



Faculty: Faculty of Information Technology
Department: Computer Science
Academic Year: 2021/2022
Semester: First

(Course Syllabus)

Subject Name	Credit Hours	Course No.	Prerequisite	Concurrent course
Operating Systems	3	1301326	1301203	

Coordinator Name	Lecturer/s	Room No.	E-mail	Course website	Office Hours
Dr. Mahmoud Qutqut	Dr. Mahmoud Qutqut	1220	qutqut@asu.edu.jo	edugate.asu.edu.jo	Posted on office's door

Type of Learning: Blended Learning

- 2 hours in-class (face-to-face) learning
- 1-hour online asynchronous learning using edugate LMS

Course Description:

This course starts with an introduction to the operating, including an overview of the components of the operating system, multiprocessor and multicore systems, as well as the kernel structure. The course covers also Operating System structure, Processor Management (mutual exclusion, synchronization of process, and scheduling algorithms), Memory Management (swapping, overlay, paging, segmentation, dynamic storage allocation, protection, virtual memory).

Course Aims:

The course describes the concepts that underlie operating systems. Particular emphasis will be given to the major OS components: Process Management, Memory Management, and Device Management. The aim is to present these concepts and algorithms in a general setting that is not tied to one particular operating system.

Student Outcomes:

SO#1 Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

Intended Learning Outcomes:

Following the successful completion of this course, the student should be able to:

A. Knowledge and Understanding:

A1. Describe the basic Operating Systems and Structure.

B. Subject Specific Skills:

- B1. Apply solutions of CPU Scheduling Algorithms.
- B2. Define the concept of processes synchronization.

C. Cognitive and Intellectual Skills:

- C1. Explain the memory management strategies.
- C2. Employ the Page Replacement Algorithms

D. Transferable Skills:

Teaching and Learning Methods:

The development of ILOs is promoted through the following teaching and learning methods:

<i>ILOs</i>	<i>Learning Methods</i>	<i>Evaluation Methods</i>
A1	Lecturing, Class discussion, Presentation	Exams and quizzes.
B1 – B2	Lecturing, Simple Project	Assignments or projects.
C1 – C2	Online sessions (asynchronous)	Watching pre-recorded videos Interactive video Online discussions Assignments

Learning skills:**Course Content:**

<i>Week</i>	<i>Main Topic (Chapter Title)</i>	<i>Topic's Details</i>	<i>Lecture Date</i>	<i>Method of instruction</i>	<i>Main Reference (Chapter #)</i>
1	Overview	Computer system components, O.S. history, Batch, real-time, Multi programmed, Multiprocessor	Monday, Oct 18, 2021	In-class lecture	Chapter 1
		Time-sharing and Distributed systems	Wednesday, Oct 20, 2021	In-class lecture	Chapter 1
2	O.S. Structures	System components, O.S. services, System calls	Monday, Oct 25, 2021	In-class lecture	Chapter 2
		Communication, system structure, virtual machines	Wednesday, Oct 27, 2021	In-class lecture	Chapter 2
3	Process Management	Concepts, PCB, process scheduling	Monday, Nov 1, 2021	In-class lecture	Chapter 3
		Operations on processes cooperating processes Interprocess communications	Wednesday, Nov 3, 2021	In-class lecture	Chapter 3
4	CPU scheduling	Concepts, scheduling criteria	Monday, Nov 8, 2021	Pre-recorded video Activity (3 marks)	Chapter 6
		Preemptive vs. non-preemptive scheduling First-Come, First-Served (FCFS)	Wednesday, Nov 10, 2021	Pre-recorded video Activity (3 marks)	Chapter 6
5	CPU scheduling	Shortest-Job-First (SJF), Priority Scheduling	Monday, Nov 15, 2021	In-class lecture	Chapter 6
		Round Robin (RR) Multilevel queue, Multilevel feedback queue	Wednesday, Nov 17, 2021	In-class lecture	Chapter 6
6	Process Synchronization	Background, Critical Section Problem, and its three solutions	Monday, Nov 22, 2021	In-class lecture	Chapter 5
		Background, Critical Section Problem, and its three solutions Multiple Process Solution, Synchronization Hardware	Wednesday, Nov 24, 2021	In-class lecture	Chapter 5
7	Semaphore	Usage, implementation	Monday, Nov 29, 2021	In-class lecture	Chapter 5
		Classic Problems of Synchronization Waitless semaphores	Wednesday, Dec 1, 2021	In-class lecture	Chapter 5

