





# **Course Specifications**

Course Title:	Operating Systems
Course Code:	332CSS-3
Program:	Bachelor of Science
Department:	Department of CS and Department of IS
College:	College of Computer Science and Information Systems
Institution:	Najran University





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#### **A. Course Identification**

1. Credit hours: 3 (2, 2, 1) [Theory, Lab, Tutorial]
2. Course type
<b>a.</b> University College $$ Department Others
<b>b.</b> Required $$ Elective
<b>3. Level/year at which this course is offered:</b> Year 3 / Level 6
<b>4. Pre-requisites for this course</b> (if any):
211CCS-4
5. Co-requisites for this course (if any):
N/A

#### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	<b>Contact Hours</b>	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

#### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contac	et Hours	
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	15
4	Others (specify)	
	Total	75
Other Learning Hours*		
1	Study	25
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	
5	Others (specify)	
	Total	45

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

#### **B.** Course Objectives and Learning Outcomes

#### **1.** Course Description

Introduction, history and evolution of operating systems, operating system structure. Introduction to basic UNIX Commands and vi editor, process management and scheduling, inter process communication, process coordination and scheduling, threads (overview, multithreading model



and threading issues), CPU scheduling (Basic concepts and scheduling algorithms), deadlocks (deadlock characterization, methods for handling deadlock), deadlock prevention, deadlock avoidance and detection, memory management and introduction to file management.

#### 2. Course Main Objective

Upon the successful completion of this course, students will be able to:

- Describe operating system history, services, applications and types.
- Apply UNIX commands to perform essential operations.
- Illustrate various algorithms of processes, threads, scheduling, synchronization, deadlock, memory management and file system.
- Explain operating system support for processes, threads, scheduling, synchronization, deadlock, memory management and file systems.
- Develop programs to make use of various systems calls and implement standard problems/algorithms related to operating systems concepts.
- Evaluate the different algorithms for CPU Scheduling, synchronization, and deadlock.

#### **3.** Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge:	
1.1	Describe operating system history, services, applications and types.	$\mathbf{K}_1$
1.2	Illustrate various algorithms of processes, threads, scheduling, synchronization, deadlock, memory management and file system.	$K_1$
1.3	Explain operating system support for processes, threads, scheduling, synchronization, deadlock, and virtual memory and file systems.	$K_1$
2	Skills :	
2.1	Develop programs to make use of various systems calls and implement standard problems/algorithms related to operating systems concepts.	<b>S</b> <sub>1</sub> , <b>S</b> <sub>4</sub>
2.2	Apply UNIX commands to perform essential operations.	$\mathbf{S}_4$
2.3	Evaluate the different algorithms for CPU Scheduling, synchronization, and deadlock.	$S_2$
3	Competence:	
3.1		
3.2		
3.3		
3		

#### **C.** Course Content

No	List of Topics	Contact Hours
1	Introduction, History and Evolution of Operating Systems, Types of Operating Systems	10
2	Operating System Structure	5
3	Introduction to UNIX commands	5
4	Process Concept	10
5	Multithreaded Programming	5
6	Process Scheduling	10
7	Process Synchronization	5
8	Deadlocks	10

