Detailed Course Description - Course Plan Development and Updating Procedures/ Computer Science Department	QF01/0408-3.0E

Faculty	Science and IT	Department	Computer Science
Course number	0112434	Course title	Operating Systems
Number of credit hours	3	Pre-requisite/co-requisite	0112332 Computer Design and Organization

Brief course description
Introduction to Operating System and Machine Architecture. Operating system and its instruction, the services provided by the OS, process management and its scheduling to the processor, type of scheduling and its algorithms, scheduling criteria's, Ways of calculating the average waiting time AWT, the modern methods of design and implementation of OS, threads , thread models and its implementation, deadlock, type of algorithms for prevents the deadlock, manipulation with files, access to the files, the proper storage media for files, memory management, RAM, and VIRUAL memory, paging, paging swapping.

	Course goals and learning outcomes
Goal 1	This course learn students to be aware of the main concepts of OS
Learning outcomes	1.1 student has knowledge on what does OS mean 1.2 student has knowledge on what does OS consist of 1.3 student has knowledge on what does OS do 1.4 student has knowledge on how does OS develop
Goal 2	learn students how OS deal with processes
Learning outcomes	2.1 student has knowledge on what processes do mean and how OS deal with them 2.2 student can manage and schedule Processes 2.3 student will be familiar with threads and their models.
Goal 3	Teach students the transactions and deadlock and
Learning outcomes	3.1 students must know methods used to deal with Deadlock. 3.2 students must be able to explain transactions within the OS
Goal 4	students will learn how does OS mange memory
Learning outcomes	4.1 students will be able to explain how contiguous allocation in memory management within the OS 4.2 students will be able to explain how paging and demand paging in memory management within the OS 4.3 students will be able to explain how virtual memory expressed within the OS
Textbook	1.- Silberschatz, galvin and Gagne , Operating System Concepts , nine edtion , wiley , October 2012
Supplementary references	**1.** Operating Systems internals and design principles, Sixth edition, By W. Stallings, 2010. **2.** Modern Operating Systems, Third edition, By : A. Tanenbaum, 2007. **3.** Operating Systems A Systematic View, Sixth edition, By: Davis and, Rajkumar, 2004. **4.** Operating System Concepts, 8th Edition By A. Silberschatz, P. B. Galvin, G. Gagne,

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	**1 1 1**	**Introduction**: • What OS do(definition, user view)? • System view of OS, • Computer-System organization: OS operation, Storage Structure and I/O structure	Ref.1:3-52	
02	**1 1 1**	**Introduction: (*cont*)** • Computer-system Architecture, • History of OS, OS operation and Cashing. • Operating System structure: OS Services, User OS Interface	Ref.1:3-52	
03	**1 1 1**	**Operating System structure:** • System calls • system programs • Simple, layered, Modules and microkernel Structure	Ref.1: 52-80	
04	**1 1 1**	**Operating System structure: *(cont)*** • Virtual machines Processes: process Control block, states of process, • process scheduling: queues, context switch • and schedulers Processes: Operations on processes, process termination,	Ref.1:81-98	
05	**1 1 1**	• Processes: Inter-process communication: Shared-memory & Message-Passing • Threads: definition, Multithreading Models • CPU Scheduling: CPU and I/O bursts, CPU-Scheduler, Preemptive Scheduling	Ref.1:101-182	
06	**1 1 1**	First Exam 20% **CPU Scheduling:** • Scheduling Criteria and FCFS scheduling algorithm • CPU Scheduling: SJF scheduling algorithms	Ref.1: 183-199	
07	**1 1 1**	**CPU Scheduling: (*cont*)** • Priority scheduling algorithms • RR scheduling algorithm • Multilevel and Multilevel-feedback queue scheduling algorithm	Ref.1: 200-223	
08	**1 1 1**	**Process Synchronization:** • Race Condition • Critical Section & solution • Peterson's Solution	Ref.1:225-240	

09	**1** **1** **1**	**Process Synchronization** ***(cont)*** • Hardware Instructions: TestAndSet() and Swap() • Semaphores • Spinlocks and problems with semaphores	Ref.1:241-265	
10	**1** **1** **1**	**Process Synchronization**: ***(cont)*** • Bounded-buffer classical synchronization problem • Readers-Writers classical synchronization problem • Dining-philosopher classical synchronization problem	Ref.1:235-266	
11	**1** **1** **1**	• Process Synchronization: Monitors • Transactions: definition, log-based recovery and checkpoints • Transactions: Checkpoints and Concurrent transactions	Ref.1: 267-280	
12	**1** **1** **1**	**Second Exam 20 %** **Deadlocks**: • System Model and necessary conditions • Resource Allocation Graph	Ref.1:283-287	
13	**1** **1** **1**	**Deadlocks:** ***(cont)*** • Deadlock prevention • Deadlock Avoidance: Safe State and resource-allocation graph • Deadlock Avoidance: Banker's Algorithm: Safety algorithm	Ref.1:288-294	
14	**1** **1** **1**	**Deadlocks:** ***(cont)*** • Deadlock Avoidance: Resource-Request algorithm and Example. • Deadlock Detection: Single-instance of each resource type & several • instances of a resource type • Deadlock Recovery: Process Termination and resource preemption	Ref.1:295-304	
15	**1** **1** **1**	**Memory Management:** • definition, address binding, memory protection • Contiguous Allocation, Paging • virtual memory	Ref.1:315-322	
16	**1** **1** **1**	**Memory Management: (cont)** Demand paging and Page Replacement **Final Exam 50 %**	Ref.1:223-354	

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Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

Name of teacher		Office Number	
Phone number (extension)		Email	_____@zug.edu.jo
Office hours			