Course Specification
(Bachelor)

Course Title:	Operating Systems
Course Code:	332CCS-3
Program:	Bachelor of Science in Computer Science
Department:	Department of Computer Science
College:	College of Computer Science and Information Systems
Institution:	Najran University
Version:	2.0
Last Revision Date:	15 February 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

3 (2, 2, 1) [Theory, Lab, Tutorial]

2. Course type

A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (Level 6/Year 3)

4. Course General Description:

Introduction, history and evolution of operating systems, operating system structure. Introduction to basic UNIX Commands and vi editors, process management and scheduling, inter-process communication, process coordination and synchronization, 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.

5. Pre-requirements for this course (if any):

111CSS-4

6. Pre-requirements for this course (if any):

N/A

7. Course Main Objective(s):

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

- Describe the 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.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity		Contact Hours
1.	**Lectures**	[2 contact hours × 15 weeks]	30
2.	**Laboratory/Studio**	[2 contact hours × 15 weeks]	30
3.	**Field**		
4.	**Tutorial**	[1 contact hour × 15 weeks]	15
5.	**Others (specify)**		
Total			75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe operating system history, services, applications, and types.	K_1	TS: 1-Interactive Lectures using PowerPoint slides and explaining the essential points in more detail with the help of a whiteboard. TS: 2- Encouraging the students to use the online	**Indirect:** - Students CLO Survey **Direct:** - Quizzes.

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
			links to know the concepts in detail. TS: 3 – Recall the topics discussed in the last lecture by asking questions to the students. TS: 4 – Motivating students to be active during class by asking questions regularly during the lecture. TS: 5 – Associating the topics with the course learning outcomes (CLO).	- Assignment. - Midterm exam (Exam consists of multiple-choice questions, true/false, fill in the blanks, and theoretical questions.) - Final Exam
1.2	Illustrate various algorithms of processes, threads, scheduling, synchronization, deadlock, memory management and file system.	K_1, K_3	TS: 1-Interactive Lectures using PowerPoint slides and using the whiteboard to explain the essential points in more detail. TS:2- Engaging the students in problem-based learning through tutorials. TS: 3- Encouraging the students to use the online links to know the concepts in detail. TS: 4 – Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Motivating students to be active during class by asking questions regularly during the lecture. TS: 6 – Associating the topics in each chapter with the CLO.	**Indirect:** - Students CLO Survey **Direct:** - Quizzes. - Midterm exam (Each exam consists of multiple-choice questions, true/false, fill in the blanks, and theoretical questions.) - Final Exam
1.3	Explain operating system support for processes, threads, scheduling, synchronization, deadlock, and virtual memory and file systems.	K_1	TS: 1-Interactive Lectures using PowerPoint slides and using the whiteboard to explain the essential points in more detail. TS: 2- Giving students tutorials related to scheduling algorithms, thread, deadlock and memory management. TS: 3- Encouraging the students to use the online	**Indirect:** - Students CLO Survey **Direct:** - Quizzes. - Midterm exam (Each exam consists of multiple-

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
			links to know the concepts in detail. TS: 4 – Recall the topics discussed in the last lecture by asking questions to the students. TS: 5 – Motivating students to be active during class by asking questions regularly during the lecture. TS: 6 – Associating the topics in each chapter with the CLO.	choice questions, true/false, fill-in-the-blanks, and theoretical questions.) - Final Exam
2.0	**Skills**			
2.1	Develop programs to make use of various systems calls and implement standard problems/algorithms related to operating systems concepts.	S_1, S_4	TS: 1- Lab Demonstrations TS: 2- Implementation of system calls and scheduling algorithms in the UNIX environment. TS: 3- Fixing and explaining the problems faced by the student during the lab session. TS: 4- Group Discussions	**Indirect:** - Students CLO Survey **Direct:** - Quizzes - Assignments - Mid Lab Exam - Final Lab Exam
2.2	Apply UNIX commands to perform essential operations.	S_4	TS: 1- Lab Demonstrations TS: 2- Lab experiments. TS: 3- Fixing and explaining the problems faced by the student during the lab session. TS: 4- Homework TS: 5- Group Discussions	**Indirect:** - Students CLO Survey **Direct:** - Quizzes - Assignments - Mid Lab Exam - Final Lab Exam
2.3	Evaluate the different algorithms for CPU scheduling, synchronization, and deadlock.	S_2	TS: 1-Interactive Lectures using PowerPoint slides and using the whiteboard to explain the essential points in more detail. TS: 2 – Associating the topics in each chapter with the CLO. TS: 2- Giving students tutorials related to evaluating the scheduling algorithms and deadlock. TS: 3- Group Discussion. TS: 4 – Recall the topics discussed in the last lecture	**Indirect:** - Students CLO Survey **Direct:** - Quizzes. - Midterm exam (Each exam consists of multiple-choice questions, true/false, fill-in-the-blanks,

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
			by asking questions to the students. TS: 5 – Motivating students to be active during class by asking questions regularly during the lecture.	and theoretical questions.) - Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

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	10
6.	Process Scheduling	10
7.	Process Synchronization	5
8.	Deadlocks	10
9.	Memory Management Strategies	5
10	Virtual Memory Management	5
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	3rd week to 12th weeks	15%
2.	Assignments	5th week	5%
3.	Mid Term Exam	7th week	20%
4.	Mid Lab Exam	10th week	10%
5.	Final Lab Exam	15th week	10%
6.	Final Exam	17 or 18th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"Operating System Concepts", A. Silberschatz, Galvin and Gagne, 10th Edition, John Willey & Sons
Supportive References	"Modern Operating Systems", Andrew S. Tanenbaum., Fourth Edition, Prentice-Hall Note: Handouts will be distributed in class, when appropriate, to cover some of the course topics.
Electronic Materials	N/A
Other Learning Materials	N/A

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Rooms with 30 seats and a whiteboard or a smartboard.
Technology equipment (projector, smart board, software)	Desktop/ Laptop computer Multimedia Projector
Other equipment (depending on the nature of the specialty)	A File cabinet to keep Class Stuff, Markers, papers and student Files, and a printer to print program screenshots.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Collecting students' suggestions to facilitate more during the class.	Students	Verbal discussion
Student's questionnaire once during the 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
Teaching strategies	Quality unit	Indirect
Assessment methods	Quality unit	Indirect
Instructor performance	Quality unit	Indirect
Course content	Quality unit	Indirect

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

G. Specification Approval

COUNCIL /COMMITTEE	Computer Science Departmental Council
REFERENCE NO.	14440203-0185-00002
DATE	1st Sep, 2022