Lesson Plan

Operating System

SEM IV

2018-2019

Subject Incharge

Prof.Mahendra Mehra

FR. Conceicao Rodrigues College of Engineering
Department of Computer Engineering
Lesson plan

SUBJECT: Operating System **ACADEMIC YEAR: 2018-19**
SUBJECT CODE: CSC405 **SEM: IV**
FACULTY NAME: Prof. Mahendra Mehra

1. Time table
2. Syllabus-text books, reference books, online resources
3. Course objectives
4. Course outcomes (level in blooms taxonomy-knowledge, skill, attitude)
5. CO-PO mapping , CO-PSO Mapping
6. CO attainment tools
7. CO attainment targets
8. Lecture plan (lectures, presentations, homework, videos, case study, social media)
9. Lab/assignments/mini-project plan
10. Curriculum gap (topic, action taken, mapped co or po)
11. Content beyond syllabus (topic, action taken, mapped co or po)
12. Guest lecture(invitation letter, attendance, thanks letter)
13. List of experiments
14. List of assignments/quiz/presentations
15. Rubrics for experiment/ assignment/mini project.. Tools used
16. Lab manual
17. Unit test question papers with marking scheme
18. Sample answer sheets for unit test/sample answer script
19. University question papers
20. Mini project list with some sample reports
21. Course exit survey form
22. Result analysis of previous semester (no. Of students appeared, passed, percentage, students> 60%)
23. Co attainment summary
24. Co attainment excel prints
25. Identified strong and weak students on the basis of test/assignment (>90% and <50%)
26. Assistance to weak students with remedial classes (attendance-contents)
27. Student feedback
28. Audit report
29. Attendance sheets
30. Attendance defaulters till test1/test2
31. Lecture notes
32. Proof of any claim made in SAR related to your subject like innovation in teaching learning and assignments and other pedagogical methods.(please refer final SAR)

TIME TABLE

Fr. Conceicao Rodrigues College of Engineering, Bandra
Computer Engineering Department

Prof. Mahendra Mehra						With Effect From: 14th January 2019				
	8.45 a.m.-09.45 a.m.	9.45 a.m.-10.45 a.m.	10.45 a.m.-11 a.m.	11 a.m. – 12 p.m.	12 p.m.-01 p.m.	1 p.m.-1.30 p.m.	1.30 p.m. - 2.30 p.m.	2.30 p.m.-3.30 p.m.	3.30 p.m.-4.30 p.m.	4.30 p.m.-5.30 p.m.
Monday			**BREAK**			**Lunch Time**	SPCC TEC - C		OS SEC – A	
Tuesday				SPCC TEC			OS SEC	OS SEC - C		
Wednesday	OS SEC						OS SEC - D			
Thursday				SPCC TEC	OS SEC					
Friday				OS SEC			OS SEC - B			
Saturday										
Total load: 16										

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV) (2018-2019)

Course Outcomes & Assessment Plan

Subject: Operating Systems (CSC405)

Course Outcomes:

Upon completion of this course students will be able to:

CSC405.1: Recognize the role of operating system as System software. **[B2: Understanding]**

CSC405.2: Interpret the role of Process management towards increasing throughput of system. **[B3: Application]**

CSC405.3: Model the concepts of deadlock in operating systems and implement them in multiprogramming system. **[B3: Application]**

CSC405.4: Demonstrate different techniques of memory management, file and I/O management. **[B3: Application]**

CSC405.5: Execute Applications using Open Source technologies and Software utilities. **[B3: Application]**

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1 (Engg Know)	PO2 (Analysis)	PO3 (Design)	PO4 (investigation)	PO5 (tools)	PO6 (engg Soci)	PO7 (Env)	PO8 (Eth)	PO9 (ind Team)	PO10 (comm.)	PO11 (PM)	PO12 (life Long)
CSC405.1	3	2										
CSC405.2	3	2										
CSC405.3	3	2										
CSC405.4	3	2										
CSC405.5	2	2	2	2	2				2			
Course To PO	2.8	2	0.4	0.4	0.4				0.4			

CO	PSO1	PSO2
CSC405.1	3	
CSC405.2	3	
CSC405.3	3	
CSC405.4	3	
CSC405.5	3	
Course to PSO	3	

Justification for CO-PO Mapping

PO1:

All COs are mapped to PO1 because engineering graduates will be able to apply the knowledge of mathematics, Operating system and its functionalities to solve engineering problems

PO2:

CSC405.1 is mapped to PO2 because students will interpret the need of system calls in the working of Operating system

CSC405.2 is mapped to PO2 because students will interpret the need for process synchronization to avoid critical section problem

CSC405.3 is mapped to PO2 because students will analyze and solve the deadlock situations

CSC405.4 is mapped to PO2 because students will implement various memory management schemes and page replacement schemes

CSC405.5 is mapped to PO2 because students analyze the need of selecting a particular topic for Mini project.

