

Text Books

1. Harvey M. Deitel, Paul J. Deitel & Abbey Deitel, "*Internet and World Wide Web: How to Program*", 5th Edition, Pearson Education, 2012, ISBN: 9780273764021
2. Thomas A. Powell, "*HTML & CSS: The Complete Reference*", McGraw Hill, Fifth Edition, 2010, ISBN: 978-0-07-174170-5

Reference Books

1. Matt J. Crouch, "*ASP.NET and VB.NET Web Programming*", Pearson Education Asia, 2002
2. Rahul Banerjee, "*Internetworking Technologies*", Prentice-Hall of India Limited, Fourth Edition, 2000
3. Thomas A. Powell, "*Web Design: The Complete Reference*", Tata McGraw Hill, Second Edition, 2002



Course Title: **Operating System (3 Cr.)**

Course Code: **CACS251**

Year/Semester: **II/IV**

Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course includes the topics that help students understand operating system and its functionality along with its types.

Course Objectives

The general objectives of this subject are to provide the basic feature, function and interface with the hardware and application software to run the computer smoothly.

Course Contents

Unit 1 Introduction to Operating System

2 Hrs.

History, Introduction and Generation of Operating System, Objectives (Resource Manager and Extended Machine), Types of Operating system, Function of Operating system.

Unit 2 Operating System Structure

2 Hrs.

Introduction, Layered System, Kernel, Types of Kernel (Monolithic/Macro Kernel and Micro / Exo-Kernel), Client-Server Model, Virtual Machines, Shell.

Unit 3 Process Management

15 Hrs.

Process Concepts(3 Hrs.): Definitions of Process, The Process Model, Process States, Process State Transition, The Process Control Block, Operations on Processes (Creation, Termination, Hierarchies, Implementation), Cooperating Processes, System Calls (Process Management, File management, Directory Management).

Threads (1 Hr): Definitions of Threads, Types of Thread Process (Single and Multithreaded Process), Benefits of Multithread, Multithreading Models (Many-to-One Model, One-to-One Model, Many-to Many Model).

Inter-Process Communication and Synchronization(6 Hrs.): Introduction, Race Condition, Critical Regions, Avoiding Critical Region: Mutual Exclusion And Serializability; Mutual Exclusion Conditions, Proposals for Achieving Mutual Exclusion: Disabling Interrupts, Lock Variable, Strict Alteration (Peterson's Solution), The TSL Instruction, Sleep and Wakeup, Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded Buffer), Serializability: Locking Protocols and Time Stamp Protocols; Classical IPC Problems (Dining Philosophers Problems, The Readers and Writers Problem, The Sleeping Barber's Problem)

Process Scheduling(5 Hrs): Basic Concept, Type of Scheduling (Preemptive Scheduling, Nonpreemptive Scheduling, Batch, Interactive, Real Time Scheduling), Scheduling Criteria or Performance Analysis, Scheduling Algorithm (Round-Robin, First Come First Served, Shortest-Job- First, Shortest Process Next, Shortest Remaining Time Next, Real Time, Priority Fair Share, Guaranteed, Lottery Scheduling, HRN, Multiple Queue, Multilevel Feedback Queue); Some Numerical Examples on Scheduling.

Unit 4 Deadlocks

4 Hrs.

System Model, System Resources: Preemptable and Non-Preemptable; Conditions for Resource Deadlocks, Deadlock Modeling, The OSTRICH Algorithm, Method of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance: Banker's Algorithm, Deadlock Detection: Resource Allocation Graph, Recovery from Deadlock.

Unit 5 Memory Management

7 Hrs.

Basic Memory Management (3 Hrs.): Introduction, Memory Hierarchy, Logical Versus Physical Address Space, Memory Management with Swapping: Memory Management with Bitmaps and with Linked List; Memory Management without Swapping, Contiguous-Memory Allocation: Memory Protection, Memory Allocation, Fragmentation (Inter Fragmentation and External Fragmentation); Non-Contiguous Memory Allocation, Fixed Partitioning Vs. Variable Partitioning, Relocation and Protection, Coalescing and Compaction.

Virtual Memory (4 Hours): Background, Paging, Structure of Page Table: Hierarchical Page Table, Hashed Page Table, Inverted Page Table, Shared Page Table; Block Mapping Vs. Direct Mapping, Demand Paging, Page Replacement and Page Faults, Page Replacement Algorithms: FIFO, OPR, LRU, SCP; Some Numerical Examples on Page Replacement, Thrashing, Segmentation, Segmentation With Paging.

