GENERAL INFORMATION

Data of the subject

Subject name	Foundations of Operating Systems
Subject code	DTC-IMAT-215
Mainprogram	Bachelor's Degree in Mathematical Engineering and Artificial Intelligence
Involved programs	Grado en Ingeniería Matemática e Inteligencia Artificial [Second year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Department of Telematics and Computer Sciencies
Coordinator	Pablo Sánchez Pérez
Schedule	Morning schedule
Office hours	To be arranged directly with the professor.

Teacher Information

Teacher

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DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Prerequisites

Python programming.

Basic computer skills.

Course contents

Contents

The course is divided into 5 main blocks: general introduction to the subject, introduction to the GNU/Linux operating system, networking and environments, process management, memory management and I/O management and file systems.

Block 1. General introduction

General introduction

Introduction to the basic architecture of a computer.

Introduction to operating systems. Basic features of current operating systems.

Block 2. Introduction to the GNU-Linux operating system, network, and environments.

Introduction to the GNU-Linux operating system, network, and environments.

GNU-Linux operating system. Virtual Machines.

Basic introduction to networks.

Python dependencies.

Block 3: Process management

Process management

Processes and threads. Characteristics and implementation in Python.

Process scheduling.

Introduction to concurrent programming, mutual exclusion, semaphores.

Block 4. Memory management

Memory management

Memory management: requirements and partitioning.

Memory allocation schemes.

Virtual memory.

Block 5. Input/output management, file management, and file systems

Input/output management, file management, and file systems

Introduction to input/output management.

Files management.

File systems.

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
Intersemester exam: 20% Final exam: 50%	**Intersemester exam (20%):** exam oriented to understand the theoretical concepts of the fundamentals of operating systems (including the basic architecture of a computer), GNU-Linux commands, bash (block 2), process management and process scheduling (if possible). **Final exam (50%):** exam containing the topics of the intersemester exam and extending it with additional concepts related to process management, memory management, input/output and file system management NO AI: The assessment is completed entirely without AI assistance in a controlled environment, ensuring that students rely solely on their existing knowledge, understanding, and skills. You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge. Any student who uses it will receive a Fail (0) on that test and a disciplinary procedure will be initiated in accordance with the University's General Regulations.	70 %
	Final project (15%): In addition to functionality, the design used in the project, the cleanliness and style of the code, and the application of the course	

Final project: 15%	syllabus will be evaluated. AI COLLABORATION (only free URLS) AI may be used to help complete the task, including idea generation, drafting, feedback, and refinement. Students should critically evaluate and modify the AI suggested outputs, demonstrating their understanding. You may use AI to assist with specific tasks such as drafting text, refining and evaluating your work. You must critically evaluate and modify any AI-generated content you use. Inappropriate use of AI tools may affect the overall evaluation of submitted assignments. Likewise, faculty members reserve the right to question students about specific aspects of their work to verify their understanding; the outcome of these consultations may also influence the final evaluation of the corresponding assignments. Students must clearly document in their submissions the specific tasks for which they have used AI tools. This does not exempt the student from responsibility for the submitted content, nor from the possibility of being questioned about it.	15 %
Weekly assignments (15%):	**Weekly assignments (15%):** The lab assignments will be oriented to learn more in depth the concepts explored in the theory classes by solving exercises individually. In addition to functionality, the style of code used in the lab assignments and the quality of the reports requested will also be assessed. AI COLLABORATION (only free URLS) AI may be used to help complete the task, including idea generation, drafting, feedback, and refinement. Students should critically evaluate and modify the AI suggested outputs, demonstrating their understanding. You may use AI to assist with specific tasks such as drafting text, refining and evaluating your work. You must critically evaluate and modify any AI-generated content you use.	15 %

Inappropriate use of AI tools may affect the overall evaluation of submitted assignments. Likewise, faculty members reserve the right to question students about specific aspects of their work to verify their understanding; the outcome of these consultations may also influence the final evaluation of the corresponding assignments.

Students must clearly document in their submissions the specific tasks for which they have used AI tools. This does not exempt the student from responsibility for the submitted content, nor from the possibility of being questioned about it.

Grading

There are two calls. Ordinary call in December/January and Extraordinary call in June.

Ordinary call

The grade for the ordinary call (CO) will be as follows:

- 50% for the final exam (EX_F).
- 20% the inter-semester exam (EX_I)
- 15% for the project (PROY)
- 15% the weekly assignments (PRACT).

