

**Jerash University**

**Faculty of Computer Science and Information Technology**

**Computer Sciences Department**

**Semester**: Fall Semester 2018/2019

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| **Course symbol and number:** 1001130 | **Course Name:** Operating System |
| **Teaching Language:** English | **Prerequisites:** 1001108. |
| **Credits:** 3 hours**.** | **Course Level:** 100 |

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| **Course Description**  |
| Operating System course will introduce the student to an exciting range of materials from the broad field of operating systems, including basic operating system structure, process and thread synchronization and concurrency, memory management techniques, process scheduling and resource management, file system and I/O system, and a few other topics. |

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| **Course Objectives**  |
| A successful student will be able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems. The students will implement solutions via C/C++ programs, and through NACHOS.  |

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| **Learning Outcomes**  |
| Upon successful completion of this course, students are expected to have the ability to: • Describe and explain the fundamental components of a computer operating system. [ABET (a), (i), (j), (k)] Assessment: Students will take midterm exams, final exams, and homework. • Describe and explain the fundamental components of a computer operating system. [ABET (a), (i), (j), (k)] Assessment: Students will take midterm exams, final exams, and homework. • Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems. [ABET (a), (i), (j), (k)] Assessment: Students will take midterm exams, final exams, and homework. • Describe and extrapolate the interactions among the various components of computing systems. [ABET (a), (i), (j), (k)] Assessment: Students will take midterm exams, final exams, and homework. • Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems. [ABET (a), (c), (i), (j), (k)] Assessment: Students will design and implement the above OS components within NACHOS with C++. • Illustrate, construct, compose and design solutions via C/C++ programs, and through NACHOS. [ABET (a), (c), (i), (j), (k)] Assessment: Students will design and implement the above OS components within NACHOS  |

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|  | **Text Book(s)**  |
| **Title**  | Operating systems concepts  |
| **Author(s)**  | Silberschatz |
| **Publisher**  | John Wiley & sons |
| **Year**  |  |
| **Edition**  |  |

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|  | **References** |
| **Books**  | 1. Silberschatz, Galvin, Gagne. Operating System Concepts. John Wiley & sons , inc
 |
| **Internet links**  | http://www.jpu.edu.jo/lms |
| **Course link**  |  |

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|  | **Instructors**  |
| **Instructor**  |  Dr.Ali Malkawi |
| **Office Location**  | الطابق السابع - 715 |
| **Office Phone**  |  |
| **E-mail**  | ali.amalkawi@jpu.edu.jo |

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| **Topics Covered**  |
| **Topics**  | **Chapters in Text**  | **Week number**  | **Teaching hours**  |
| **Introduction*** What is an operating system?
* Simple Batch Systems
* Multiprogramming Batched Systems
* Time-Sharing Systems
* Personal-Computer Systems
* Parallel Systems
* Distributed Systems
* Real -Time Systems
 | *Chapter 1* | *1* | *3* |
| **Computer System Structures** * Computer system operation I/O structure
* Storage structure
* Storage hierarchy
* Hardware protection
* General system architecture
 | *Chapter 2* | *2,3*  | *12* |
| **Operating System Structures** * System Components
* Operating System Services
* System Calls
* System Programs
* System Structure
* Virtual Machines
* System Design and Implementation
* System Generation
 | *Chapter 3* | *4,5*  | *12* |
| **Processes** * Process Concept
* Process Scheduling
* Operations on Processes
* Cooperating Processes
* Interprocess Communication
* Communication in Client-Server Systems
 | *Chapter 4* | *6,7*  | *12* |
| *Reference with Pointers* |  |  |  |
| **CPU Scheduling** * Basic Concepts
* Scheduling Criteria
* Scheduling Algorithms
 | *Chapter 5* | *8,9*  | *12* |
| **Deadlocks** * System Model
* Deadlock Characterization
* Methods for Handling Deadlocks
* Deadlock Prevention
* Deadlock Avoidance
* Deadlock Detection
* Recovery from Deadlock
* Combined Approach to Deadlock Handling
 | *Chapter 7* | *10,11* | *12* |
| **Memory Management** * Background
* Swapping
* Contiguous Allocation
* Paging
* Segmentation
 | *Chapter 8* | *12* | *6* |
| **Virtual Memory** * Background
* Demand Paging
* Process Creation
* Page Replacement
* Allocation of Frames
* Thrashing
 | *Chapter 9* | *13* | *6* |
| **File System** * Interface
* File Concept
* Access Methods
* Directory Structure
* File Sharing
* Protection
* File System Structure
* File System Implementation
* Directory Implementation
* Allocation Methods
 | *Chapter 10* | *14,15* | *12* |

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|  | ***Evaluation***  |  |
| **Assignment and Projects** |  | ***20%***  |
| Project  |  | **15%** |
| Presentation & Discussion |  | **5%** |
| **Individual Work** |  | *80%*  |
| Attendance, Participation, Home works and short report | Chapter Homework’s, Discussions, Short Presentations | **10%** |
| Quizzes | Unannounced Short quizzes |
| First Exam | Multiple Choice Questions worth 25% and Essay Questions worth 75% of exam grade. | **15%** |
| Second Exam | Multiple Choice Questions worth 25% of and Essay Questions worth 75% of exam grade. | **15%** |
| A Comprehensive Final examination | Multiple Choice Questions worth 25% and Essay Questions worth 75% of exam grade.  | **40%** |
| *total* |  | *100%* |

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|  | ***Policy***  |
| ***Attendance***  | *Attendance is very important for the course. In accordance with university policy, students missing more than the allowed absence rate of total classes are subject to failure. Penalties may be assessed without regard to the student's performance. Attendance will be recorded at the beginning or end of each class.*  |
| ***Exams***  | *All exams will be CLOSE-BOOK; necessary algorithms/equations/relations will be supplied as convenient.* |

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| **Class Schedule & Room**  |

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| **Office Hours**  |
|  Sun: 12 - 2  Mon: 8 - 11  Tues: 12 - 2 Wed: 8 - 11 |
|  | \* Or by an appointment through email |  |

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|  | **Teaching Assistant**  |
| To announced later on.  |  |

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|  | **Prerequisites**  |
| **Prerequisites by course** | 1001108  |