



**COMSATS Institute of Information Technology Lahore**  
**Department of Computer Science**

Course: Operating System Concepts (3 Credit hours)  
(Fall 2012)

---

---

**Office:** C-12 in C-Block  
**Instructor:** Rab Nawaz Jadoon  
(Assistant Professor)  
**Office hours:** (9.00 am to 5.00 pm)  
**Email:** [rabnawaz@ciitlahore.edu.pk](mailto:rabnawaz@ciitlahore.edu.pk)  
**Office phone:** 042-111-001-007 (Ext 851)

---

---

## Course Contents:

This course provides the overview of computer system and the operating system, the concepts of process management, memory management, storage management, protection and security issues, and distributed systems.

### Required Text Books

#### Text Book:

1. Operating Systems by H.M Dietal

#### Reference Books:

1. Operating System by William Stalling
2. Modern operating system by Andrew Tannenbaum
3. Operating system by Silberschutz.

# **Introduction to Operating System**

**Introduction to Operating System, Operating system needs/importance, History of operating system**

**Components of Computer System, Boot Sequence, Booting operation**

**Components of operating system**

**(H/W, S/W, Firmware)**

**Functions and objectives of Operating system**

**Introduction to difference operating system and their design specification.**

**Introduction to different processing system**

**(Multiprogramming, Multiprocessing, Multitasking)**

**Types of Operating system**

- **General purpose operating system**
- **Special purpose operating system**
- **Single user general purpose and special purpose**

**Multi-user general and special purpose operating system**

## **Process Management**

**Process management**

**Introduction to process**

**Process stated, process state model**

**Three state process model, five state process model**

**PCB (Process Control Block)**

**Operations on process**

**Interrupt Processing**

**Interrupt classes**

**Context switching**

## **Introduction to Threads**

**Introduction to Threads**

**Process vs threads**

**Multithreading, threads functionality,**

**Thread states**

**User level threads and kernel level threads**

**(Advantages and disadvantages of both the types)**

**Relationship between threads and processes**

**Multithreading in java**

**Implementation of threads through java.**

**Microkernel, Benefits of microkernel**

## Introduction to concurrent processes

5 <sup>th</sup> week	<p><b>Intro to Concurrent process</b></p> <p><b>Concurrency control in operating system</b></p> <p><b>Problems regarding concurrent process</b></p> <p><b>Mutual exclusion and critical section</b></p> <p><b>Solutions for concurrency control</b></p> <p><b>Semaphores</b></p> <p><b>Inter process communication (IPC)</b></p> <p><b>Buffering and spooling and their types</b></p>	
6 <sup>th</sup> week	<p><b>Introduction to deadlocks, examples</b></p> <p><b>Resource sharing concepts</b></p> <p><b>Conditions for deadlock occurrence</b></p> <p><b>Major area of deadlock research</b></p> <ul style="list-style-type: none"><li>• <b>Deadlock prevention</b></li><li>• <b>Deadlock avoidance</b></li><li>• <b>Deadlock detection</b></li><li>• <b>Deadlock recovery</b></li></ul>	
7 <sup>th</sup> week	<p><b>CPU Scheduling</b></p> <p><b>Scheduling evaluation parameters</b></p> <p><b>Scheduling levels</b></p> <p><b>Scheduling algorithms</b></p> <p><b>Comparison of scheduling algorithms</b></p>	
8 <sup>th</sup> week	<p><b>Memory management</b></p> <p><b>Introduction to real storage management</b></p> <p><b>Memory hierarchy</b></p> <p><b>Storage management strategies</b></p> <p><b>Contiguous vs non contiguous memory allocations</b></p> <p><b>Single user contiguous system</b></p> <p><b>Protection mechanism</b></p> <p><b>Memory Partitioning</b></p> <p><b>(Fixed Partitioning mechanism, Variable partition)</b></p> <p><b>Fragmentation</b></p> <p><b>(internal and external fragmentation)</b></p>	
9 <sup>th</sup> week	<p><b>Introduction to virtual storage management</b></p> <p><b>Basic concepts regarding virtual storage</b></p>	

