecture, Programming 1 and Programming 2

Teaching form

Classroom lectures, e-learning exercises and self-assessments and on-line tutoring

The course will be held in Italian.

Textbook and teaching resource

A. Silberschatz, P. Galvin, G. Gagne, "Sistemi Operativi - concetti ed esempi", 10th Edition, Pearson, ISBN: 978-88-9190-455-3

J. Kurose, K. Ross, "Reti di Calcolatori e Internet", 7th Edition, Pearson, ISBN: 978-88-9190-254-2

On-line lessons, exercises and other material

Semester

Second year, first semester

Assessment method

The assessment consists in a written test, with the possibility of partial intermediate tests (*in itinere*).

There are two *in itinere* tests and are held in the middle and at the end of the course. It is necessary to pass both of them to pass the exam. In the event that one of the two *in itinere* tests has not been passed or has not been sustained, it is possible to recover it in the first exam session, provided that the other test has been positively

passed. Passing only one of the two *in itinere* tests does not give rise to any bonus for the subsequent full examination tests.

The tests include both multiple choice questions and open-ended questions, requiring a reasoned argument on one of the course topics. Open-ended questions are only assessed if the student has correctly answered at least 50% of the multiple choice questions. Only the second of the partial intermediate tests includes open-ended questions.

The following table shows the composition of the exams, with the division of the questions in the two parts of the course (Networks and Operating Systems)

Test	Multiple choice (Networks)	Multiple choice (OS)	Open (Networks)	Open (OS)
I in itinere	8	6	-	-
II in itinere	5	7	1	1
Full exam	8	8	1	1

Office hours

Prof. Braione: by appointment via email

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