Unit6 Input/ Output Device Management

4 Hrs.

Principle of I/O Hardware: I/O Devices, Device Controllers, Memory Mapped I/O, Direct Memory Access; Principle of I/O Software: Goals of I/O Software, Program I/O, Interrupt -Driven I/O, I/O Using DMA; I/O Software Layers: Interrupts Handler, Device Drivers, Device Independent I/O Software, User - Space I/O Software; Disk: Disk Hardware; Disk Scheduling: Seek Time, Rational Delay, Transfer Time; Disk Scheduling Algorithms: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, Lock Scheduling

Unit 7 File System Interface Management

2 Hrs.

File Concept: File Naming, File Structure, File Type, File Access, File Attributes, File Operation and File Descriptors; Directories: Single-Level Directory Systems, Hierarchical Directory Systems, Path Names, Directory Operation; Access

Methods: Sequential, Direct; Protection: Types of Access, Access Control List, Access Control Matrix

Unit 8 Security Management

3 Hrs.

Introduction, Security Problems, User Authentication: Passwords, password Vulnerabilities, Encrypted password, One Time Password and Biometrics password; User Authorization, Program Threats: Trojan Horse, Trap Door, Stack and Buffer Overflow; System Threats: Worms, Viruses, Denial of Services.

Unit 9 Distributed Operating System

4 Hrs.

Introduction, Advantages of Distributed System over Centralized System, Advantages of Distributed System over Independent PCs, Disadvantages of Distributed System, Hardware and Software Concepts, Communication in Distributed Systems, Message Passing, Remote Procedure Call, Process in Distribution System, Clock Synchronization.

Unit 10 Case Study

2 Hrs.

DOS and Windows Operating System, Unix Operating System, Linux Operating System

Laboratory Works

Lab works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course. Project should be assigned on Individual Basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

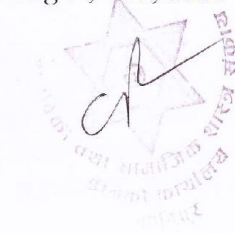
Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. Andrew S. Tanenbaum, "*Modern Operating System 6/e*", PHI, 2011/12
2. Silberschatz, P.B. Galvin, G. Gagne, "*Operating System Concepts 8/e* ", Wiley India, 2014 ISBN : 9788126520510

Reference Books

1. Andrew S. Tanenbaum, "*Distributed Operating System*", Pearson
2. D M Dhamdhare, "*System Programming and Operating System*", Tata McGraw-Hill, 2009
3. P. Pal Choudhury, "*Operating Systems Principles and Design*", PHI, 2011



Course Title: **Numerical Methods (3 Cr.)**

Course Code: **CACS252**

Year/Semester: **II/IV**

Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course covers solution of nonlinear equations, interpolation and approximation, numerical differentiation and integration and solution of linear algebraic equation, ordinary differential equations and partial differential equations. It provides knowledge for numerical analysis.

Course Objectives

The general objectives of this subject are to make students familiar with the theory of numerical analysis for solving algebraic and transcendental equations, solution of ordinary and partial differential equations, numerical differentiation and integration.

Course Contents

Unit 1 Solution of Nonlinear Equations

10 Hrs.

Introduction, Types of Equation, Errors in Computing, The Bisection Method; The Method of False Position, Newton- Raphson Method, Solution of System of Nonlinear Equation, Fixed Point Iteration and Convergence

Unit 2 Interpolation and Approximation

8 Hrs.

Introduction, Errors in Polynomial Interpolation, Lagrange's Polynomials, Newton's Interpolation using Difference and Divided Differences, Cubic Spline Interpolation, Least Squares Method for Linear and Non-linear Data.

Unit 3 Numerical Differentiation and Integration

5 Hrs.

Introduction to Numerical Differentiation, Newton's Differentiation Formulas, Numerical Integration (Trapezoidal Rule, Simpson's 1/3 rule, 3/8 rule); Romberg Integration; Numerical Double Integration.

Unit 4 Solution of Linear Algebraic Equations

10 Hrs.

Review of the existence of solutions and properties of matrices, Consistency of a Linear System of Equations, Gaussian Elimination Method, Gauss-Jordan Method, Inverse of matrix using Gauss Elimination Method, Method of factorization, Iterative Methods(Jacobi & Gauss-Seidel Iteration),Power Method.

Unit 5 Solution of Ordinary Differential Equations

7 Hrs.

Introduction to Differential Equations, Initial Value Problem, Taylor Series Method, Picard's Method, Euler's Method and Its Accuracy, Heun's method,

Runge-Kutta Methods, Solution of Higher Order Equations, Boundary Value Problems, Shooting Method and Its Algorithm.

