هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Operating Systems
Course Code:	CS1502
Program:	Computer Science
Department:	Computer Science and Engineering
College:	Computer Science and information technology
Institution:	Albaha University
Version:	2023 V1
Last Revision Date:	9 October 2023

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A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (7)					
4. Course general Description:					

4. Course general Description

Lecture:

This is the first course in operating systems theory and design. After successfully completing this course, students understand the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Lab:

The lab of this course implements concepts learned in an operating systems course using Linux (Ubuntu) operating systems. The labs of this course provide an opportunity to students to have hands-on experience on Linux operating systems by learning, its installation, shell commands and scripting. Besides, Students practice basic operating concepts e.g., process and I/Os system calls and process scheduling using C programming language.

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

None

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

None

7. Course Main Objective(s):

At the end of the course students will be able to:

- **Describe the concept of operating system and its structure.**
- **Describe process management, including processes, threads, synchronization, scheduling and deadlocks.**
- **Describe memory management, including main memory and virtual memory.**
- **Define storage management, including mass-storage, file system and I/O system.**
- **Define protection and security.**
- **Operate across different operating systems environment.**
- **Demonstrate hands-on expertise on Linux operating system.**

- **Practice on covered topics by solving given assignments periodically.**
- **Communicate concepts and techniques in participation and presentations**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	55	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	33
2.	**Laboratory/Studio**	22
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		55

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the fundamental concepts of process management, memory management, Storage management and inter-process communication in operating system.	K1	• Lectures • Multimedia Presentation • Discussions/debates • Practice Exercises	• Assignments (Using Rubrics) • Quizzes • Midterm exam • Final exam
2.0	Skills			
2.1	Explain storage management, including mass-storage, file system and I/O system	S1	• Demonstrations • Labs Lectures • Group Discussion • Group Projects	• Homework/Assignments • Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			• Case Studies	• Midterm Exam • Final Exam • Lab exercises (Rubric) • Lab exams • Project Assessment (Rubric) • Report Assessment (Rubric
2.2	Discuss protection and security	S2	• Demonstrations • Debates/Discussions • Labs Lectures • Group Discussion • Group Projects • Case Studies	• Homework/Assignments • Quizzes • Midterm Exam • Final Exam • Lab exercises (Rubric) • Project Assessment (Rubric) • Report Assessment (Rubric)
2.3	Compare across different operating systems environment	S3	• Demonstrations • Debates/Discussions • Labs Lectures • Group Discussion • Group Projects • Case Studies	• Homework/Assignments • Final Exam • Lab exercises (Rubric) • Lab exams • Project Assessment (Rubric) • Report Assessment (Rubric)
2.4	Implement hands-on expertise on Linux operating system	S4	• Demonstrations • Labs Lectures • Group Projects • Case Studies • Practical Exercises	• Lab exercises (Rubric) • Lab exams • Viva-voce (Rubric) • Project Assessment (Rubric) • Report Assessment (Rubric)
2.5	Communicate concepts and techniques in oral presentations	S5	• Slide Presentations • Multimedia Presentations • Demonstrations	• Viva-voce (Rubric)

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			• Debates/Discussions • Group Projects	• Presentation Assessment (Rubric)
3.0	Values, autonomy, and responsibility			
3.1	Work both independently and collaboratively	V1	• Presentation • Guest Lectures • Debates/Discussions • Group Projects • Team-based Learning • Case Studies • Seminars	• Rubrics • Note Cards

C. Course Content

No	List of Topics	Contact Hours
1.	History of operating systems	2
2.	Introduction, an overview of operating systems	2
3.	Operating systems concepts and structure	3
4.	Processes	3
5.	Threads	3
6.	CPU Scheduling	2
7.	Synchronization (Semaphores)	2
8.	Synchronization (Deadlocks)	2
9.	Memory management	2
10.	Main memory	2
11.	File systems	2
12.	Mass-storage systems	2
13.	I/O Systems	2
14.	Multi-Processor systems	2
15.	Security and protection	2
Total		33

No	List of Topics - Lab	Contact Hours
1.	Linux/Ubuntu Installation and Introduction to Linux	3
2.	Basic Linux shell commands	2
3.	More Linux shell commands and examples	2
4.	Basic scrip building	3
5.	Using structured commands in shell scripting	2
6.	More structured commands in shell scripting	2
7.	Advanced shell scripting, creating functions	2
8.	TCSH: Process system calls	3
9.	TCSH: I/O system calls	1
10.	TCSH: Process scheduling	3
Total		22

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework Assignments	Week 4, 8, 10	5%
2.	Midterm	6	15%
3.	Quiz	10	15%
4	Oral presentations and participation	12	5%
5	Lab Continuous Evaluation	Every Two Weeks	10%
6	Lab Final Evaluation	12	10%
7	Final Exam	13	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	Abraham Silberschatz et al., Operating Systems Concepts (10th edition), Wiley, 2018.
Supportive References	William Stallings, Operating Systems: Internals and Design Principles (7th edition), Pearson , 2011. Thomas W. Doeppner, Operating Systems in depth, Wiley, 2010.
Electronic Materials	ACM (Association for Computer Machinery) web site - http://www.acm.org/ IEEE Computer Society web site - http://www.computer.org/portal/web/guest/home Access to the Saudi Digital Library (SDL). Using the learning management system of the university – Rafid System (https://lms.bu.edu.sa/).
Other Learning Materials	Ubuntu Linux (Required) Windows 10 (Optional) MAC OS (Optional)

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• A classroom or lecture hall with whiteboard for 25 students. A computer laboratory with Linux computers.

Items	Resources
Technology equipment (projector, smart board, software)	• A digital image projection system with connection to desktop computer and laptop computer. • High speed Internet connection. • An instructor computer station. • Blackboard (Rafid) for female section.
Other equipment (depending on the nature of the specialty)	**Cloud service provider account?**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students** • Faculty • Peer Reviewers • Program Leader Course Coordinator	• Surveys (indirect). • Direct feedback from students (interview between Program leader and students). • Course evaluation by Peer Reviewers (indirect). • Class visits by Program Leader. Comprehensive Course report (where we can find information about teaching difficulties and action plan, …)
Effectiveness of Students assessment	• Students • Faculty • Peer Reviewers • Course Coordinator • Exam Evaluation Committee • Course Coordinator	• Surveys (indirect). • Direct feedback from students (interview between Program leader and students). • Assessment results (direct) • Course evaluation by Peer Reviewers (indirect). • Comprehensive Course report (where we can find information about assessment difficulties and action plan, …) • Exam evaluation by the Exam Evaluation Committee (indirect)
Quality of learning resources	• Students • Faculty • Peer Reviewers	• Surveys (indirect) • Course evaluation by Peer Reviewers (indirect).

Assessment Areas/Issues	Assessor	Assessment Methods
	• Course Coordinator	• Comprehensive Course report (where we can find information about difficulties and challenges about learning resources as well as consequences and action plan, …)
The extent to which CLOs have been achieved	• Faculty • Program Leader • Course Coordinator	• Student Results (direct) • Comprehensive Course report (where we can find the CLO assessment results)
Other	**None**	**None**

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	