ACADEMIC PROGRAM

OPEATING SYSTEMS AND NETWORKS LAB

B.F.A. IN **COMPUTER SCIENCE**

MODALITY: ON CAMPUS

ACADEMIC YEAR: 2022-2023

Name of the course:	Opeating Systems and Networks Lab	
Degree :	Computer Science	
Location:	Centro Universitario de Tecnología y Arte Digital	
Area:	Laboratories	
Year:	1º	
Teaching period:	1	
Type:	OB	
ECTS credits:	6	
Teaching modality:	On campus	
Language:	English	
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SUBJECT DESCRIPTION

Area description

This subject belongs to the subject of Laboratories. This subject is dedicated to the eminently practical study of the fundamental concepts associated with networks, operating systems, distributed systems and databases.

Subject description

In this subject, the basic concepts of IP networks, operating systems and Linux programming are studied in a practical way.

Linux will be used in subsequent subjects: IP networks, programming, databases, distributed systems, etc. Therefore, in this subject the foundations will be laid to acquire basic knowledge of network management in Linux systems, as well as knowledge for the management and use of Linux both at the user level and at the basic administrator level. The knowledge necessary for automating Linux processes (scripting) will also be studied.

In the 2nd year subjects of SSOO and Computer Networks, the theoretical foundations of the architecture of operating systems and networks will be studied in detail and in depth.

COMPETENCIES AND LEARNING OUTCOMES

Competencies
BASIC AND GENERAL SKILLS

BC1: Students should demonstrate knowledge in an area of study that builds upon the foundation of general secondary education and goest beyond at a level that, while supported by advanced textbooks, also encompasses certain aspects derived from the cutting edge of their field of study.

BC2: Students should be able to apply their knowledge to their work or vocation in a professional manner, and they should possess the competencies typically demonstrated through the development and defence of arguments as well as problem-solving within their field of study.

BC3: Students must possess the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that involve reflection on socially, scientifically, or ethically significant issues.

BC4: Students should be capable of conveying information, ideas, problems, and solutions to both specialized and non-specialized audiences.

BC5: Students should have developed the learning skills necessary to pursue further studies with a high degree of autonomy.

GC1 - The ability to comprehend, plan, and solve problems through the development of computer-based solutions.

GC2 - Proficiency in creating computer solutions that are environmentally friendly, socially responsible, and sustainable in their use of natural resources, while also adhering to legal and ethical standards.

GC3 - Knowledge of the scientific principles applicable to solving computer-related problems.

GC4 - The capacity to simplify and optimize computer systems by understanding their complexity.

GC5 - The ability to acquire, adapt, and create new computer technologies.

SPECIFIC SKILLS

SC1 - Familiarity with the architecture of Operating Systems and various mechanisms for managing processes, communication, and synchronization within them.

SC2 - The ability to administer a small-scale computer server or network and automate related tasks.

SC3 - Knowledge of computer communication technologies, including the capability to configure a TCP/IP network and basic services.

SC4 - Understanding of fault tolerance, adaptability, load balancing, and system predictability for the development of distributed applications.

TRASVERSAL SKILLS

CT4 - The ability to constantly update acquired knowledge in the use of digital tools and technologies based on the current state of the industry and the technologies in use.

Learning outcomes
Upon completion of the degree, the graduate will be able to:

- Be able to install Linux and Windows

- To know and apply shell commands in Linux and Windows

- To manage users and access permissions in a system

- To be able to automate tasks using scripting language

- To understand the basics of a computer network

- To configure a simple TCP/IP network

- To know the elements of a relational database

- To build simple queries in SQL

- To be able to write elementary database applications

CONTENTS

Introduction to Operating Systems

Linux installation and configuration

Windows installation and configuration

Differences between work stations and servers

User management

Task automation with scripting language

Principles of computer networks

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SUBJECT SYLLABUS

Topic 1.- Origin, introduction to SSOO and virtualization. Linux installation

Brief history about the origin of SSOO and introduction to SSOO in general. What is an Operative System. Parts of an Operating System. Description of GNU/Linux. What is virtualization, basic concepts about containers. Linux installation.

