Report of Value Added Course (CAV-25-01) on "Operating System Algorithms with UNIX Commands" from 21st January - 28th February, 2025

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Wed, Aug 20, 2025 at 6:57 AM

Brief Report of Value Added Course (CAV-25-01)
On
Operating System Algorithms with UNIX Commands
(21st January - 28th February, 2025)
Organized by
Department of Computer Application
In Association with
Integral University Center for Advanced Training
Integral University, Lucknow

The Department of Computer Application in Association with Integral University Center for Advanced Training, Integral University, Lucknow organized an online **Value Added Course (CAV-25-01)** on **"Operating System Algorithms with UNIX Commands"** for the University students from all the branches. The four-weeks Value-Added Course, with 30-hours of active engagement, was organized from 21st January to 28th February, 2025 in online mode using Google Classroom.

For advertisement of the course, IUCAT created an HTML Emailer comprising the details of the course along with the registration link and circulate the Emailer to the students through Communication Cell. Total **212 students** from all the branches registered in the course. One batch has been created to start the course and we have followed evening time from Monday to Thursday to deliver the course sessions. The duration of the session was 1 hour per day. The entire course sessions of the batch were successfully delivered by **Ms. Fiza Afreen** (Assistant Professor, Department of Computer Application, Integral University, Lucknow), **Ms. Nadiya Parveen** (Assistant Professor, Department of Computer Application, Integral University, Lucknow) and **Ms. Fareen** (Assistant Professor, Department of Computer Application, Integral University, Lucknow).

Learning skills of the students were excellent. They attended the course with full dedication. At the end of the course, we conducted an online quiz based on the Operating System Algorithms with UNIX Commands and course completion feedback from the participants on Google Classroom and then students downloaded their certificate if they attended the sessions, assignments submitted, completion of quiz and feedback.

Total **108 students** successfully completed the course and received an e-Certificate. The distribution of e-Certificate was based on student's attendance, assignments submitted and their performance in the online quiz, conducted at the end of the course.

The course focuses on the fundamental algorithms and concepts used in modern operating systems, specifically through the lens of UNIX-like systems. Students will explore core topics such as process management, memory management, file systems, and scheduling, all while learning how to implement and interact with these concepts using UNIX commands and shell scripting. Practical hands-on experience with tools like ps, top, grep, awk, and sed will help reinforce theoretical knowledge, providing students with both a deep understanding of operating system functionality and proficiency in using UNIX

systems. This course designed to provide both theoretical knowledge of OS algorithms and practical skills in using UNIX commands and tools to manage and troubleshoot operating systems.

The course helps students to get exposed to the industry and to acquire adequate technical knowledge and know-how thereof. It is not possible for any institution to provide all types of processes, equipment, etc., that are used in various industries. The Training course therefore provides an opportunity to the students to get exposed to a very large area of technology and its processes. This training course results in better employment opportunities for students and helps them to acquire better analytical as well as practical approaches.

The Value-Added Course was organized by Department of Computer Application in Association with Integral University Center for Advanced Training under the able guidance of **Prof. (Dr.) Mohammad Faisal**, Head, Department of Computer Application, Integral University, Lucknow and was coordinated by **Dr. Farooq Ahmad** (Assistant Professor, Department of Computer Application and Coordinator, IUCAT).

Key Highlights of the training:

- It was an online learning course.

- Total 212 students from all the branches registered in the Value-Added course.

- The students successfully completed the Value Added Course on "Operating System Algorithms with UNIX Commands (CAV-25-01)".

- 108 students successfully completed the course and received an e-Certificate.

- Four-Week online course with 30 hours of active engagement consisting of self-learning materials, collaborative learning through discussion forums & groups, assessment through online Quizzes and Assignments, and feedback from the participants.

- Learning support by Resource person and Facilitators.

- Students received e-Certificate from the following programs:

B.Com. (Hons)	B. Pharm	BCA	B. Tech (CSE)	BBA
B. Tech (ECE)	B. Sc. (Agriculture)	B. Sc. (CS)	M. Sc.	BMLT
Bachelor of Education	B. Sc. (Biotechnology)	B. Sc. (Nursing)	MCA	Diploma (CS)
MBA	M. Sc. (Biotechnology)	M. Tech.	Bachelor of Pharmacy	B. Tech (Mech.)