In other words:

$$CO = 0.5 * EX\_F + 0.2\ EX\_I + 0.15 * PROY + 0.15 * PRACT$$

$CO \geq 5$ will be necessary to pass the course and the following conditions must be fulfilled:

- It will be mandatory that $EX\_F \geq 5$. That is, the grade of the final exam of the subject must be equal to or higher than 5. Otherwise, $CO = EX\_F$.
- It will be mandatory that $(PROY + PRACT)/2 \geq 5$. That is, a grade greater than or equal to 5 must be obtained in the average obtained between the project and the weekly assignments in both extraordinary and ordinary calls in order to pass the course. If this minimum grade is not reached in the ordinary call, both the project and the assignments can be handed in again in the extraordinary call and $CO = (PROY + PRACT)/2$. The grade of the exam in the ordinary call will be kept for the extraordinary call if it is passed.
- It will be necessary to obtain a grade of at least 4 in both the project and the average of the assignments in order to pass the course. In other words, $PROY \geq 4$ and $PRACT \geq 4$. If this restriction is not met, $CO = MIN(PRACT, PROY)$. The grade for the exam in the ordinary call is saved for the extraordinary call if the student passes. If $PROY \geq 4$ and $PRACT \geq 4$ are met, the grades of PROY and PRACT are saved for the extraordinary exam, provided that $(PROY + PRACT)/2 \geq 5$. If the condition of $PROY \geq 4$ and $PRACT \geq 4$

is not met, the project and/or the assignments can be handed in again in the extraordinary call.

GENERAL CONSIDERATIONS:

- If the student fails to attend 15% or more of the classroom hours of this subject, the student will not be allowed to take the final exam in both the ordinary and extraordinary calls.
- The lab assignments/project handed in 24h after the deadline will have a penalty of 50% of the grade. After 24h after the deadline, the grade of the lab assignments/project will be 0.

Extraordinary call

The grade for the extraordinary call (CE) will be as follows:

- 70% for the final exam of the course (EX_F, the inter-semester exam is not taken into account).
- 15% for the project (PROY)
- 15% for the weekly assignments (PRACT).

In other words:

$CE = 0.7 * EX\_F + 0.15 * PROJ + 0.15 * PRACT$

$CE \geq 5$ will be necessary to pass the course and the following restrictions must be met:

- It will be mandatory that $EX\_F \geq 5$. That is to say, the mark of the final exam in the extraordinary call of the subject must be equal to or higher than 5.
- It is compulsory that $(PROY + PRACT)/ 2 \geq 5$. That is, a grade greater than or equal to 5 must be obtained in the average obtained between the project and the weekly assignments. If this minimum grade is not reached, then $CE = (PROY + PRACT)/ 2$.
- It will be necessary to obtain a grade of at least 4 in both the project and the average of the assignments in order to pass the course. In other words, $PROY \geq 4$ and $PRACT \geq 4$. If this condition is not met, $CE = MIN(PRACT, PROY)$.

GENERAL CONSIDERATIONS:

- If the student fails to attend 15% or more of the classroom hours of this subject, the student will not be allowed to take the final exam in both the ordinary and extraordinary calls.
- The lab assignments/project handed in 24h after the deadline will have a penalty of 50% of the grade. After 24h after the deadline, the grade of the lab assignments/project will be 0.

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Reading and study of the theoretical contents, notes and code provided by the teacher.	After and before each class	

Final Project	At least 1 month before the end of the course	Last week of classes
Exams realisation	October, December/January, and June	
Weekly assignments realisation	Before, during and after the lab class	1 week after publication in moodle
Block 1. General introduction	At the beginning of the course	Between 1 week and 1 and a half weeks approximately
Block 2. Introduction to the GNU-Linux operating system, network, and environments.	After Block 1. During the month of September	Approximately 3 weeks
Block 3. Process management	After Block 2. End of September. October	Between 4 and 4 and a half week approximately
Block 4. Memory management.	After Block 3. November	Between 2 and 2.5 weeks, approximately.
Block 5. Input/output management, file management, and file systems	After finishing Block 4. Late November and start of December	Approximately 1 week

BIBLIOGRAPHY AND RESOURCES

Basic References
Moodle (teacher's manuals and slides). Contact the teacher for specific books to further learning.