Topic 2.- Basic Linux concepts and commands. File System (commands on files and directories). Package manager. First steps with Ubuntu terminal mode. Linux file system architecture, system variables, basic commands (ls, pwd, echo, type, which, cd), relative and absolute paths. Commands on files and directories: creation and deletion of directories and files (mkdir, rmdir, touch, cat, echo), copy and move directories and files (cp, mv, rm). Links (ln). Special characters (wildcards) for search patterns. Compress and decompress files. Advanced commands: truncate, grep, find, awk, sed, tr, cut, wc. Redirects: input, output and error. Pipes

(pipes). Commands related to obtaining times and calendars (date, cal, timedatectl). Package installation manager.

Topic 3.- Basic management of groups, users and permissions

File and directory permissions. Change file and directory permissions. Owners of a file or directory. Change of owner. Content of the group and user configuration files. Passwd. Add and delete and modify users and groups. The root user. The sudo command.

Topic 4. Basic concepts of networks and IP addressing - Related commands

Basic network information; ip addr, ip link. Routing tables ip neigh, ip route. Connection/disconnection of network interfaces. DHCP server. Trace tools, ping, tracepath, arping.

Topic 5.- Process and memory management.

Commands top, ps, kill, killall, free. Other terminals (Ctrl + Alt + Fx). Foreground and background processes. Kill a foreground process (Ctrl + C), move it to the background (Ctrl + Z). Commands bg, fg. Run multiple processes (&&, ||, ;)

Topic 6.- Text editors, basic structure of a script. bash scripting

Operation and commands of the vim and nano text editors. Creation of the first script. How are scripts executed in bash? Shebang (#!/bin/bash). Variables (I). Script invocation arguments ($0, $1, $1, $3, $#, $@). Command replacement. Export variables. Variable length. Environment Variables. Arithmetic operations. Boolean expressions (eq versus =). Conditional structures (IF), CASE, Loops (FOR, WHILE, UNTIL, BREAK, CONTINUE). READ reading command. Read from STDIN. Functions, passing parameters by reference. Variables (II), declare. Arrays. Libraries. String Management

TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
Theoretical / Expository classes	22,50	22,50
Practical classes	28,50	28,50
Tutorials	4,00	0,00
Independent study and autonomous work of the student	50,00	0,00
Elaboration of work (group or individual)	40,00	0,00
Evaluation Activities	5,00	5,00
TOTAL	150	56

Teaching methodologies

Expository method or master lesson

Case learning

Learning based on problem solving

Cooperative or collaborative learning

inquiry learning

Flipped classroom methodology

Gamification

Just in time Teaching (JITT) or classroom on time

Expository method or master lesson

Case method

Learning based on problem solving

Cooperative or collaborative learning

inquiry learning

Flipped classroom methodology

Gamification

TEMPORAL DEVELOPMENT

DIDACTIC UNITS / TOPICS TIME PERIOD

Topic 1. Origin, introduction and basic SSOO concepts. Virtualization. Linux installation (Ubuntu). Week 1 and 2

Topic 2. Basic concepts and commands of Linux, File System (commands on files and directories). Weeks 3, 4, 5 and 6

Topic 3. Basic management of groups, users and permissions. Week 7 and 8

Topic 4. IP addressing and Network configuration management commands. Week 9 and 10

Topic 5. Process and memory management. Weeks 11 and 12

Topic 6. Editors and Bash scripting. Week 13, 14 and 15

EVALUATION SYSTEM

ASSESSMENT SYSTEM	MINIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)	MAXIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)
Assessment of participation in class, exercises or projects of the course	10	30
Assessment of assignments, projects, reports, memos	30	60
Objective test	30	60

GRADING CRITERIA

ASSESSMENT SYSTEM	ORDINARY EVALUATION	EXTRAORDINARY EVALUATION
Assessment of participation in class, exercises or projects of the course	10	10
Assessment of assignments, projects, reports, memos	40	40
Objective test	50	50

General comments on the evaluations/assessments

The final grade for the subject in the ordinary call will be calculated with the grades of the three activities described in the previous table, applying the corresponding weights. Therefore, the rule to apply to calculate the final grade will be:

Ordinary_Final_Grade=10%*AE1 + 40%*AE2 +50%*AE3

AE1: The evaluation of participation and class work: will be carried out based on attendance, class work and the delivery of the activities and exercises proposed during classes. This aspect will represent 10% of the final grade for the subject in the ordinary call.