We have delivered the following course content on "Operating System Algorithms with UNIX Commands":

Module 1: Introduction to Operating Systems and UNIX

- **Overview of Operating Systems: Functions, types, and components**
- **Introduction to UNIX/Linux Systems: History, architecture, shell environments**
- **Basic UNIX Commands: File handling (`ls`, `cp`, `mv`, `rm`), directory navigation (`cd`, `pwd`), permissions (`chmod`, `chown`)**

Module 2: Process Management

- **Processes and Process Control**: Process states, lifecycle, and process control blocks
- **UNIX Process Commands**: `ps`, `top`, `kill`, `bg`, `fg`, `jobs`
- **Process Scheduling Algorithms**: First-Come-First-Served (FCFS), Shortest Job First (SJF), Round Robin (RR)
- **UNIX System Calls for Process Management**: `fork()`, `exec()`, `wait()`, `exit()`

Module 3: Memory Management

- **Memory Allocation Strategies**: Contiguous, paging, and segmentation
- **Virtual Memory**: Paging, page tables, and page replacement algorithms
- **Memory Management in UNIX**: `free, top, vmstat, ulimit`
- **Swapping and Paging**: `swap`, swap space management in UNIX
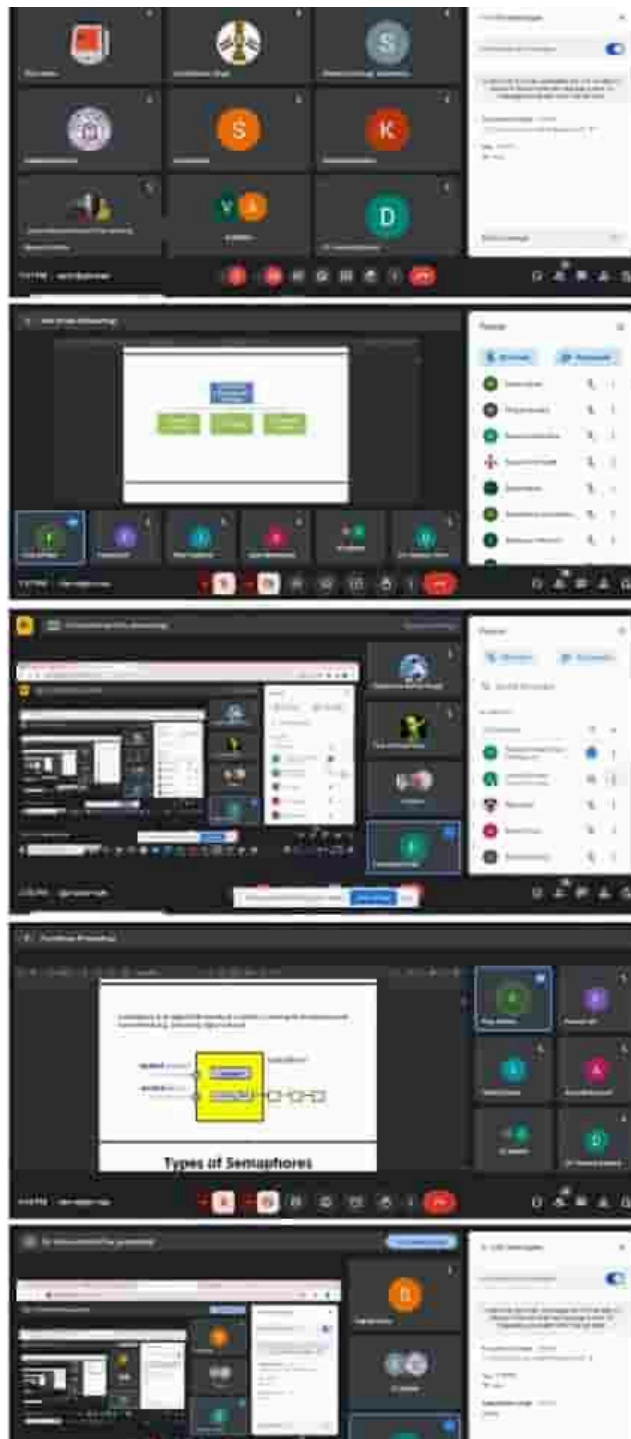
Module 4: File System Management

- **File System Structure**: Inodes, directories, file metadata
- **File Operations**: Open, read, write, close, delete
- **UNIX File Commands**: `ls, cat, cp, rm, ln`
- **File Permissions and Ownership**: `chmod, chown, umask`
- **Disk Scheduling Algorithms**: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK

Module 5: Inter-Process Communication (IPC)

- **IPC Basics**: Shared memory, message passing, semaphores
- **UNIX IPC Mechanisms**: Pipes, named pipes (`mkfifo`), message queues, semaphores
- **Synchronization Algorithms**: Mutexes, semaphores, monitors, critical sections
- **UNIX Commands for IPC**: `ipcs, ipcrm, nc, shmget(), msgget()`

Module 6: Scheduling Algorithms

- **CPU Scheduling Concepts**: Scheduling criteria, throughput, waiting time, turn-around time
- **UNIX Scheduling**: Priority scheduling, time-sharing
- **Advanced Scheduling Algorithms**: Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling
- **Real-Time Scheduling**: Rate-Monotonic Scheduling, Earliest Deadline First

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Dr. Mohammad Faisal

Professor and Head

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