Unit 6 Solution of Partial Differential Equations

5 Hrs.

Introduction to Partial Differential Equations, Deriving Difference Equations, Laplacian Equation and Poisson's Equation.

Laboratory Works

Laboratory works will consist of program development and testing of Non-linear Equations, Interpolation, Numerical Differentiation and Integration, Linear Algebraic Equations, Ordinary and Partial Differential Equations using C or C++Builder.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. C.F. Gerald and P.O. Wheatley, "Applied Numerical Analysis", 4th Edition, Addison Wesley Publishing Company, New York
2. S. S Sastry, "Introduction to Methods of Numerical Analysis",- Prentice- Hall India

Reference Books

1. W. Cheney and D. Kinciad, "Numerical Mathematics and Computing", 2nd edition, Brooks/Cole Publishing Co., 1985
2. W.H. Press, B.P. Flannery et. al., "Numerical Recipes in C", 1st Edition, Cambridge Press, 1998.

3. S. Yakwitz and F. Szidarovszky, "*An Introduction to Numerical Computations*", 2nd Edition, Macmillan Publishing Co., New York.
4. S.S. Sastry, "*Engineering Mathematics Volume two*", Prentice-Hall of India.



Course Title: **Software Engineering (3 Cr.)**
Course Code: **CACS253**
Year/Semester: **II/IV**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1)**

Course Description

This course includes the topics that provide fundamental concept and standard of software engineering so that students will be able to develop software and/or handle software project using the global standard of software.

Course Objectives

This Course is designed to provide the students with the basic competencies required to identify requirements, documents the system design and maintain a developed system. It presumes a general understanding of computers and programming which are covered in the first and second semester of the degree.

Course Contents

Unit 1 Introduction

4 Hrs.

Definition of Software, Type of Software, Characteristic of Software, Attributes of Good Software, Definition of Software Engineering, Software Engineering Costs, Key Challenges that Software Engineering Facing, System Engineering and Software Engineering, Professional Practice.

Unit 2 Software Development Process Model

8 Hrs.

Software Process, Software Process Model: The Waterfall Model, Evolutionary Development, Component-Based Software Engineering (CBSE); Process Iteration: Incremental Delivery, Spiral Development; Rapid Software Development: Agile Methods, Extreme Programming, Rapid Application Development, Software Prototyping; Rational Unified Process (RUP), Computer Aided Software Engineering (CASE): Overview of CASE Approach, Classification of CASE tools.

Unit 3 Software Requirement Analysis and Specification

10 Hrs.

System and Software Requirements, Type of Software Requirements: Functional and Non-Functional Requirements, Domain Requirements, User Requirements; Elicitation and Analysis of Requirements: Overview of Techniques, View Points, Interviewing, Scenarios, Use-Case, Ethnography, Requirement Validation, Requirement Specification, Feasibility.

Unit 4 Software Design

10 hrs.

Design Concept: Abstraction, Architecture, Patterns, Modularity: Cohesion, Coupling; Information Hiding, Functional Independence, Refinement; Architectural Design: Repository Model, Client Server Model, Layered Model, Modular Decomposition; Procedural Design Using Structured Methods, User

Interface Design: Human-Computer Interaction, Information Presentation, Interface Evaluation; Design Notation.

Unit 5 Coding

2 Hrs.

Programming Language and Development Tools, Selecting Languages and Tools, Good Programming Practices

Unit 6 Software Testing and Quality Assurance

6 Hrs.

Verification and Validation, Techniques of Testing: Black-box and White-box Testing, Inspections; Level of Testing: Unit Testing, Integration Testing, Interface Testing, System Testing, Alpha and Beta Testing, Regression Testing; Design of Test Cases, Quality Management Activities, Product and Process Quality, Standards: ISO9000, Capability Maturity Model (CMM);

Unit 7 Software Maintenance

3 Hrs.

Evolving Nature of Software, Different Types of Maintenance: Fault Repair, Software Adaptation, Functionality Addition or Modification; Maintenance Prediction, Re-Engineering, Configuration Management (CM): Importance of CM, Configuration Items, Versioning;

Unit 8 Managing Software Projects

2 Hrs.

Needs for the Proper Management of Software Projects, Management Activities: Project Planning, Estimating Costs, Project Scheduling, Risk Management, Managing People;

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
40	-	60 (3 Hrs.)	-	100