Program	59EC – Communications Electronic Engineering B. Eng. 59SC – Telecommunications Systems Engineering B. Eng. 59SO – Sound and Image Engineering B.Eng. 59TL – Telematics Engineering B. Eng.

Course number and name	
Number	595000026, 595000325, 595000125, 595000225
Name	Operating Systems
Semester	S5 [(September-January)]

Credits and contact hours	
ECTS Credits	4,5
Contact hours	45

Coordinator's name	López Presa, José Luis [joseluis.lopezp@upm.es]

Specific course information
Description of course content
The operating system is the basic software component of any computer system. Its main function is to provide applications with a suitable execution environment and manage machine resources to achieve an equitable, safe and efficient sharing between the different programs and services. This course provides a theoretical and practical introduction to the concepts, technologies and tools of operating systems, mainly for general purpose computers. These topics are exemplified on widely used operating systems, such as POSIX / Unix and Windows. The course competes all the levels that the student learns in the degrees, from digital logic to application. At the end of the course the student will know the most important characteristics of operating systems, such as the general structure of the operating system, the sharing of resources, the protection between processes, the interface of communication with users and applications and the treatment of concurrency problems. Some details about the fundamental problems in the management of CPU resources, memory, I / O and files, are also shown, with the most common techniques used to manage these resources efficiently and flexibly. In addition, the student will achieve basic skills of use at the user level of an operating system of the type POSIX / Unix (FreeBSD) and multi-threaded application development for the same. Students will also develop multithreaded applications for Java environment with concurrency control between different threads.
List of topics to be covered
1. Concepts, objectives and components of the operating system 2. Processor management

3. Memory management
4. Concurrency
5. Input/output management
6. Files system

Lab sessions:
1. Installation of a FreeBSD operating system on a virtual machine.
2. POSIX environments.
3. Multitasking applications in POSIX environments.
4. Threads and concurrency in Java.

Prerequisites or co-requisites

- Computer architecture, C and Java programming and ability to understand technical texts in English about the computer science.
- Programming I
- Programming II
- Microprocessors

Specific goals for the course

Specific outcomes of instruction

- RA61 – To learn general principles about general purpose and real time operating systems, as well as the basic mechanisms of resource management.
- RA967 – To use the POSIX system calls.
- RA966 – To know how to use POSIX systems to develop applications in the field of the telecommunications.
- RA57 – Ability to design an application de from a specification of a medium-complexity problem.
- RA56 – Ability to program medium-complexity applications in a high-level language according to the rules of structured programming.
- RA64 - Understand the specific problems of concurrent applications. Learn the basic tools for developing applications with these characteristics.
- RA63 - Use standard application development tools for a general purpose operating system.
- RA62 - Installation and use of a multi-programmed general purpose operating system.

Further reading and supplementary materials

- TANENBAUM A. S. Sistemas Operativos Modernos. Pearson Educación, 2015
- ABRAHAM SILBERSCHATZ & PETER GALVIN & GREG GAGNE. Conceptos de sistemas operativos. 10ª Edición McGraw-Hill, 2018.
- WILLIAM STALLINGS. Sistemas Operativos: aspectos internos y principios de diseño. 9ª Edición Pearson Educación, 2018
- CARRETERO PEREZ J. / DE MIGUEL ANASAGASTI P. / GARCIA CARBALLEIRA F. / PEREZ COSTOYA F. Sistemas operativos: una visión aplicada. 2ª Edición Mc. Graw.Hill, 2007.
- Moodle.


TELECO.
CAMPUS
SUR-UPM
ETSIST
POLITÉCNICA