PO3:

CSC405.5 is mapped to PO3 because students will design an application as part of mini projects

PO4:

CSC405.5 is mapped to PO4 because students will conduct investigations on the DevOps tools as part of mini projects

PO5:

CSC405.5 is mapped to PO5 because the students will use different tools like Android SDK to build Android application and DevOps tools to understand automation.

PO9:

CSC405.5 is mapped to this PO9 because the students work in a team to develop the mini project and present case studies.

PO10:

CSC405.5 is mapped to this PO10 because the students submit written report of the mini project

PSO1:

All COs are mapped to PSO1 because the graduates will be able to apply fundamental knowledge of operating system to build solutions for real world problems.

CO Assessment Plan

CSC405.1	*CSC405.1: Recognize the role of operating system as System software. [B2: Understanding]*		
Delivery Methods		Black Board, lecture notes and video	
Target		**2.5**	
Sr.no	**CO Assessment Tools**	**Target (Tool wise)**	**Weightage**
1.	Test 1	60% student score more than 60%	0.2
	Questions	TEST1(Q1 (a OR b) total 05 marks)	
	Date	Test1(5/2/19) Test2(9/4/19)	
2.	Lab Experiments	60% students will score minimum 70% marks	0.3
	Experiment nos	1,2,3,4,5,10	
3.	Assignment 1	60% student score more than 70%	0.2
	Date	14/1/2019	
4.	Semester End Exams	60% students score more than 60%	0.3
	Date	29/05/2019	
5.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	15/4/2019	

CO Assessment Tools:

CSC405.1: Direct Methods(80%): Test(1) , Assignment1, Quiz1, Lab_Exp(1-5), Uni_Exam(TH+PR)

CO1dm = 0.2(T1) +0.3LAB(1-5) + 0.2A1 + (0.2UTh+0.1UPr)

Indirect Methods(20%): Course exit survey

CO3idm =Course_Exit_Survey

CSC405.1 = 0.8*CO1dm + 0.2* CO1idm

CSC405.2		CSC405.2: Interpret the role of Process management towards increasing throughput of system. [B3: Application]	
	Delivery Methods	Black Board, lecture notes and video	
	Target	**2.5**	
Sr.no	**CO Assessment Tools**	**Target (Tool wise)**	**Weightage**
1.	Test 1	60% student score more than 70%	0.2
	Question no 2	TEST1(Q2 for 05M) & TEST1(Q3 for 10M)	
	Date	5/2/19	
2.	Lab Experiments	60% students will score minimum 70% marks	0.3
	Experiment nos	6	
3.	Assignment 2	60% student score more than 70%	0.2
	Date	1/2/2019	
4.	Semester End Exams	60% students score more than 60%	0.3
	Date	29/05/2019	
5.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	15/4/2019	

CO Assessment Tools:

CSC405.2: Direct Methods(80%): Test1 , Assignment2, , Lab_Exp(6), Uni_Exam(TH+PR)

CO1dm = 0.2T1 +0.3LAB(6) + 0.2A2 + (0.2UTh+0.1UPr)

Indirect Methods(20%): Course exit survey

CO3idm =Course_Exit_Survey

CSC405.1 = 0.8*CO1dm + 0.2* CO1idm

CSC405.3	*CSC405.3: Model the concepts of deadlock in operating systems and implement them in multiprogramming system. [B3: Application]*		
	Delivery Methods	Black Board, lecture notes and video	
	Target	**2.7**	
Sr.no	**CO Assessment Tools**	**Target (Tool wise)**	**Weightage**
1.	Test 2	60% student score more than 70%	0.2
	Question no	Test2 (Q1 for 10 marks) Test2(Q3 for 05 marks)	
	Date	9/4/19	
2.	Lab Experiments	60% students will score minimum 70% marks	0.3
	Experiment nos	7	
3.	Assignment 3	60% student score more than 70%	0.2
	Date	22/2/2019	
4.	Semester End Exams	60% students score more than 60%	0.3
	Date	29/05/2019	
5.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	15/4/2019	

