Lesson Plan

Operating System

SEM IV

2019-2020

Subject Incharge

Prof.Mahendra Mehra

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

SUBJECT: Operating System **ACADEMIC YEAR: 2019-20**
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
Jan-May 2020

			11 a.m.			p.m.		3.30 p.m.		
Monday			Break			Lunch Time	OS SEC	OS SEC - B		
Tuesday				CC BEC - A			DO BEIT– C			
Wednesday				DO BEIT - B					OS SEC	
Thursday				OS SEC			DO BEIT - D			
Friday		OS SEC		CC BEC - A				DO BEIT - A		
Saturday										

Total load: 4Th + 14P = 18

FR. Conceicao Rodrigues College Of Engineering

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

Department of Computer Engineering

S.E. (Computer) (semester IV) (2019-2020)

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(26/2/20) Test2(7/4/20)	
2.	Lab Experiments	65% students will score minimum 70% marks	0.2
	Experiment nos	1,2,3,4,5,10	
3.	Assignment 1	60% student score more than 70%	0.2
	Date	14/1/2020	
4.	Module test	60% student score more than 70%	0.2
	Date	14/1/2020	
5.	Semester End Exams	60% students score more than 60%	0.2
	Date		
6.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	16/4/2020	

CO Assessment Tools:

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

CO1dm = 0.2(T1) +0.2LAB(1-5,10) + 0.2A1 + 0.2M1+ (0.1UTh+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	Test1(26/2/20) Test2(7/4/20)	
2.	Lab Experiments	65% students will score minimum 70% marks	0.2
	Experiment nos	6	
3.	Assignment 2	60% student score more than 70%	0.2
	Date	25/2/2020	
4.	Module test	60% student score more than 70%	0.2
	Date	25/2/2020	
5.	Semester End Exams	60% students score more than 60%	0.2
	Date		
6.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	16/4/2020	

CO Assessment Tools:

CSC405.2: Direct Methods(80%): Test1 , Assignment2,QUIZ2 , Lab_Exp(6), Uni_Exam(TH+PR)

CO1dm = 0.2T1 +0.3LAB(6) + 0.2A2 + 0.2M2+ (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	Test1(26/2/20) Test2(7/4/20)	
2.	Lab Experiments	65% students will score minimum 70% marks	0.2
	Experiment nos	7	
3.	Assignment 3	60% student score more than 70%	0.2
	Date	22/2/2020	
4.	Module test	60% student score more than 70%	0.2
	Date	04/3/2020	
5.	Semester End Exams	60% students score more than 60%	0.2
	Date		
6.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	16/4/2020	

CO Assessment Tools:

CSC405.3: Direct Methods(80%): Test(1-2), Assignment3,Quiz3, Lab_Exp(7), Uni_Exam(TH+PR)

CO1dm = 0.2(T2) +0.3LAB(7) + 0.2A3+ 0.2M3 + (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(26/2/20) Test2(7/4/20)	
2.	Lab Experiments	65% students will score minimum 70% marks	0.2
	Experiment nos	8,9	
3.	Assignment 4	60% student score more than 70%	0.2
	Date	18/3/2020	
4.	Module test	60% student score more than 70%	0.2
	Date	28/3/2020	
5.	Semester End Exams	60% students score more than 60%	0.2
	Date		
6.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	16/4/2020	

CO Assessment Tools:

CSC405.4: Direct Methods(80%): Test2 , Assignment4,Quiz4, Lab_Exp(8,9), Uni_Exam(TH+PR)

CO1dm = 0.2(T2) +0.3LAB(8,9) + 0.2A4 + 0.2M4+ (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)	65% students will score minimum 70% marks **04/02/2020 TO 06/04/2020**	0.8
2.	Semester End Exams**(Practical + Oral)**	60% students score more than 60%	0.2
	Date		
3.	Course Exit Survey	75% student rate above average (4 & 5)	0.2
	Date	16/4/2020	

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:

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Department of Computer Engineering

S.E. (Computer) (semester IV)

(2019-2020)

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:

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

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2019-2020)

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

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Department of Computer Engineering

S.E. (Computer) (semester IV)

(2019-2020)

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)

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Department of Computer Engineering

S.E. (Computer) (semester IV)

(2019-2020)

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)

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I UNIT TEST

SEMESTER: IV **BRANCH: COMPUTER**
SUBJECT: Operating Systems (CSC405) **MAX. MARKS: 20**
DATE: 27/02/2020 **TIME: 10:00AM -11:00AM**