	<p><b>Dynamic address translation</b></p> <p><b>Block Mapping mechanism</b></p> <p><b>Virtual address space vs real address space</b></p> <p><b>Introduction to paging</b></p>	
<b>10<sup>th</sup> week</b>	<p><b>Paging concepts</b></p> <p><b>Page Map Tables and their structures</b></p> <p><b>DAT in paging system</b></p> <ul style="list-style-type: none"> <li>• <b>Direct Mapping</b></li> <li>• <b>Associative mapping</b></li> <li>• <b>Combined direct and associative mapping</b></li> </ul> <p><b>Sharing in paging</b></p> <p><b>Introduction to segmentation</b></p> <p><b>DAT in Segmentation system</b></p> <ul style="list-style-type: none"> <li>• <b>Direct Mapping</b></li> <li>• <b>Associative mapping</b></li> <li>• <b>Combined direct and associative mapping</b></li> </ul> <p><b>Sharing in segmentation</b></p> <p><b>Combined paging and segmentation system</b></p> <p><b>DAT in Combined paging and segmentation system</b></p>	
<b>11<sup>th</sup> week</b>	<p><b>Disk Scheduling,</b></p> <p><b>Performance evaluating parameters</b></p> <p><b>Page replacement algorithms</b></p> <p><b>File organization,</b></p>	
<b>12<sup>th</sup> week</b>	<p><b>Operating system Security,</b></p> <p><b>Introduction to distributed system</b></p>	

## Evaluation methods

Assignment/quizzes → 25%

First sessional → 10%

Second sessional → 15%

Final term → 50%

## Rules and policy in this class

1. Although the rules and policy defined here may seem a little bit rush, they are not meant to cause any harm to you instead to protect you and to prepare you for better life and to become professionals.
2. Students are not allowed to bring their family members for day care or baby sitting. The classroom is not a place for children.
3. Student behavior/classroom decorum: “Free discussion, inquiry, and expression are encouraged this class.” However, classroom behavior that interferes with either the instructor’s ability to conduct the classroom or the ability of students to benefit from the instruction is not acceptable.
4. Please turn off (or place on silence) your beepers and cellular phones before the lecture starts. In the event of a situation where student legitimately needs to carry a beeper/cellular telephone to class, prior notice and approval of the instructor is required.
5. No use of electronic devices while in class unless required or approved by the instructor.
6. Classroom behavior which is deemed inappropriate and cannot be resolved by the student and the faculty member may be referred to the Office of DCO, 1st Floor C-Block; telephone (851), for administrative or disciplinary review as per the code of Students Conduct.
7. As part of the academic integrity outlined in the current General Catalogue: “Students are expected to maintain the highest standards of academic integrity. Behavior that violates these standards is not acceptable.
8. Students are NOT allowed to share their assignments and to communicate during the tests or exam.
9. No student is allowed in the class if not officially registered in this class.
10. *Late assignment will be penalized as follow after the assignment due date and time: 10% off the first day, 25% off the second day, 50% off the third day, and “Zero” after that. All the assignments will be due in class on the specified due date.*
11. No makeup test or exam will be given except in the case of emergency such as the student being sick and he/she is unable to come to class in which case an official Doctor’s excuse MUST be presented to the instructor. The student concerned is required to take the make

up test/exam no later than two lectures or class periods after he/she returns to class. Failure to comply will result in the grade of zero (0) for the test/exam.

*12. All students are encouraged to attend class and on time. I will be taking rolls randomly. A total of five (6) absences will result in the grade of "F" in this class for the student(s) concerned.*

*13. It is totally forbidden to voice or/and video record this course lecture presentations without a written agreement signed and dated between the student and the instructor. Any violation to this rule will result to the invasion of the instructor privacy.*

14. Finally, I am totally open to any constructive critics or/and suggestions.

## **Emergency Evacuation**

In the case of fire or emergency, please do not panic and simply follow your instructor's emergency procedure evacuations.