CO Assessment Tools:

CSC405.3: Direct Methods(80%): Test(1-2), Assignment3, Lab_Exp(7), Uni_Exam(TH+PR)

CO1dm = 0.2(T2) +0.3LAB(7) + 0.2A3 + (0.2UTh+0.1UPr)

Indirect Methods(20%): Course exit survey

CO3idm =Course_Exit_Survey

CSC405.1 = 0.8*CO1dm + 0.2* CO1idm

CSC405.4	*CSC405.4: Demonstrate different techniques of memory management, file and I/O management. [B4: Application]*		
Delivery Methods		Black Board, lecture notes and video	
Target		**2.7**	
Sr.no	**CO Assessment Tools**	**Target (Tool wise)**	**Weightage**
1.	Test 2	60% student score more than 70%	0.2
	Question no 2	Test2 (Q2 for 05 marks)	
	Date	Test1(5/2/19) Test2(9/4/19)	
2.	Lab Experiments	60% students will score minimum 70% marks	0.3
	Experiment nos	8,9	
3.	Assignment 4	60% student score more than 70%	0.2
	Date	18/3/2019	
4.	Semester End Exams	60% students score more than 60%	0.3
	Date	29/05/2019	
5.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	15/4/2019	

CO Assessment Tools:

CSC405.4: Direct Methods(80%): Test2 , Assignment4, Lab_Exp(8,9), Uni_Exam(TH+PR)

CO1dm = 0.2(T2) +0.3LAB(8,9) + 0.2A4 + (0.2UTh+0.1UPr)

Indirect Methods(20%): Course exit survey

CO3idm =Course_Exit_Survey

CSC405.1 = 0.8*CO1dm + 0.2* CO1idm

CSC405.5	*CSC405.5:* Execute *Applications using Open Source technologies and Software utilities. [B3: Application]*		
	Delivery Methods	Mentoring , Workshops ,Video Series & Online Courses	
	Target	**2.7**	
Sr.no	**CO Assessment Tools**	**Target (Tool wise)**	**Weightage**
1.	Mini Project (10 marks)	60% students will score minimum 70% marks **04/02/2019 TO 06/04/2019**	0.8
2.	Semester End Exams**(Practical + Oral)**	60% students score more than 60%	0.2
	Date	22/4/19 & 24/4/19	
3.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	15/4/2019	

CO Assessment Tools:

CSC405.5: Direct Methods(80%): Mini-Project, Uni_Exam(PR)

CO1dm = 0.8(MP) + 0.2 (UPr)

Indirect Methods(20%): Course exit survey

CO3idm =Course_Exit_Survey

CSC405.1 = 0.8*CO1dm + 0.2* CO1idm

Course Outcomes Target:

Upon completion of this course students will be able to:

CSC405.1: Recognize the role of operating system as System software. **[B2: Understanding]**

Target level: 2.5

CSC405.2: Interpret the role of Process management towards increasing throughput of system. **[B3: Application]**

Target level: 2.5

CSC405.3: Model the concepts of deadlock in operating systems and implement them in multiprogramming system. **[B3: Application]**

Target level: 2.7

CSC405.4: Demonstrate different techniques of memory management, file and I/O management. **[B3: Application]**

Target level: 2.7

CSC405.5: Execute Applications using Open Source technologies and Software utilities. . **[B3: Application]**

Target level: 2.7

Content Beyond Syllabus:

In order understand current applications, trends and new directions in Open Source OS AND TOOLS following topics will be covered

Sr.no.	Curriculum gap contents	Action Plan	CO MAPPED
1.	Building Android Application	Mini Project	CO5
2.	DevOps Tools	Workshop/Online Courses / Mini Project	CO5

Curriculum Gap:

No gap identified

Rubrics for assessment of Experiment:

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2018-2019)

CLASS : S.E. (COMPUTER)

SUBJECT NAME : OPERATING SYSTEM

SUBJECT CODE : CSC405

EXPERIMENT NO:	**(1-9)**
TITLE:	
DATE OF PERFORMANCE :	
DATE OF SUBMISSION :	
ROLL NO :	
NAME OF STUDENT :	

EVALUATION:

Sr.no	Rubric	Marks
1	On time Submission (2)	
2	Coding Standards (4)	
3	Post Lab Assignments (4)	
Total		
Signature		

Rubrics for the Experiments:

