



Spring Term

Basic Information:

Title:	<i>Operating System Concepts</i>	Code	IT 366
Program:	BBIT	Credit Hours:	Three (03)
Sessions:	30 Classes + Mid Term + Final Term	Pre-Requisite:	IT 367

Course Description:

Operating systems are central to computing activities. An operating system is a program that acts as an intermediary between a user of a computer and the computer hardware. Two primary aims of an operating systems are to manage resources (e.g. CPU time, memory) and to control users and software. Operating system design goals are often contradictory and vary depending of user, software, and hardware criteria. This course describes the fundamental concepts behind operating systems, and examines the ways that design goals can be achieved

Learning Outcomes:

After the completion of this course, it is expected that students who will involve themselves in the knowledge base working of the course will be capable to

1. *Describe and explain the concepts, structure and design of operating systems*
2. *Describe the impact of operating system design on application system design and performance*
3. *Demonstrate competency in recognizing and using operating system design and performance*
4. *Demonstrate competency in recognizing and using operating system features.*
5. *have a working knowledge of systems-level programming using the UNIX environment*

Teaching Learning Methodology:

The formal teaching component of this course consists of active student participation in and contribution to all forms of teaching and learning i.e. lectures, discussions, research assignments and projects. Lectures will be twice a week of 90 min each.

Group Configurations:

One of the objectives of this course is to encourage and facilitate teamwork. Class will have to make a group of four for projects and research assignments. It is recommended that student will form their own groups. As a general guideline, your group should have members with diverse skill sets including people who are proficient or have aptitude for different subject areas.

Weekly Term Plan

Wk	Topic	Activity
01	<i>Introduction and Overview</i>	
02	<i>Process Concept & Management</i>	
03	<i>CPU Scheduling</i>	
04	<i>Inter Process Communication</i>	
05	<i>Process Synchronization</i>	
06	<i>Process Synchronization</i>	
07	<i>Deadlock Handling</i>	
08	<i>Mid Term Examination</i>	
09	<i>Memory Management I</i>	
10	<i>Memory Management II</i>	
11	<i>Virtual Memory Management</i>	
12	<i>Secondary Storage Management</i>	
13	<i>File Systems</i>	
14	<i>Device Management</i>	
15	<i>Security & Protection</i>	
16	<i>Case Study; Windows</i>	
17	<i>Case Study; Linux</i>	
18	<i>Final Term Examination</i>	



Spring Term

Topics in Detail

Introduction

- Definition
- Types of Operating System
 - Batched Systems
 - Parallel Systems
 - Real Time Systems
 - Distributed Systems
 - Time Sharing Systems
 - Multiprogramming Systems

Components of Operating System

- Process Management
- Memory Management
- Storage Management
- File System
- I/O Systems
- Virtual Machine

Process Management

- Concept of Process
- Operations on Process
- Independent Process
- Cooperative Process
 - Attributes of Cooperative Process
 - Reasons to Support Cooperative Process
 - Inter Process Communication
- Threads & Multithreading
- Distributed Process Management

CPU Scheduling

- Scheduling Criteria
- Preemptive Non-Preemptive Scheduling
- Schedulers
 - Long Term Scheduler
 - Medium Term Scheduler
 - Short Tem Scheduler
- Scheduling Algorithm
 - First Come First Serve
 - Shortest Job First
 - Round Robin
 - Multilevel Queue Scheduling
 - Highest Response Ratio
- Performance Analysis
 - Deterministic Modeling
 - Queuing Analysis of Algorithms

Text & Recommended Readings

1. Operating System Concepts
Abraham Silberschatz
Wiley & Sons, 7th Edition, 0-471-69466-5
2. Operating Systems
William Stalling
Prentice Hall, 3rd Edition, 0138874077
3. Practical Guide to Red Hat Linux 8.0
Mark G. Sobell
Addison-Wesley, 0201703130

Process Synchronization

- Critical Section Problem
- Solution Requirements
- Dekker's & Peterson Algorithm
- Hardware Solution
- Semaphores
- Dinning Philosopher Problem

Deadlock Handling

- Introduction
- Causes of Deadlock
- Requirements of Solution
- Solutions
 - Deadlock Prevention
 - Deadlock Avoidance
 - Deadlock Detection

Memory Management

- Memory Address Space
- Contiguous Allocation
 - Swapping
 - Single Partition
- Memory Partitioning
- Non Contiguous Allocation
 - Paging
 - Segmentation
 - Segmentation with Paging
- Virtual Memory
 - Dynamic Linking & Loading
 - Overlays
 - Demand Paging
 - Page Replacement
 - Page Replacement Algorithm
 - Thrashing

File System

- File Concept
- Access Method
- File System Structure
- Directory Structure & Implementation
- Allocation Methods
 - Contiguous Allocation
 - Linked Allocation
 - Index Allocation
- Free Space Management

Tools

1. Red Hat Linux
2. Visio 5.0 Professional
3. Microsoft Word for Documentation
 - Headings Arial 11pt Bold
 - Normal Text Times New Roman 10pt
 - Header Footer Times New Roman 6pt
 - Paragraph Single Line Spacing
 - First Line Indent 1.0 cm
 - Page Margins 2 cm from each side
4. Microsoft PowerPoint for Presentation



Spring Term

Grading Policy:

Final Grade for this course will be the cumulated result of the following term work with relevant participation according to the quoted percentage.

Sessional	25%		Mid Term	35%		Final Term	40%
Assignments	10 %		Mid Term Exam	25%		Final Exam	30%
Quizzes	10%		Major Report/Work	10%		Case Study/ Project/ Term Paper	10%
Presentations	05%						

Remember subdivision of Mid Term and Final Term Examination should be done only in extreme cases of very essential and major Grading Instruments.

Dishonest Practices & Plagiarism

Any student found responsible for dishonest practice/cheating (e.g. copying the work of others, use of unauthorized material in Grading Instruments) in relation to any piece of Grading Instrument will face penalties like deduction of marks, grade 'F' in the course, or in extreme cases, suspension and rustication from IBIT.

For details consult Plagiarism Policy of PU at <http://pu.edu.pk/dpcc/downloads/Plagiarism-Policy.pdf>

Grading System:

Letter Grade	Grade Point	Num Equivalence
A	4.00	85 – 100 %
A-	3.70	80 – 84 %
B+	3.30	75 – 79%
B	3.00	70 – 74 %
B-	2.70	65 – 69 %
C+	2.30	61 – 64 %
C	2.00	58 – 60 %
C-	1.70	55 – 57 %
D	1.00	50 – 54 %
F	0.00	Below 50 %
I	Incomplete	*
W	Withdraw	*

Norms to Course:

- ✓ *Submission Date and Time for the term instruments is always **Un-Extendable**.*
- ✓ *5 Absentees in class will result in forced withdrawal. (PU Policy)*
- ✓ *Re-sit in Mid and Final Term will cause you a loss of 2 and 3 grade marks respectively. (PU Policy)*
- ✓ *This is your responsibility to keep track of your position in class evaluation units.*
- ✓ *After the submission date, NO excuse will be entertained.*
- ✓ ***Keep a copy of all submitted Grading Instruments.***
- ✓ *Assignment is acceptable only in its Entirety.*
- ✓ *No make up for any assignment and quiz.*
- ✓ *Copied & Shared work will score Zero.*
- ✓ *Assignments are Individual.*

Good Luck
 For the Spring Term