9	Memory Management Strategies	5
10	Virtual Memory Management	5
11	11 Implementing File Systems	
Total		75

#### **D.** Teaching and Assessment

## **1.** Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		•
1.1	Describe operating system history, services, applications and types. Illustrate various algorithms of	Lectures, active learning, collaborative and cooperative learning and independent	Following methods are used to assess student's knowledge acquired in
	processes, threads, scheduling, synchronization, deadlock, memory management and file system.	study assignments are used as teaching strategies. - Showing and delivering PPT	this course Class Quizzes.
1.3	Explain operating system support for processes, threads, scheduling, synchronization, deadlock, and virtual memory and file systems.	<ul> <li>presentation in the class.</li> <li>Using a whiteboard to explain essential points in more detail.</li> <li>Motivating students to be active during class by asking questions regularly during lecture.</li> <li>Motivating students to work in the home, to search from the internet, to read related reference books by giving them assignments related to operating system and OS security.</li> <li>Let students solve scheduling problems and giving correction on their solution during class.</li> <li>Motivating students to be active during class by asking questions regularly.</li> <li>Giving students tutorial related to scheduling algorithms, thread, memory memory memory memory memory</li> </ul>	<ul> <li>Assignment.</li> <li>Midterm exam (Each exam consists of multiple choice questions, true/false, fill in the blanks, and theoretical questions.)</li> <li>Final Exam</li> </ul>
2.0	Skills		
2.1	Develop programs to make use of various systems calls and implement standard problems/algorithms related to operating systems concepts.	- Solving algorithm on whiteboard for students to make them more familiar with various scheduling	Following methods are used to assess student's skills in this course.
2.2	Apply UNIX commands to perform essential operations.	algorithms. - Let students solve and	<ul><li>Class Quizzes.</li><li>Assignment.</li></ul>
2.3	Evaluate the different algorithms for CPU Scheduling, synchronization and deadlock.	evaluate the scheduling problems and giving correction on theirsolution desing class.	<ul> <li>Lab Quiz</li> <li>Lab quiz/Lab mid- term exam/Lab final exam.</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		<ul> <li>Motivating students to be active during class by asking questions regularly.</li> <li>Giving students tutorial related to scheduling algorithm to explain them in more detail.</li> <li>Motivating students to work in the home, to search the internet, to read related reference books by giving them assignments.</li> <li>Use C and UNIX commands, and develop various system programs under Linux to make use of OS concepts related to System calls, CPU Scheduling, process synchronization during the lab session.</li> </ul>	- Final Exam
3.0	Competence		
	N/A		

#### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz # 01	3 <sup>th</sup> week	2%
2	Quiz # 02	6 <sup>th</sup> week	3%
3	Assignments	9 <sup>th</sup> week	5%
4	Mid Term Exam-I	TBA	15%
5	Mid Term Exam-II	TBA	15%
6	Makeup Mid Term Exam (Only for exceptional cases)	TBA	15%
7	Mid Lab Exam or Lab Assignment/Project	TBA	10%
8	Final Lab Exam	TBA	10%
	Final Exam	TBA	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

#### E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

During the whole semester, 10 hours/week are reserved for students to guide them, to help them and to explain them topic which is not clear to them during lecture.

#### **F. Learning Resources and Facilities**





#### **1.Learning Resources**

<b>Required Textbooks</b>	"Operating System Concepts", A. Silberschatz , Galvin and Gagne, $10^{\rm th}$ Edition , John Willey & Sons
Essential References Materials	<ul> <li>"Modern Operating Systems", Andrew S. Tanenbaum., Fourth Edition, Prentice Hall</li> <li><u>Note</u>: Handouts will be distributed in class, when appropriate, to cover some of the course topics.</li> </ul>
Electronic Materials	N/A
Other Learning Materials	N/A

#### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture Rooms with 20 seats and a whiteboard or a smart board.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Desktop/ Laptop computer Multimedia Projector
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	A File cabinet to keep Class Stuff, Markers, papers and students Files, and a printer to print program screenshots.

#### **G.** Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	<b>Evaluation Methods</b>
Collecting students' questionnaire about the faculty and teaching methods.	Students	Survey
Collecting students' suggestions to facilitate more during the class.	Students	Verbal discussion
Student's questioner once during semester about course learning outcomes.	Students	Indirect Survey
Achievement percentage of course learning outcomes, direct evaluation using CLO assessment sheet	Course Instructor	Direct evaluation using CLO achievement calculation

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods (Direct, Indirect)



### H. Specification Approval Data

Council / Committee	Department Council
Reference No.	Session No. 10 (441-38-43300)
Date	17/02/2020
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