

**ECTS A.A. 98-99**

**Course name: Operating System** (Sistemi Operativi)

**Year: 4th Semester: 1st**

**Course type: Compulsory** (presente solo nel Corso di Laurea di Ingegneria Informatica)

**Teacher: Letizia LEONARDI**

### **Lectures**

**Total number of hours: 104**

**Duration: 13**

**Hours per week: 8**

**Theory: 6**

**Exercise: 2**

### **Laboratory**

**Total number of hours: 39**

**Duration: 13**

**Hours per week: 3**

### **Assessment method**

Written tests + evaluation of a laboratory project + oral

**CODE: xxx**

**ECTS CREDITS: x**

### **AIMS**

The course aim is both to reach a good knowledge of each Operating System level and to study a specific Operating System (UNIX). To this purpose, the theoretic arguments are faced from a system point of view by using UNIX as a case of study. In particular, w.r.t. UNIX, the course aims at both going over the knowledge of the external interface (commands and shell language), given in the course of Foundations of Computer Science II, and deepening it describing the shell implementation after the presentation of the basic primitives.

### **PROGRAMME**

- Operating System introduction  
Historical evolution: from first Operating Systems to modern ones. Operating Systems classification: mono- and multi-user systems, batch and interactive systems, time-sharing and real-time systems.
- Basic elements of an Operating System.
- Concurrent programming techniques  
Synchronisation and communication models for processes by using global and local scenarios. The deadlock problem. Mechanisms and policies of resources protection.
- Operating System as resource managers
  - a) CPU management: scheduling algorithms;
  - b) Memory management: swapping, paging, segmentation, virtual memory;
  - c) File System management: logic organisation and physical allocation.
- Analysis of an existing Operating System: UNIX.  
Going over and deepening of the user interface:
  - main user commands: redirection and command piping;
  - programming by using different command languages: the Bourne shell example.System programming by using the programming language C: in particular, process handling and synchronisation by using the mechanisms of the different versions (Unix BSD 4.3 and Unix System V).
- Distributed system and security issues.  
Communication primitives for UNIX-based distributed systems: the socket mechanism.

### **BIBLIOGRAPHY**

1. SILBERSCHATZ A., GALVIN P., *Operating System Concepts*, Addison-Wesley, 1994.
2. MILENKOVIC M., *Operating Systems: Concepts and Design*, McGraw-Hill, 1987.
3. ANCILOTTI P., BOARI M., *Principi e Tecniche di Programmazione Concorrente*, UTET, 1988 (in italian).
4. BOURNE S. R., *UNIX System V*, Addison-Wesley, 1990.
5. TANENBAUM A.S., WOODHULL A.S., *Operating Systems: Design and Implementation*, Prentice-Hall, 1997.
6. HAVILAND K., SALAMA B., *Unix System Programming*, Addison-Wesley, 1987.
7. FOXLEY E., *Unix for Super Users*, Addison-Wesley, 1985.

**PRE-REQUISITES**

Foundations of Computer Science II