Operating systems design

Academic Year: (2019 / 2020)   **Review date: 07-05-2020**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: CALDERON MATEOS, ALEJANDRO

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)
* Programming
* Operating Systems

OBJECTIVES

The goal of this course is to introduce students into the organization, structure and internal vision of the operating system, and the integrated services used in order to let students to design operating systems elements. The students have to know the impact of the decisions taken in the design into the computational system. In order to archive this goal, the student have to acquire several generic skills, knowledge, capacities and attitudes.

General/transversal competences:
- Analysis and synthesis capacities (PO a)
- Abilities to organize and to plan (PO a)
- Problem resolution abilities (PO c)
- Capacity to apply theoretical concepts (PO a, c)

Specific competences:
- Cognitive (knowledge) (PO a)
1. Knowledge of the architecture and organization of a Operating System.
2. An understanding of the impact of the operating system design decisions into the rest of the system.
3. Knowledge of the techniques for programming and modifying the operating system.
4. Knowledge of the methods for the internal management of resources in an operating system.

- Procedimental/Instrumental (Know how) (PO b, e, j, k, g)
1. To modify the operating system through modules programming or building.
2. To design operating systems components
3. To use tools for operating systems

- Attitudinal (To be) (PO c, d, i)
1. Critical attitude towards the internal architecture of current operating systems.
2. Concern for the quality of the components of an operating system.
3. Motivation for archiving better solutions.
4. Self-learing capacities.

General and Transversal Competences
 * To use in an efficient way electronic tools for writing technical report, project memos and reports about computer science, including high quality presentations (CG9)
 * Basic knowledge about the usage and the programming of computers, operating systems, data bases, and computer applications with engineering applications (CGB4)

Computer Science's related competences
 * Knowledge of characteristics, functionality and structure of operating systems, and to design and implement software based on its services (CECRI10)

Computer Engineering related competences
 * Knowledge to design and implement system software and communication software (CEIC4)

DESCRIPTION OF CONTENTS: PROGRAMME

Course syllabus:
1.- Introduction
2.- Operating system Internals
3.- Process, communication and synchronization in operating systems
4.- I/O, File system and directories
5.- Memory Management
6.- Advanced aspects

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures (PO a)
- Practical lessons (PO a, b, c, e, k)
- Exercises and Exams (PO a, b, c, e)
- Student's work

Relationship between outcomes and evaluable activities:
* PO a, b, e, j: exercices, and exam
* PO c, k, d, g, i: laboratories

* CG9: labs (report)
* CGB4: labs
* CECRI10: labs
* CEIC4: labs

Soft-skills: work in a group

ASSESSMENT SYSTEM

I) Ordinary session

The continuous evaluation consists of: Programming assignments and Exercises.

About the continuous evaluation:
  + All programming assignments are mandatory.
    * They require that the average of all grades of all assignment must be a minimal of 4 (over 10)
  + Exercises tagged as mandatory must be done.

In the Final exam:
  + All the subject content (and activities done) are included.
    It will cover quizzes, exercises, programming assignments, etc.
  + The minimal grade to pass the ordinary session in the final exam is 4 over 10.

The final grade will be computed by the following formula:
   Final grade = Final exam grade * 0.30 + Programming assignments grade * 0.40 + Exercises and lab. assignments grade * 0.3

For all students that are not following the continuous evaluation
the final grade will be the 60% of the final exam grade.

II) Extraordinary session

In the Final exam:
  * All the subject content (and activities done) are included.
  * The minimal grade to pass the final exam is 4 out of 10.
  * The average grade of the exercises related to the Programming assignments
    will be 4 or higher for students that did not meet the requirements of the continuous evaluation.

% end-of-term-examination:	30
% of continuous assessment (assigments, laboratory, practicals…):	70

BASIC BIBLIOGRAPHY

 - Abraham Silberschatz Operating System Concepts , Wiley, ISBN-10: 1118063333 | ISBN-13: 978-1118063330, 9th Edition
 - Jesús Carretero, Félix García, Pedro de Miguel y Fernando Pérez Sistemas Operativos, 2ª edición,

McGraw-Hill, 2ª edición, 2007

ADDITIONAL BIBLIOGRAPHY

- Andrew Tanenbaum Operating Systems: Design and Implementation , Prentice Hall, 3rd edition, 2008

- Daniel P. Bovet & Marco Cesati Understanding the Linux Kernel, O'Reilly, 2005

- Jesús Carretero, Félix García, Pedro de Miguel y Fernando Pérez Problemas de Sistemas Operativos: de la base al diseño, McGraw-Hill, 2002
- Jesús Carretero, Félix García, Pedro de Miguel y Fernando Pérez. Sistemas Operativos, Una Visión Aplicada, McGraw-Hill, 2º Edición, 2007
- Sreekrishnan Venkateswaran Essential Linux Device Drivers, Prentice Hall, 2008

- William Stallings Operating Systems: Internals and Design Principles , Prentice Hall, 2009 ISBN-10: 0136006329