| Course Code: CSE 324 |
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| **Course Title: Operating Systems Lab** |
| **Credits: 1.5** |

## Course Content (from syllabus):

Introduction to the Basic of Linux, its purposes, basic network commands. File management and different types of permission setup. Shell Administration, Adding and removing users, Daily administrative works, Configure/installing different software. Processes in Linux and managing them. System logs and analyze them. Shell script: Introduction to Shell Scripts- Shell programming, Decision making and Loop control structure, functions. Different programming language in Linux editor environment and implement different Operating system algorithms.

## Course Description/Rationale:

The course aims to explore the importance of the operating system, its function and different techniques used by the operating system to achieve its goals as resource manager. The course also explores how application interacts with the operating system and how the operating systems interact with the machine. Also, the course shed light on some of the existing operating systems and how the topics taught in the course are applied in these systems. Some topics in the course are implemented by writing the programs to practically know how.

## Course Objectives:

- o To learn the basic of Linux and its different Commands
- o To learn shell script
- o To learn different programming language in Linux editor environment and implement different Operating system algorithm
- o To learn about file management, administration and different types of permission setup.
- o To understand how system processes work and how to manage them
- o To work with system logs and remote connection tools

## Course Learning Outcome (CLO): (at the end of the course, students will be able to do :)

| CLO1 | Make use of the Unix commands and shell programming. |
| :--- | :--- |
| CLO2 | Build shell programs for process and file system management with system calls. |
| CLO3 | Apply different algorithms of Operating Systems like CPU scheduling algorithm, page replacement algorithms, deadlock avoidance, and detection algorithm with analyzing the performance of them. |

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| CLO4 | Able to design and develop a course project that can have a positive impact on the environment or society. |

**Mapping of Course Learning Outcomes to Program Learning Outcomes**

| | PLO-1 | PLO-2 | PLO-3 | PLO-4 | PLO-5 | PLO-6 | PLO-7 | PLO-8 | PLO-9 | PLO-10 | PLO-11 | PLO-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO-1** | ✓ | | | | | | | | | | | |
| **CLO-2** | | ✓ | | | | | | | | | | |
| **CLO-3** | | | ✓ | | | | | | | | | |
| **CLO-4** | | | | | ✓ | | | | | | | |

**Teaching and Learning Activities (TLA)**

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|---|---|
| **TLA1** | Demonstrations once a week according to the university policy using multimedia of different topics. |
| **TLA2** | Active discussion in class regarding efficient designing and solving of logical and mathematical problems. |
| **TLA3** | Group discussion and presentation regarding diverse problems and corresponding lectures. |
| **TLA4** | Evaluation of class performances to reach each student in a class for every topic. |

**Mapping Course Learning Outcome (CLOs) with the Teaching-Learning and Assessment Strategy:**

| CLO's | Teaching Learning Strategy | Assessment Strategy | Corresponding PLO number | Domain Level/Learning Taxonomy |
|---|---|---|---|---|
| | | | | |

| CLO1 | TLA1, TLA4 | Lab Performance, report/Viva | PLO-1 | L1 |
|------|-----------|------------------------------|-------|-----|
| CLO2 | TLA2, TLA4 | Lab Performance, report/ Final Exam | PLO-2 | L2,L3 |
| CLO3 | TLA2, TLA4 | Lab Performance, report/ Final Exam | PLO-3 | L2,L3 |
| CLO4 | TLA2, TLA3 | Project Report/Viva/ Presentation | PLO-5 | L3,L4 |

**Course Delivery Plan/Lesson Delivery Plan:**

| Week/Lesson (hour) | Experiment Name and Details | Student Activities | Name of the tools | Mapping with CLO | Assessment Plan |
|--------------------|------------------------------|--------------------|-------------------|-------------------|------------------|
| **Week-1** | Introduction to Linux, Linux Installation, Introduction to Shell, Creating user account. | **TLA1, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO1** | **Lab Performance/Viva** |
| **Week-2** | Course Project discussion and group formation – list of projects, team formation, project plan and deliverables with presentation | . **TLA1, TLA3** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Project idea presentation** |
| **Week-3** | Introduction to Linux tools- Linux files, Directories, Root, File Permissions, Working with | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Lab Performance/ Final Exam** |

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|---|---|---|---|---|---|
| | files and directories, Disk related commands | | | | |
| **Week-4** | Introduction to Shell Scripts-Shell programming, Shell Variables, Shell Keywords, Write simple Shell program | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Lab Performance/Lab Report/ Final Exam** |
| **Week-5** | Decision making and Loop control structure | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Lab Performance/Lab Report/ Final Exam** |
| **Week-6** | Review on previous topics(conditional statement, loop) and Functions | **TLA2, TLA3** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Lab Performance/Lab Report/ Final Exam** |
| **Week-7** | Shell Administration Adding and removing users, Daily administrative works, Configure/installing different software/ language Ubuntu | **TLA3, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO2** | **Lab Performance/Lab Report/ Viva** |
| **Week-8** | Processes in Linux, Process Scheduler | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO3** | **Lab Performance/Lab Report/ Final Exam** |

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|---|---|---|---|---|---|
| **Week-9** | Deadlock avoidance , Disk management, Monitoring system and Ensuring system | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO3** | **Lab Performance/Lab Report/Final Exam** |
| **Week-10** | **Memory allocation algorithms** | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO3** | **Lab Performance/Lab Report/ Viva** |
| **Week-11** | **Page Replacement Algorithms** | **TLA2, TLA4** | Ubuntu / online platform(Webminal, Cocal) | **CLO3** | **Lab Performance/Lab Report/ Viva** |
| **Week-12** | Project demonstration | Course project presentation by team members | | **CLO4** | |
| **Week-13** | **Viva** | **Individual viva** | | | |
| **Week-14** | Lab Final | Solve problems using shell script and Implement different algorithms | | | |

## Assessment Rubrics:

| Assessment \|task | CLO's | | | | Marks (Total 100) |
|---|---|---|---|---|---|
| | CLO1 | CLO2 | CLO3 | CLO4 | |
| Attendance | -- | -- | -- | -- | 10 |
| Report/Project | -- | -- | -- | 25 | 25 |
| Lab Performance | 7 | 10 | 8 | -- | 25 |
| Lab Final /Viva | 10 | 15 | 15 | -- | 25 |

| Total Mark | 17 | 25 | 23 | 25 | 100 |
| --- | --- | --- | --- | --- | --- |

**Learning Materials:**

**Textbook/Recommended Readings:**

Unix Shell Programming- Yashavant P. Kanetkar

**Reference Books/Supplementary Readings:**

Teach Yourself Unix Shell Programming in 14days-Kamran Husain

**Other Readings:**

PPT slides/Online Materials