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. "Operating system acts as a Resource manager",** Give a valid rationale behind this Phrase. **OR** **B.** Differentiate between **Monolithic Kernel and Microkernel architectures**. Justify the scenarios in which each must be used.	**[5]**	**CSC405.1**
Q-2	**A.** The time taken to switch between user and kernel modes of execution is **t1** while the time taken to switch between two processes is **t2**. Which of the following is TRUE? Give justification for your answer. **1. t1 > t2** **2. t1 = t2** **3. t1 < t2** **4. Nothing can be said about the relation between t1 and t2** **Or** **B.** Assume that process (P, Q, R, S, T) with burst time of (4, 1, 8, 1, 2) respectively are to be executed on a single processor system The jobs are assumed to have arrived at time 0 and in the order p, q, r, s, t. Calculate the departure time (completion time) for job p if scheduling is round robin with time slice 1.	**[5]**	**CSC405.2**

Q-3	For the processes listed in the following table, which of the following scheduling schemes will give the lowest average turnaround time? **Process Arrival Time Burst Time** **A 0 3** **B 1 6** **C 4 4** **D 6 2** **(A)First Come First Serve** **(B) Non-pre-emptive Shortest Job First** **(C) Shortest Remaining Time First** **(D) Round Robin with Quantum value two**	**[10]**	**CSC405.2**

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

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II UNIT TEST(previous year 2019)

SEMESTER: IV **BRANCH: COMPUTER**
SUBJECT: Operating Systems (CSC405) **MAX. MARKS: 20**
DATE: 7/04/2019 **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 55. Find the no. of head movements in cylinders using, SCAN, C-SCAN, LOOK scheduling. Assume head moving towards cylinder 0.

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

Using LRU, OPT page replacement policy for the given page frame sequence,
0,2,1,6,4,0,1,0,3,1,7,4,0,2,3,1,2,1,6,2,0,3,4

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. Explain the process of booting an Operating system with necessary diagrams?
2. Explain the architecture used in Tesla self drive cars and elaborate on the Operating system aspect of it..
3. What is 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, 137, 67

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

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Department of Computer Engineering

S.E. (Computer) (semester IV)

(2019-2020)

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,	6/1/20		i
2.	Objectives and Functions of O.S, OS Services,	8/1/20		i
3.	Special purpose systems, Types Of OS	9/1/20		i
4.	System calls, types of system	10/1/20		i, vi

	calls			
5.	OS Design Considerations for Multiprocessor and Multicore architectures,	13/1/20		i, iv , vi
6.	Operating system structure,. Linux Kernel and Shell	15/1/20		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 conce pts	16/1/20		i
8.	Concept of a Process, Process States, Process Description, Process Control Block, Operations on Processes	17/1/20		i
9.	Threads: Definition and Types, Concept of Multithreading, Multicore processors and threads.	20/1/20		i
10.	Scheduling criteria , scheduling algorithms, Preemptive, Non preemptive, FCFS	22/1/20 23/1/20		i , iv
11.	Scheduling algorithms: SJF ,SRTN	24/1/20		i , iv
12.	Scheduling algorithms: Priority based, Round Robin	27/1/20		i , iv
13.	Multilevel Queue scheduling, Operating System Examples.	29/1/20		i
14.	Introduction to Thread Scheduling, Multiprocessor	30/1/20		i

	Scheduling and Linux Scheduling.			
15.	Concurrency: Principles of Concurrency, InterProcess Communication, Process/Thread Synchronization.	31/1/20		i
16.	**Synchronization:** Background , the critical section problem, Peterson's Solution	3/2/20 5/2/20		i, vi
17.	Synchronization Hardware Sem aphores, classic problems of Synchronization: The Producer Consumer Problem	6/2/20		i, vi
18.	classic problems of Synchronization: Readers writers problem,	7/2/20		i, vi
19.	Dinning Philosopher Problem	10/2/20 12/2/20		i, vi
20	Revision : SUM SOLVING SESSIONS	14/2/20 17/02/20		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.	21/2/20		i
22	Deadlock avoidance Banker's al gorithm for single &	24/2/20		i, iv, vi

	multiple resources -I	25/2/20		
23	Deadlock avoidance Banker's al gorithm for single & multiple resources- II	2/3/20		i, iv, vi
24	Deadlock recovery ,	4/3/20		i, iv
25	Deadlock Detection,	6/3/20		i, iv
26	Revision : SUM SOLVING SESSIONS	9/3/20		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,	11/3/20		i
28.	Paging , structure of page table s ,	12/3/20		i, iv, vi
29.	segmentation	13/3/20		i
30	**Virtual memory management:** Demand paging , copy on write	16/3/20		i, iv, vi
31.	Page replacement, FIFO, Optimal, LRU	18/3/20		i, iv
32	LRU Approximation, Counting Based, Allocation of frames , Thrashing	19/3/20		i