AE2: Throughout the course, mandatory practice(s) will be proposed that must be delivered on the indicated date through the virtual platform. Additionally, a partial exam of the subject taught so far will also be carried out. This activity (mandatory and partial practice(s)) will be evaluated through the virtual platform itself and will account for 40% of the final grade for the subject in the ordinary call. Works out of form and date will

not be admitted without justified cause and all of them must be submitted to be approved in the ordinary call. If any of these mandatory evaluable practices are delivered after the deadline, there will be a 30% penalty on the grade. In order to pass the subject in the ordinary session, it will be a requirement to have delivered the mandatory practice(s) that have been requested. If the student has not completed the proposed midterm, he will have a 0 in said grade.

AE3: At the end of the semester a final exam will be taken, which will have a total weight on the grade of the ordinary call of 50%. To pass the subject in the ordinary session, it will be necessary for the student to have at least a 4 (out of 10) in said exam.

In summary, to pass the subject in the ordinary call it is necessary that the final exam be at least 4.0 (out of 10), that the evaluable practical(s) requested during the course be delivered (those belonging to activity AE2 of 40 %), that is, these practices are mandatory and no average will be taken if any of them is not presented and the final average grade (including AE1, AE2 and AE3) is at least 5.0 (out of 10).

If any of these requirements are not met, the subject will be automatically considered failed regardless of the rest of the grades.

If the student does not obtain approval in the ordinary session, the student may take the extraordinary session. Namely:

IF the student has failed the subject in the ordinary session because he did not reach 4 in the final exam, but has all his practices delivered and approved, then he will have to take the extraordinary exam exclusively and the rest of his course notes will be kept. . Her extraordinary exam maintains the weight of 50% of the grade and must have a minimum grade of 4 (out of 10).

If the student has the subject failed in ordinary due to pending and/or failed practices but his exam grade is greater than or equal to 4, said exam will be saved, but he will have to present the pending or failed practices in an extraordinary session.

Otherwise, (failed exam and failed mandatory practices) you must:

Take the extraordinary final exam that will represent 60% of the grade in said call and in which the subject required of the student will be all the content of the subject seen in class.

In addition, you must submit the practice(s) failed or not submitted and that are presented at the beginning of the second semester and whose weight on the final grade will be 30%.

The remaining 10% will be the grade for attendance and class work obtained during the course.

The final average grade must be at least 5.0 (out of 10) and the final exam grade must be at least 4 (out of 10).

No grades of any kind will be kept between different academic years, nor between different calls.

LIST OF REFERENCES (BOOKS, PUBLICATIONS, WEBSITES):

Basic Bibliography:

Ⓔ Linux: Basic principles of using the system. Nicolas Pons. ENI Editions.

- ISBN 9782409017360.

ⒺHow Linux Works: Brian Ward.

Ⓔ Linux Pocket Guide: O'Reilly Publishing

Ⓔ Linux: Advanced administration. Maintenance and operation of servers. Philippe Pinchon. ENI Editions. ISBN 978-2409003974.

Recommended Bibliography:

Ⓔ Network Services in Linux. José Rafael Ramírez Pita. ISBN 9781723939235.

Ⓔ Linux Internals: How Linux works. Daniel Ezquerra. ISBN 9781520848679.

REQUIRED MATERIALS, SOFTWARE AND TOOLS

Type of classroom
Theory classroom

Board and projection system

Materials:
Personal Computer

Software:
Virtual Box

Ubuntu 22.04.

MdCharm

MarkdownPad