Indicator	Very Poor	Poor	Average	Good	Excellent
On time Submission (2)	Experiment not submitted (0)	More than two session late (0.5)	Two sessions late (1)	One session late (1.5)	Early or on time (2)
Coding Standards (4)	N/A	A difficult and inefficient solution. Does not execute due to errors. User prompts are misleading or non-existent (1)	A logical solution that is easy to follow but it is not the most efficient. Executes without errors. User prompts contain little information, poor design. (2)	Solution is efficient, easy to understand, and maintain Executes without errors. User prompts are understandable, minimum use of symbols or spacing in output. (3)	Solution is efficient and easy to follow (i.e. no confusing tricks). Executes without errors excellent user prompts, good use of symbols, spacing in output. (4)
Post Lab Assignments (4)	N/A	Major points are omitted / addressed minimally (1)	All major topics are covered, the Answers are accurate. (2)	Most major and some minor criteria are included. Answers are Accurate (3)	All major and minor criteria are covered and Answers are accurate. (4)

Rubrics for assessment of Mini Project:

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2018-2019)

Class : S.E. (COMPUTER)

Subject Name: Operating System

Subject Code: CSC405

Experiment No:	**10 MINI-PROJECT**
Title:	
Date of Performance:	
Date of Submission:	
Roll No:	
Name of the Student:	

Evaluation:

Sr. No	Rubric	Grade
1	On time Submission (1)	
2	Completeness(03)	
3	Features (04)	
4	Solutions validity(2)	

Signature of the Teacher:

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2018-2019)

Project progress report

Title of the Project:

Date:

Class TE-COMPUTERS **SEM: V**

Subject In charge: Prof. Mahendra Mehra

Members name	Planned efforts	Actual efforts		Remarks
		Knowledge gained	Practical implementation	

Explanation of Rubrics: MINI-PROJECT

Indicator	Very Poor	Poor	Average	Good	Excellent
On time Submission (1) Maintains project deadline	Project not done (00)	More than two session late (0)	Two sessions late (00)	One of the progress report on time (0.5)	Both progress report on time (01)
Completeness(03) Complete all parts of project	N/A	40-60% complete (01)	60-80% complete (02)	80-90% complete(2.5)	90-100% complete(03)
Project specific Technical Features(04) 1. Open source tool 2. Installation 3. Configuration 4. Test bed 5. Output	N/A	One feature (01)	Two features (02)	Three features(03)	4-5 features (04)
Solutions validity(2) 1. Process Automation 2. Working Prototype	N/A	N/A	N/A	Process Automation with default prototype (01)	Process automation with working prototype (02)

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2018-2019)

Class : S.E. (COMPUTER)

Subject Name: Operating System

Subject Code: CSC405

Experiment No:	**Assignments (1-4)**
Title:	
Date of Performance:	
Date of Submission:	
Roll No:	
Name of the Student:	

Evaluation:

Sr. No	Rubric	Grade
1	On time Submission (2)	
2	Organization (2)	
3	Level of content(4)	
4	Depth and breadth of discussion (2)	

Signature of the Teacher:

Rubrics for the Assignments:

Indicator	Very Poor	Poor	Average	Good	Excellent
On time Submission (2)	Assignment not submitted (0)	More than two session late (0.5)	Two sessions late (1)	One session late (1.5)	Early or on time (2)
Organization (2)	N/A	Very poor readability and not structured (0.5)	Poor readability and somewhat structured (1)	Readable with one or two mistakes and structured (1.5)	Very well written and structured without any mistakes (2)
Level of content (4)	N/A	Major points are omitted / addressed minimally (1)	All major topics are covered, the information is accurate. (2)	Most major and some minor criteria are included. Information is Accurate (3)	All major and minor criteria are covered and are accurate. (4)
Depth and breadth of discussion (2)	N/A	None in evidence; superficial at most (0.5)	Minor points/information may be missing and discussion is minimal (1)	Discussion centers on some of the points and covers them adequately (1.5)	Information is presented in depth and is accurate (2)

FR. CONCEICAO RODRIGUES COLLEGE OF ENGG.
Fr. Agnel Ashram, Bandstand, Bandra (W) Mumbai 400 050.