Lect.	Portion to be covered	Planned date	Actual date	Content Delivery Method

No.				
33	Files System Structure,	20/3/20 23/3/20		i, iv
34	File System implementation, Directory implementation	25/3/20 26/3/20		
35	Allocation Methods contiguous allocation	27/3/20		i, iv
36	Linked list allocation, indexed allocations, Free space management	30/3/20		i, iv
37	**Secondary storage** : structures: Disks Scheduling Algorithm: FCFS, SSTF	1/4/20 2/4/20		i, iv, vi
38	SCAN, CSCAN	3/4/20		i, iv, vi
39	LOOK, Disk Management	6/4/20 8/4/20		i, iv, vi
40	Disk Cache, Linux I/O.	9/4/20 10/4/20		i, iv, vi
41	Revision : SUM SOLVING SESSIONS	13/4/20 15/4/20 16/4/20		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 (2019-2020)

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**

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Department Of Computer Engineering

OS: List of Experiments (2019-2020)

Practical Plan

Exp No.	Date Planned				Concept	Title/aim
	A	B	C	D		
01	14/1/2020	18/1/2020	15/1/2020	16/1/2020	FILE MANAGEMENT COMMANDS	**To study the Linux File system Hierarchy and different types users in LINUX.**
02	21/1/2020	25/1/2020	22/1/2020	23/1/2020	Shell scripting	**Learning Linux File | User | Process Management commands.**
03	28/1/2020	1/2/2020	29/1/2020	30/1/2020		**Linux Bash Scripting (BASICS)**
04	18/2/2020	8/2/2020	26/2/2020	20/2/2020	System calls	**Linux Bash Scripting (Advanced) (GREP | AWK | SED | CUT)**
05	25/2/2020	22/2/2020	5/3/2020	27/2/2020		**Implement System Calls** **a. Program to implement I/O System call** **b. Process management (fork | wait | getpid | getppid | getuid | setuid | getgid | getegid)**
06	11/3/2020	1/3/2020	12/3/2020	6/3/2020	Process Scheduling	**Write a program to demonstrate Process Scheduling Algorithms** **a. FCFS** **b. Non Preemptive SJF** **c. Round Robin** **d. Non Preemptive Priority**
07	18/3/2020	8/3/2020	19/3/2020	13/3/2020	Deadlock Avoidance	**Write a program to Demonstrate Bankers Algorithm for Deadlock Avoidance**
08	25/3/2020	22/3/2020	26/3/2020	20/3/2020	Memory Management	**Implement various page replacement policies** **a. FIFO** **b. LRU**

09	**1/4/2020**	**5/4/2020**	**2/4/2020**	**27/3/2020**		**Implement Dynamic Partitioning Placement Algorithms** **d. Best Fit** **e. First-Fit** **f. Worst-Fit etc**
10	**04/02/2020 TO 06/04/2020**	**04/02/2020 TO 06/04/2020**	**04/02/2020 TO 06/04/2020**	**04/02/2020 TO 06/04/2020**	Mini-Project(Devops tools / Android)	**Mini Project**
11	**DOA**	**14/1/2020**	**DOS**	**23/1/2020**	Assignments	**Assignment 1 (CO1)**
12	**DOA**	**1/2/2020**	**DOS**	**18/2/2020**		**Assignment 2 (CO2)**
13	**DOA**	**22/2/2020**	**DOS**	**12/3/2020**		**Assignment 3 (CO3)**
14	**DOA**	**18/3/2020**	**DOS**	**1/4/2020**		**Assignment 4 (CO4)**

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Department Of Computer Engineering
OS-LAB (CSC405)
(2019-2020)

Mini-Project Plan

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

Date	Activity
29/01/2020	Project Group formation, Topic Submission through Google Form https://forms.gle/UqVvKVKwhLtKFecj8
4/03/2020	1st Project Progress Report
05/03/2020	Project Demonstration + Corrections and Improvements
22/03/2020	2nd Project Progress Report
04/04/20 to 06/04/20	Final Project Report and Presentation

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

Computer Engineering Department

Course Exit Form

Operating System

(2019 - 2020)

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