8	Deadlock	System Model, Deadlock characterization	Monday, Dec 6, 2021	Pre-recorded video Activity (3 marks)	Chapter 7
		System resource allocation graph Methods for handling Deadlock, Deadlock Prevention	Wednesday, Dec 8, 2021	Pre-recorded video Activity (3 marks)	Chapter 7
9	Deadlock	Avoidance, Detection, Recovery	Monday, Dec 13, 2021	Pre-recorded video Activity (3 marks)	Chapter 7
		Banker's algorithm Safety algorithm	Wednesday, Dec 15, 2021	Pre-recorded video Activity (3 marks)	Chapter 7
10	Memory Management	Address binding		Midterm Exam (Tentatively)	Chapter 8
		Logical & physical addresses	Monday, Dec 20, 2021	In-class lecture	Chapter 8
		Dynamic loading and Linking	Wednesday, Dec 22, 2021	In-class lecture	Chapter 8
11	Memory Management	Overlays, Swapping, Contiguous Allocation	Monday, Dec 27, 2021	In-class lecture	Chapter 8
		The dynamic storage allocation problem Fragmentation, memory protection	Wednesday, Dec 29, 2021	In-class lecture	Chapter 8
12	Paging	Paging System: Basic Method, Hardware Support	Monday, Jan 3, 2022	In-class lecture	Chapter 8
		Translation look-aside buffer Protection, Page Table structure, Shared Pages	Wednesday, Jan 5, 2022	In-class lecture	Chapter 8
13	Segmentation	Basics, Hardware, Protection, and Sharing	Monday, Jan 10, 2022	In-class lecture	Chapter 8
		Fragmentation Segmentation with paging	Wednesday, Jan 12, 2022	In-class lecture	Chapter 8
14	Virtual Memory	Background, Demand Paging	Monday, Jan 17, 2022	Pre-recorded video Activity (3 marks)	Chapter 9
		Process Creation The basic scheme, FIFO	Wednesday, Jan 19, 2022	Pre-recorded video Activity (3 marks)	Chapter 9
15	Page replacement and Protection and Security	Optimal Algorithm	Monday, Jan 24, 2022	Pre-recorded video Activity (3 marks)	Chapter 9
		LRU Algorithm Counting Based Goals of Protection, Program Threats	Wednesday, Jan 26, 2022	Pre-recorded video Activity (3 marks)	Chapter 9 Chapter 14
16	Final Exam				

Grade Distribution:

Your course grade will be determined by the following:

Assessment Method	Final Grade %	Due Date
- Midterm Exam	30%	9th week (12/12/2021 to 16/12/2021)
- Asynchronous learning activities	30%	As in the course content calendar above
- Final Examination (paper-based)	40%	Week 16

**Distribution of examination material (may vary depending on material included)*

Course Policies:

A. Attendance policies:

- Attendance: Mandatory.
- First warning – with5..... absences
- Last warning – with7..... absences
- Failing in the subject – with8..... absences

B. Absences from exams and handing in assignments on time:

This will result in zero achievements unless a health report or other significant excuse is documented.

C. Health and safety procedures:

D. Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment to cheating will lead to applying one or more of the following penalties together:

1. Failing the subject he/she cheated at
2. Failing the other subjects taken in the same course
3. Not allowed to register for the next semester. The summer semester is not considered as a semester

E. Grading policy:

Exams and Quizzes:

- Midterm Exam:30..... points
- Asynchronous learning activities: 30..... points
- Final Exam:40..... points
- Total:100..... points

F. Available university services that support achievement in the course:

Teacher assistants (TAs) help students to improve their programming skills, lecturers office hours, review sessions organized by students.

Required Equipment and Tools:

Microsoft Teams, Projector, and board.

Make-up Exam Policy:

Make-up exams will be offered for valid reasons. They may be different from regular exams in content and format.

Textbooks information:

A. Silberschatz, P. Galvin., and G. Gagne, “Operating System Concepts”. Wiley, 10th Edition, 2018.

Main Reference:

A. Silberschatz, P. Galvin., and G. Gagne, “Operating System Concepts”. Wiley, 10th Edition, 2018.

Other References:

1. A. Silberschatz, P. Galvin. Operating System Concepts. Wiley, 9th Edition, 2013. ISBN: 978-1-118-06333-0
2. W. Stallings. Operating Systems, Internals, and Design Principles. 7th Edition, Prentice-Hall, 2014.
3. Applied Operating System Concept: A. Silberschatz, P.B. Galvin, John Wiley, 2000.

Additional information:

No side talks during the lecture
No mobile phones during lecture
Entering the lecture theatre after the instructor is not permitted.
Homework should be done by students independently or by teamwork and will be asked at the exams

Course Material and Announcements:

Students need to use the e-learning page at the ASU website in order to get all lecture handouts and guidelines which will be uploaded there.

In addition, course-related announcements and exam results will be posted on the e-learning page, and is the responsibility of each student to check the site regularly.

Course Coordinator:Dr. Mahmoud Outqut..... Signature: Date: Oct. 16, 2021
Head of curriculum committee:Dr. Yousef Elshaikh..... Signature: Date: Oct. 16, 2021

Head of Department: Dr. Yousef Elshaikh Signature: Date: Oct. 16, 2021
Dean: Dr. Mohammad Hijawi Signature: Date: Oct. 16, 2021

Copy to:

- Head of Department
- Head of curriculum committee
- Course File

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