I UNIT TEST

SEMESTER: IV **BRANCH: COMPUTER**
SUBJECT: Operating Systems (CSC405) **MAX. MARKS: 20**
DATE: 05/02/2019 **TIME: 01PM -02PM**

Course Outcomes uptil UT1:

CSC405.1: Recognize the role of operating system as System software. **[B2: Understanding]**
CSC405.2: Interpret the role of Process management towards increasing throughput of system. **[B3: Application]**

Q.No	Answer the following	Marks	CO
Q-1	A. Differentiate between **Monolithic Kernel and Microkernel architectures**. Justify the scenarios in which each must be used. **OR** B. **"Multiprogramming will not cause starvation."** State whether the given statement is **True** or **False**. Justify the same. What are the remedies for starvation?	**[5]**	**CSC405.1**
Q-2	A. Three concurrent processes X, Y, and Z execute three different code segments that access and update certain shared variables. Process X executes the P operation (i.e., wait) on semaphores a, b and c; process Y executes the P operation on semaphores b, c and d; process Z executes the P operation on semaphores c, d, and a before entering the respective code segments. After completing the execution of its code segment, each process invokes the V operation (i.e., signal) on its three semaphores. All semaphores are binary semaphores initialized to one. Which one of the following represents a deadlock free order of invoking the P operations by the processes? **(A)X:P(a)P(b)P(c) Y:P(b)P(c)P(d) Z:P(c)P(d)P(a)** **(B)X:P(b)P(a)P(c) Y:P(b)P(c)P(d) Z:P(a)P(c)P(d)** **(C)X:P(b)P(a)P(c) Y:P(c)P(b)P(d) Z:P(a)P(c)P(d)** **(D)X: P(a)P(b)P(c) Y:P(c)P(b)P(d) Z:P(c)P(d)P(a)**	**[5]**	**CSC405.2**
Q-3	A. Consider the following set of processes, with the arrival times and the CPU-burst times given in milliseconds. **Process** / **Arrival Time** / **Burst Time** **P1** / **0** / **5** **P2** / **1** / **3** **P3** / **2** / **3** **P4** / **4** / **1** What is the **average Turnaround time** and **Average Waiting time** for these processes with **SRTF** and **Round Robin** algorithm (**Time quantum for RR is 2ms**)	**[10]**	**CSC405.2**

**********ALL THE BEST**********

FR. CONCEICAO RODRIGUES COLLEGE OF ENGG.
Fr. Agnel Ashram, Bandstand, Bandra (W) Mumbai 400 050.

I UNIT TEST

SEMESTER: IV **BRANCH: COMPUTER**
SUBJECT: Operating Systems (CSC405) **MAX. MARKS: 20**
DATE: 09/04/2019 **TIME: 01PM -02PM**

Note: Draw Diagrams where necessary

Highlight Formulas and results in numerical section.

Q.1. Consider the following snapshot of the system **(1*10M = 10M) (CO3)**

PROCESS	ALLOCATION			MAX			AVAILABLE		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Answer the following question using Bankers algorithm

a. What is the content of the Need Matrix? **(02 marks)**
b. Is the system in safe state? **(04 marks)**
c. If the request from P1 arrives for **(1, 0, 2)** can the request be granted immediately? **(04 marks)**

Q.2 Consider following disk request sequence for a disk with 100 tracks. **(1*10M = 05M) (CO4)**

44, 20,95,4,50,52,47,61,87,25

Head pointer starting at 39. Find the no. of head movements in cylinders using, SCAN, C-SCAN, LOOK scheduling. Assume head moving towards cylinder 99.

Q.3. Numerical: **(1*05M = 05M) (CO3)**

Using LRU, OPT page replacement policy for the given page frame sequence, **0,2,1,6,4,0,1,0,3,1,2,1,6,2,0,3,4**

Page frame size is 4.

Calculate page hit and page miss and page fault ratio for each of the policy.

**********ALL THE BEST**********

OS ASSIGNMENTS

Assignment 1:

1. Why use API's rather than system calls?
2. Differentiate between system software and application software also list out all the tools required to build them.
3. What are the design consideration for multicore os and multiprocessor architecture ?

Assignment 2:

1. Compare and contrast between multiprocessor and multicore architecture.
2. Differentiate between Intel Pentium, i3, i5, i7 processors.
3. Explain the reason why Linux OS supports all kind of hardware devices unlike Window OS which requires installing device drivers separately.
4. Write a short note on Linux Scheduling.

Assignment 3:

1. Explain the rationale behind choosing the page size to be power of 2.
2. Explain buddy system in memory allocation strategy.
3. Distinguish between paging and segmentation.

Assignment 4:

1. Explain Linux Virtual file system Architecture with a neat diagram.
2. Calculate the **TOTAL HEAD MOVEMENT** for following disk scheduling algorithm
a. FCFS b. SSTF c. SCAN AND C-SCAN d. LOOK AND C-LOOK
Work Queue: 23, 89, 132, 42, 187
There are 200 cylinders numbered from 0 - 199 the disk head stars at number 100.
3. Write short note on
    a. File Organization and access
    b. Secondary storage management
    c. File Allocation methods
    d. Operating system Design Issues

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2018-2019)

Lesson Plan: Operating System

Semester IV **Year: 2018-19**

Subject Incharge: Prof. Mahendra Mehra

Course Objectives:

CSC405.1: Recognize the role of operating system as System software. **[B2: Understanding]**
CSC405.2: Interpret the role of Process management towards increasing throughput of system. **[B3: Application]**

CSC405.3: Model the concepts of deadlock in operating systems and implement them in multiprogramming system. **[B3: Application]**

CSC405.4: Demonstrate different techniques of memory management, file and I/O management. **[B3: Application]**

CSC405.5: Execute Applications using Open Source technologies and Software utilities. **[B3: Application]**

Modes of Content Delivery:

i	Class Room Teaching	v	Self Learning Online Resources	Ix	Industry Visit
ii	Tutorial	vi	Slides	X	Group Discussion
iii	Remedial Coaching	vii	Simulations/Demonstrations	xi	Seminar
iv	Lab Experiment	viii	Expert Lecture	xii	Case Study

Lect. No.	Portion to be covered	Planned date	Actual date	Content Delivery Method
1.	Introduction to Operating System,	1/1/19	1/1/19	i
2.	Objectives and Functions of O.S, OS Services,	1/1/19	1/1/19	i
3.	Special purpose systems, Types Of OS	2/1/19	2/1/19	i

4.	System calls, types of system calls	3/1/19	3/1/19	i, vi
5.	OS Design Considerations for Multiprocessor and Multicore architectures,	4/1/19	8/1/19	i, iv , vi
6.	Operating system structure,. Linux Kernel and Shell	8/1/19	10/1/19	I, vii,

Books:

1. Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
2. Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.

Self Learning Online Resource:

1. http://www.tutorialspoint.com/operating_system/
2. http://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/1_Introduction.html
3. http://www.csl.mtu.edu/cs4411.ck/www/NOTES/process/fork/create.html

Lect. No.	Portion to be covered	Planned date	Actual date	Content Delivery Method
7.	**Operations on process :** Process scheduling: basic concepts	9/1/19	11/1/19	i
8.	Concept of a Process, Process States, Process Description, Process Control Block, Operations on Processes	10/1/19	15/1/19	i
9.	Threads: Definition and Types, Concept of Multithreading, Multicore processors and threads.	11/1/19	16/1/19	i
10.	Scheduling criteria , scheduling algorithms, Preemptive, Non preemptive, FCFS	15/1/19	17/1/19	i , iv
11.	Scheduling algorithms: SJF ,SRTN	16/1/19	17/1/19	i , iv
12.	Scheduling algorithms: Priority based, Round Robin	17/1/19	18/1/19	i , iv
13.	Multilevel Queue scheduling, Operating System Examples.	18/1/19	22/1/19	i

14.	Introduction to Thread Scheduling, Multiprocessor Scheduling and Linux Scheduling.	16/1/19	23/1/19	i
15.	Concurrency: Principles of Concurrency, InterProcess Communication, Process/Thread Synchronization.	17/1/19	24/1/19	i
16.	**Synchronization:** Background , the critical section problem, Peterson's Solution	18/1/19	25/1/19	i, vi
17.	Synchronization Hardware Sem aphores, classic problems of Synchronization: The Producer Consumer Problem	22/1/19	29/1/19	i, vi
18.	classic problems of Synchronization: Readers writers problem,	23/1/19	30/1/19	i, vi
19.	Dinning Philosopher Problem	24/1/19	30/1/19	i, vi
20	Revision : SUM SOLVING SESSIONS	25/1/19	1/2/19	i

Books:

1. Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
2. Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.

Self Learning Online Resource:

1. http://www.tutorialspoint.com/operating_system/os_process_scheduling_algorithms.html
2. https://www.it.uu.se/edu/course/homepage/oskomp/vt07/lectures/scheduling_algorithms/handout.pdf
3. http://www.dailyfreecode.com/code/simulate-process-synchronization-call-2182.aspx

Lect. No.	Portion to be covered	Planned date	Actual date	Content Delivery Method
21	Deadlock Problem, Deadlock Characterization, Deadlock Prevention.	29/1/19	7/2/19	i

22	Deadlock avoidance Banker's al gorithm for single & multiple resources -I	30/1/19	7/2/19	i, iv, vi
23	Deadlock avoidance Banker's al gorithm for single & multiple resources- II	1/2/19	20/2/19	i, iv, vi
24	Deadlock recovery ,	7/2/19	21/2/19	i, iv
25	Deadlock Detection,	8/1219	22/1219	i, iv
26	Revision : SUM SOLVING SESSIONS	12/2/19	25/2/19	i

Books:

1. Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
2. Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.

Self Learning Online Resource:

1. **http://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/7_Deadlocks.html**
2. **http://web.cs.wpi.edu/~cs3013/c07/lectures/Section07-Deadlocks.pdf**
3. **http://www.youtube.com/watch?v=q71pmJYE86U**

Lect. No.	Portion to be covered	Planned date	Actual date	Content Delivery Method
27.	**Memory management strategies:** background , swapping ,contiguous memory allocation,	13/2/19	26/2/19	i
28.	Paging , structure of page table s ,	14/2/19	27/2/19	i, iv, vi
29.	segmentation	5/3/19	5/3/19	i
30	**Virtual memory management:** Demand paging , copy on write	6/3/19	6/3/19	i, iv, vi
31.	Page replacement, FIFO, Optimal, LRU	7/3/19	7/3/19	i, iv
32	LRU Approximation, Counting Based, Allocation of frames , Thrashing	8/3/19	7/3/19	i

Lect. No.	Portion to be covered	Planned date	Actual date	Content Delivery Method
33	Files System Structure,	12/3/19	8/3/19	i, iv
34	File System implementation, Directory implementation	13/3/19	12/3/19	
35	Allocation Methods contiguous allocation	14/3/19	13/3/19	i, iv
36	Linked list allocation, indexed allocations, Free space management	19/3/19	14/3/19	i, iv
37	**Secondary storage** : structures: Disks Scheduling Algorithm: FCFS, SSTF	20/3/19	19/3/19	i, iv, vi
38	SCAN, CSCAN	22/3/19	20/3/19	i, iv, vi
39	LOOK, Disk Management	26/3/19 27/3/19	22/3/19 26/3/19	i, iv, vi
40	Disk Cache, Linux I/O.	28/3/19	27/3/19	i, iv, vi
41	Revision : SUM SOLVING SESSIONS	3/4/19	28/4/19 3/4/19	i

Books:

1. Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
2. Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.

Self Learning Online Resource:

1. **http://www.tutorialspoint.com/operating_system/os_file_system.htm**
2. **http://www.cs.iit.edu/~cs561/cs450/disksched/disksched.html**
3. **http://www2.cs.uregina.ca/~hamilton/courses/330/notes/io/node8.html**

Text Books:

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN-10: 0133805913 • ISBN-13: 9780133805918 .
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons , Inc., 9th Edition, 2016, ISBN 978-81-265-5427-0
3. Andrew Tannenbaum, Operating System Design and Implementation, Pearson, 3rd Edition.
4. D.M Dhamdhere, Operating Systems: A Concept Based Approach, Mc-Graw Hill

Reference Books:

1. Maurice J. Bach, "Design of UNIX Operating System", PHI
2. Achyut Godbole and Atul Kahate, Operating Systems, Mc Graw Hill Education, 3rd Edition
3. The Linux Kernel Book, Remy Card, Eric Dumas, Frank Mevel, Wiley Publications.

FR. Conceicao Rodrigues College Of Engineering
Department Of Computer Engineering
OS: List of Experiments (2018-2019)

Sr.no	Concept	CO	Experiment
01	FILE MANAGEMENT COMMANDS	CO1	To study the Linux File system Hierarchy and different types users in LINUX.
02	Shell scripting		Learning Linux File | User | Process Management commands.
03			Linux Bash Scripting (BASICS)
04			Linux Bash Scripting (Advanced) (GREP | AWK | SED | CUT)
05	System calls Process synchronization	CO1	System Calls a. Program to implement I/O System call b. Process management (fork | wait | getpid | getppid | getuid | setuid | getgid | getegid)
06	PROCESS SCHEDULING	CO1	Write a program to demonstrate Process Scheduling Algorithms a. FCFS b. Non Preemptive SJF c. Round Robin d. Non Preemptive Priority
07	Deadlock Avoidance	CO2	Write a program to Demonstrate Bankers Algorithm for Deadlock Avoidance
08	Memory Management	CO3	Implement various page replacement policies a. FIFO b. LRU
09		CO4	Implement Dynamic Partitioning Placement Algorithms a. Best Fit b. First-Fit c. Worst-Fit etc
10	Mini-Project(Devops tools / Android)	CO5	Mini Project

FR. Conceicao Rodrigues College Of Engineering

Department Of Computer Engineering

OS: List of Experiments (2018-2019)

Practical Plan

Exp No.	Date Planned				Concept	Title/aim
	A	B	C	D		
01	**14/1/2019**	**18/1/2019**	**15/1/2019**	**16/1/2019**	FILE MANAGEMENT COMMANDS	**To study the Linux File system Hierarchy and different types users in LINUX.**
02	**21/1/2019**	**25/1/2019**	**22/1/2019**	**23/1/2019**	Shell scripting	**Learning Linux File | User | Process Management commands.**
03	**28/1/2019**	**1/2/2019**	**29/1/2019**	**30/1/2019**		**Linux Bash Scripting (BASICS)**
04	**18/2/2019**	**8/2/2019**	**26/2/2019**	**20/2/2019**	System calls	**Linux Bash Scripting (Advanced) (GREP | AWK | SED | CUT)**
05	**25/2/2019**	**22/2/2019**	**5/3/2019**	**27/2/2019**		**Implement System Calls** **a. Program to implement I/O System call** **b. Process management (fork | wait | getpid | getppid | getuid | setuid | getgid | getegid)**
06	**11/3/2019**	**1/3/2019**	**12/3/2019**	**6/3/2019**	Process Scheduling	**Write a program to demonstrate Process Scheduling Algorithms** **a. FCFS** **b. Non Preemptive SJF** **c. Round Robin** **d. Non Preemptive Priority**
07	**18/3/2019**	**8/3/2019**	**19/3/2019**	**13/3/2019**	Deadlock Avoidance	**Write a program to Demonstrate Bankers Algorithm for Deadlock Avoidance**
08	**25/3/2019**	**22/3/2019**	**26/3/2019**	**20/3/2019**	Memory Management	**Implement various page replacement policies** **a. FIFO** **b. LRU**

09	**1/4/2019**	**5/4/2019**	**2/4/2019**	**27/3/2019**		**Implement Dynamic Partitioning Placement Algorithms** **d. Best Fit** **e. First-Fit** **f. Worst-Fit etc**
10	**04/02/2019 TO 06/04/2019**	**04/02/2019 TO 06/04/2019**	**04/02/2019 TO 06/04/2019**	**04/02/2019 TO 06/04/2019**	Mini-Project(Devops tools / Android)	**Mini Project**
11	**DOA**	**14/1/2019**	**DOS**	**23/1/2019**	Assignments	**Assignment 1 (CO1)**
12	**DOA**	**1/2/2019**	**DOS**	**18/2/2019**		**Assignment 2 (CO2)**
13	**DOA**	**22/2/2019**	**DOS**	**12/3/2019**		**Assignment 3 (CO3)**
14	**DOA**	**18/3/2019**	**DOS**	**1/4/2019**		**Assignment 4 (CO4)**

FR. Conceicao Rodrigues College Of Engineering

Department Of Computer Engineering
OS-LAB (CSC405)
(2018-2019)

Mini-Project Plan

CSC405.5: Execute Applications using Open Source technologies and Software utilities. **[B3: Application]**

Date	Activity
29/01/2019	Project Group formation, Topic Submission through Google Form https://forms.gle/UGsP9EhhbGFHpFva8
21/02/2019	1st Project Progress Report
05/03/2019	Project Demonstration + Corrections and Improvements
22/03/2019	2nd Project Progress Report
04/04/19 to 06/04/19	Project Report and Presentation

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Computer Engineering Department

Course Exit Form

Operating System

(2018 - 2019)

1. **I am able to understand the role of operating system as System software.**
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

2. **I am able to describe the role of Process synchronization towards increasing throughput of system**
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

3. **I am able to Model the concepts of deadlock in operating systems and implement them in multiprogramming system.**
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

4. **I am able to Demonstrate different techniques of memory management, file and I/O management**
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

5. **I am able to Execute Applications using Open Source technologies and Software utilities**
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree