Operating Systems

Academic Year: (2024 / 2025) **Review date: 22-01-2025**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: CARRETERO PEREZ, JESUS

Type: Basic Core ECTS Credits : 6.0

Year : 2 Semester : 2

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Programming (first year, semester 2)
Computer Structure (second year, semester 1)

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG1. Students are able to demonstrate knowledge and understanding of concepts in mathematics, statistics and computation and to apply them to solve problems in science and engineering with an ability for analysis and synthesis.
CG3. Students can solve computationally with the help of the most advanced computing tools mathematical models coming from applications in science, engineering, economy and other social sciences.
CG4. Students are able to show that they can analyze and interpret, with help of computer science, the solutions obtained from problems associated to real world mathematical models, discriminating the most relevant behaviours for each application.
CG6. Students can search and use bibliographic resources, in physical or digital support, as they are needed to state and solve mathematically and computationally applied problems arising in new or unknown environments or with insufficient information.
CE13. Students have shown that they understand how computers work, and the impact of their structure and operation on programs performance as well as their physical limitations.
CE16. Students have shown that they understand the characteristics, functionalities and structure of the operating system, and that they can develop programs that make use of their services.

RA2. Through sustained and well prepared argument and procedures, students will be able to apply their knowledge, their understanding and the capabilities to resolve problems in complex specialized professional and work areas requiring the use of creative and innovative ideas.
RA3. Students must have the capacity to gather and interpret data and information on which they base their conclusions, including where relevant and necessary, reflections on matters of a social, scientific, and ethical nature in their field of study.
RA4. Students must be able to perform in complex situations that require developing novel solutions in the academic as well as in the professional realm, within their field of study.
RA5. Students must know how to communication with all types of audiences (specialized or not) their knowledge, methodology, ideas, problems and solutions in the area of their field of study in a clear and

precise way.
RA6. Students must be capable of identifying their own education and training needs in their field of study and the work or professional environment and organize their own learning with a high degree of autonomy in all types of contexts (structured or not).

OBJECTIVES

In this subject we aim the student to understand the concept of operating system, knowing its structure and operation, to be able to use the operating systems services from a program, as well as to know and apply the fundamental principles and basic techniques of parallel and concurrent programming.

Use of Artificial Intelligence tools selectively allowed in this subject. The teacher may indicate a list of works and exercises that the student can perform using AI tools, specifying how they should be used, and how the student should describe the use they have made of them. If the use of AI by the student would give rise to academic fraud by falsifying the results of an exam or work required to accredit academic performance, the provisions of the Regulations of the Carlos III University of Madrid will be applied. partial development of Law 3/2022, of February 24, on university coexistence.

DESCRIPTION OF CONTENTS: PROGRAMME

Introduction to operating systems.
Operating systems services.
Files and directories.
Processes and threads.
Processes and threads scheduling.
Inter-process communication.
Concurrent processes and synchronization.

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.67 ECTS]
Knowledge and concepts students must acquire. Student receive course notes and will have basic reference texts to facilitate following the classes and carrying out follow up work. Students partake in exercises to resolve practical problems and participate in workshops and evaluation tests, all geared towards acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.15 ECTS]
Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.72 ECTS]

WORKSHOPS AND LABORATORY SESSIONS [8 hours with 100% on site, 0.3 ECTS]

FINAL EXAM. [4 hours with 100% on site, 0.15 ECTS]
Global assessment of knowledge, skills and capacities acquired throughout the course.

METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed, while providing material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with a teacher as tutor.

LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

The evaluation allows to know the degree of satisfaction of the knowledge goal, thus all work of the students will be valuated by using continuous evaluation of their activities by using exercises, exams, projects, and other activities.

The following scoring will be used for continuous evaluation:

SE1 - FINAL EXAM. [40 %]
Global assessment of knowledge, skills and capacities acquired throughout the course.

SE2 - CONTINUOUS EVALUATION. [60 %]
Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course.

With the following rules:

a) Ordinary Exam: 40%.
* Activities to assess theory concepts and OS problem solving abilities.
* It covers all the program.

b) Partial activities: 20%.
* Partial assessments of theory concepts and OS problem solving abilities. It covers 50% of the program.
* Extra projects or exercises requested in class.
* Other activities requested along the course. Must be delivered on time.

c) Projects and exercises: 40%.
* Activities must be delivered on time. They are mandatory.
* Each project is evaluated separately, including solution adopted, functionality completeness, and design.
* Evaluation of the project written memory. Project memory organization and correctness, written exam correctness.
* Evaluation of tools usage.
* Evaluation of the collaborative work of the members distinguishing roles. Responsibility of the result is shared by all members.
* Total score for project is computed by given weight to each activity.

To pass the projects, it is mandatory to deliver of all them, to get a minim score of 2 per project, and a minimum average score of 4 fort all the projects . If those criteria are not covered, the student will loose continuous evaluation.

In the case of copy detection in any project or partial exam, those students implicated will loose continuous evaluation. Copy could be among students or by taking the projects from Internet.

You will also loose continuous evaluation, if you not deliver all the projects, or do not get minimum a score of 2 in every project.

For those students not following the continuous evaluation, the ordinary exam will cover all the program (including projects). It will have a maximum value of 60% over 10.

A minimum score of 35% is required to follow the continuous evaluation.
If the student does not get the minimum, but the average of continuous evaluation and the exam is higher than 50%, the final student sore will be 45%.

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

To pass the ordinary evaluation, the student must pass 50% considering the scores of the trajectory chosen.

To compute the final score for the extraordinary exam, the following situations are possible:
A.- Students following continuous evaluation that did not pass:
a- Extraordinary exam will weight 40%
b- Other 60% will come from the score of continuous evaluation.
c- A minimum score of 40% is mandatory to pass the exam and compute the average.

B- Students not following continuous evaluation partially or totally:
a.- Extraordinary exam will weight 100%
b.- It may include all the topics related to the course contents, including theory and projects.
c.- A minimum of 5 is required to pass the exam.

Use of Artificial Intelligence tools selectively allowed in this subject. The teacher may indicate a list of works and exercises that the student can perform using AI tools, specifying how they should be used, and how the student should describe the use they have made of them. If the use of AI by the student would give rise to academic fraud by falsifying the results of an exam or work required to accredit academic performance, the provisions of the Regulations of the Carlos III University of Madrid will be applied. partial development of Law 3/2022, of February 24, on university coexistence.

BASIC BIBLIOGRAPHY

- Abraham Silberschatz, Greg Gagne, Peter B. Galvin Operating System Concepts, 10th Edition, Wiley, 2018