Description of Course CSE 204

PART A: General Information

1	**Course Title**	: Operating Systems and Unix Programming Sessional
2	**Type of Course**	: Compulsory, Sessional
3	**Offered to**	: Department of IoT and Robotics Engineering (IRE)
4	**Pre-requisite Course(s)**	: None

PART B: Course Details

1. Course Content (As approved by the Academic Council)

To focus on fundamental practical aspects of Operating Systems. In this lab the students learn about Linux (Unix) commands, shell script, scheduling algorithms, process synchronization, deadlock, memory management, file systems etc.

Course Objectives

The students are expected to:

- Acquire a solid understanding of Linux-based operating systems, including command-line navigation, system administration tasks, and scripting, fostering the ability to work effectively in Linux environments.
- Develop hands-on proficiency in implementing and manipulating key operating system concepts, such as process management, memory allocation, and file systems, through practical exercises and real-world scenarios.
- Promote teamwork and effective communication skills by engaging in collaborative OS projects, providing students with the opportunity to work collectively, share insights, and contribute to the successful completion of comprehensive system development tasks.

2. Knowledge required

Technical

Proficiency in a programming language like C, C++ and basic knowledge of computer architecture, including concepts like memory hierarchy, CPU architecture, and input/output systems.

Mathematics

- None

3. Course Outcomes (COs)

CO No.	CO Statement	Corresponding PO(s)*	Domains and Taxonomy Level(s)**	Delivery Method(s) and Activity(-ies)	Assessment Tool(s)
1	**Understand** the Unix commands and apply these to basic shell scripting programs**.**	PO(a)	C2, P3	Lectures, Lab demonstrations	Lab-tasks, Lab-tests, Reports
2	**Apply** knowledge of operating systems by implementing diverse scheduling algorithms, synchronization mechanisms, and memory management schemes.	PO(c)	C3, P3	Lectures, Lab demonstrations	Lab-tasks, Lab-tests, Reports

3	**Demonstrate** practical application of theoretical concepts, foster problem-solving skills, and enhance teamwork and communication through engaging operating system projects**.**	PO(i)	A3	Lab group work	Peer and instructor assessment

Cognitive Domain Taxonomy Levels: C1- Knowledge**, C2-** Comprehension, **C3-**Application, **C4-** Analysis, **C5-** Synthesis, **C6-** Evaluation; **Affective Domain Taxonomy Levels**: **A1-** Receiving, **A2-** Responding, **A3-** Valuing, **A4-** Organizing, **A5-** Characterizing; **Psychomotor Domain Taxonomy Levels**: **P1**-Perception, **P2-** Set, **P3-** Guided Response, **P4-** Mechanism, **P5-** Complex Overt Response, **P6-** Adaptation, **P7-** Organization

Program Outcomes (PO): PO(a) Engineering Knowledge**, PO(b**) Problem Analysis**, PO(c)** Design/development Solution, **PO(d)** Investigation, **PO(e)** Modern tool usage, **PO(f)** The Engineer and Society, **PO(g)** Environment and sustainability, **PO(h)** Ethics, **PO(i)** Individual work and team work, **PO(j).** Communication, **PO(k)** Project management and finance, **PO(l)** Life-long Learning

* For details of program outcome (PO) statements, please see the departmental website or course curriculum

4. Mapping of Knowledge Profile, Complex Engineering Problem Solving and Complex Engineering Activities

CO	K1	K2	K3	K4	K5	K6	K7	K8	P1	P2	P3	P4	P5	P6	P7	A1	A2	A3	A4	A5
1	·									·						·				
2			·						·											
3					·	·	·	·							·				·	·

5. Lecture/ Activity Plan

Week	Topics
Week 1	Title: **Shell Script Commands** Outline: Shell, Navigation, Exploring the System, Manipulating Files and Directories.
Week 2	Title: **Shell Script Commands** Outline: File Permission, Searching for Files, Text Processing, and Processes.
Week 3	Title: **Shell Script Commands** Outline: Shell script commands: Redirection, Network, Achieving, and Backup.
Week 4	Title: **Basic Shell Programming** Outline: Writing first script, Variable and Constants, Top Down design, and Flow control with if.
Week 5	Title: **Shell Programming** Outline: Looping with while, for; Branching with the case, etc.
Week 6	Title: **Shell Programming** Outline: String, Numbers and Arrays
Week 7	**Midterm Examination**
Week 8	Title: **Scheduling algorithms** Outline: First Come First Serve (FCFS), Shortest Job First (SJF), Priority Scheduling, Round Robin
Week 9	Title: **Process Synchronization** Outline: Synchronous and Asynchronous process using P-thread
Week 10	Title: **Memory management scheme and Page Replacement** Outline: Best Fit, First Fit, Worst Fit, Segmentation, Paging

Week 11	Title: **Memory management scheme and Page Replacement** Outline: Best Fit, First Fit, Worst Fit, Segmentation, Paging
Week 12	Title: **Page Replacement algorithm** Outline: First In First Out (FIFO), Least Recently Used (LRU), Optimal Page Replacement
Week 13	Title: **Deadlock and Deadlock Prevention** Outline: Bankers Algorithm and Analysis *****Final Project Submission*****
Week 14	**Final Examination**

6. **Assessment Strategy**
   - Class participation will be judged by in-class evaluation; attendance will be recorded in every class.
   - Continuous assessment will be done in the form of laboratory tasks, assignments, laboratory-tests, report writing and viva.
   - Project assessment marks will be awarded according to the successful completion of project milestones as detailed in the project guide.
7. **Distribution of Marks**

Criterion	Marks
Attendance	10%
Lab Performance	10%
Lab Reports	10%
Project Proposal	10%
Mid Term	
Mid Term Examination at **6th** Week	12%
Progress Presentation at **7th** Week	12%
Final Exam	
Final Project Showcase at **13th** Week	18%
Lab Final Examination at **14th** Week	18%
Total	**100%**

8. **Textbook/Reference**
   - Linux System Programming" by Robert Love
   - Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne

Besides going through relevant topics of the textbook, it is strongly advised that the students follow the class lectures and discussions regularly for a thorough understanding of the topics.

Course Teacher(s):

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Date of Preparation:

Date of Approval by BUGS: