



St. Xavier's College – Autonomous Mumbai

Syllabus For 4th Semester Courses in Information Technology (June 2013 onwards)

Contents:

Theory Syllabus for Courses:

S.ITS.4.01 – Software Engineering

S.ITS.4.02 – Modern Operating Systems

S.ITS.4.03 – Multimedia Systems

S.ITS.4.04 – Data Structures using JAVA

S.ITS.4.05 – Statistical Techniques and Operation Research

Practical Course Syllabus for: S.ITS.4.PR

S.Y. B.Sc.IT
Title: Software Engineering

Course: S.ITS.4.01

Learning Objective:

To develop the systematic approach required for software development.

Number of lectures: 75

UNIT 1

Introduction

(12 lectures)

What is software engineering?

Phases in the development of software,

Prescriptive Models, Waterfall Model,

Incremental Process Model, Evolutionary Process Models,

Specialized Process Models.

UNIT 2

Software Engineering Practice

(13 lectures)

Software Engineering Practice, Communication Practices,

Planning Practices, Modeling Principles,

Construction Practice, Deployment.

UNIT 3

Modeling and Approaches to System Requirements

(14 lectures)

Events and system requirements, Things and system requirements,

Data entities and Objects, Entity-Relationship diagram,

Traditional Approach, Object oriented approach

UNIT 4

Performing User Interface Design

(12 lectures)

The Golden Rules, User Interface Analysis and Design,

Interface Analysis, Interface Design Steps,

Design Evaluation.

UNIT 5

Testing Strategies and Tactics

(12 lectures)

A Strategic Approach to Software Testing,

Test Strategies for Conventional Software,

Object Oriented Software, Validation Testing,

System Testing, Software Testing Fundamentals,

Black Box Testing, White Box Testing

UNIT 6

Software Project Management

(12 lectures)

Cost Estimation, Project Scheduling,

Staffing, Software Configuration Management,

Quality Assurance, Project Monitoring, Risk Management.

Continuous Internal Assessment

Presentation / Developing Documentation for Project Undertaken.

Mid Term test.

List Of Text Books

1. "Software Engineering, Principles and Practice", Hans van Vliet, Wiley.

2. "Software Engineering, A Practitioner's Approach", Roger S. Pressman, TMH
3. "System Analysis and Design"

List Of Recommended Reference Books

1. An Integrated Approach To Software Engineering, PankajJalote, Narosa.
 2. Software Engineering, S. L. Pfleeger, Macman.
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S.Y. B.Sc.IT

Course: S.ITS.4.02

Title: Modern Operating System

Learning Objective:

Operating System forms the heart of all computer system which is required for running any kind of application program. This subject focuses on the mechanism involved in building an Operating System and understanding the fundamentals of modern operating system.

Number of lectures: 75

UNIT 1

Introduction To Operating System

(10 lectures)

History of Operating System,

Types of Operating System

Batch, Multiprogramming,
Multitasking,
Real-Time

Operating System Structure

Layered,
Monolithic,
Microkernel

UNIT 2

Processes and Deadlock

(20 lectures)

Process Management

Creation,
Termination,
States

Thread Model and Implementation,

Interprocess Communication & Synchronization

Race Condition,
Critical Region,
Mutual Exclusion,
Semaphores,
Monitors

Classical IPC Problems

Dining Philosophers Problem,
Readers and Writers Problem

Process Scheduling(Preemptive and Nonpreemptive),

Deadlock

Deadlock Detection And Recovery,

Deadlock Avoidance,
Deadlock Prevention

UNIT 3

Unix Commands and Shell Scripts

(10 lectures)

Basic Commands

ls, cp, mv, rm,
echo, date, cal etc.

vi Editor

Basic Concepts, Commands,
Programming in vi

Shell Programming

Types of Shell, Environment Variables,

Programming Construct:

loops, conditions,
logical operators

UNIT 4

Memory Management

(10 lectures)

Static Allocation, Dynamic Allocation,
Segmentation, Paging, Virtual Memory,
Page Replacement Algorithm

Optimal Page Replacement Algorithm,
First-In First-Out

UNIT 5

File System

(10 lectures)

Files

Naming, Structure, Types,
Access, Attribute,

Directories

Single Level, Hierarchical Level,
Path Name, Operations

File System Implementation

Layout, Implementation, Shared Files

UNIT 6

Distributed Operating System

(15 lectures)

Introduction to Distributed Operating System

Goals, Hardware Concepts,
Software Concepts, Design Issues

Multiprocessor System

Motivation and Classification,
Multiprocessor Interconnection,
Types of Multiprocessor

Continuous Internal Assessment

Assignments / Project / Presentation / Case Study

Mid Term test.

List Of Text Books

1. Operating Systems(Concepts & Design) by Milan Milenkovic - Tata McGraw Hill
2. Modern Operating Systems by Andrew S. Tanenbaum- Pearson Education.
3. Distributed Operating Systems by Andrew S. Tnenbaum, Pearson Education.

List Of Recommended Reference Books

1. The Design of Unix Operating System by Maurice J. Bach – Prentice Hall.
2. Working with Unix by Kaushal Thakker, KiranDattani – BPB Publication
3. Operating System Concepts by Silbershatz, Peterson, Galvin – Addison Wesley.
4. Operating System Design and Implementation by Andrew S. Tanenbaum.

S.Y. B.Sc.IT

Course: S.ITS.4.03

Title: Multimedia System

Learning Objective:

To learn the types of multimedia, encoding - decoding and its application.

Number of lectures: 75

UNIT 1

Introduction to Multimedia

(08 lectures)

Defining the scope of multimedia,
Hypertext and Collaborative research,
Multimedia and personalised computing,
Multimedia on the map,
Emerging applications, The challenges

UNIT 2

Multimedia Information Representation

(15 lectures)

Digitization principles –Analog signals –Encoder design,
Text –Unformatted text -Formatted text -Hyper text,
Images -Graphics -Digitized documents –Digitized pictures,
Audio –PCM speech –CD quality audio Synthesized audio,
Video –Broadcast television –Digital video –PC video -Video content

UNIT 3

Digital Video and Image Compression

(15 lectures)

Video compression techniques,
standardization of Algorithm,
The JPEG Image Compression Standard,
ITU-T Recommendations,
The EPEG Motion Video Compression Standard,
DVI Technology

UNIT 4

Operating System Support for Continuous Media Application

(10 lectures)

Limitation of Work station Operating system,
New OS support, Experiments using Real Time mach

UNIT 5

Multimedia Interchange

(15 lectures)

Quick time Movie File Format, QMFI,
MHEG (Multimedia and Hypermedia Information EncodingExpert Group),
Format Function and representation,
Track model and Object model, Real TimeInterchange

UNIT 6

Multimedia conferencing

(12 lectures)

Teleconferencing systems,
Requirements of Multimedia communications,
Shared Application Architecture and embedded Distributed objects,
Multimedia Conferencing Architecture

Continuous Internal Assessment

Assignments
Mid Term test

List Of Text Books

Multimedia Systems by John F Koegel Buford—Pearson Education

List Of Recommended Reference Books

Multimedia Communications by Fred Halsall —Pearson Education

S.Y. B.Sc.IT

Course: S.ITS.4.04

Title: Data Structures using JAVA

Learning Objective:

Data Structure is required in almost all programming design. Performance of a program mainly depends on the data structure and algorithms used in the program. This subject forms the basis for selecting the appropriate data structure as needed by the program to improve the efficiency of a program.

UNIT 1

(10 lectures)

Introduction to Data Structures

Basic terminology,
Abstract Data Types,
Data Structure Types And Operation,
Time Complexity
 Big Oh and Big Omega Notation,
 Best Case, Worst Case,
 Average Case Analysis.

UNIT 2

(12 lectures)

Arrays, Records and Pointers

Linear Array,
Representation in Memory,
Traversing, Inserting and Deleting,
Sorting
 Bubble Sort,
 Selection Sort,
 Insertion Sort
Searching
 Linear Search,

Binary Search

UNIT 3

(13 lectures)

Stacks, Queues, recursion

Introduction to Stack,
Array Representation of Stack,
Notations
 Polish Notation,
 Reverse Polish Notation,
Quick sort,
Recursion,
Tower of Hanoi,
Queues, Deques

UNIT 4

(15 lectures)

Linked List

Introduction to Linked List,
Representation of Linked List in Memory,
Traversing,
Insertion and deletion,
Searching

UNIT 5

(15 lectures)

Trees

Introduction to Binary Trees,
Representation of Binary Tree in Memory,
Traversing,
Binary Search Tree,
 Insertion and deletion,
Heap sort,
Path length: Huffman's Algorithm

UNIT 6

(10 lectures)

Graphs

Introduction to Graph Theory,
Representation of Graph
 Adjacency matrix, Path Matrix,
 Linked Representation,
Traversing
 Breadth-First Search,
 Depth-First Search,
Operation on Graphs,
Shortest Paths: Warshall's Algorithm

Continuous Internal Assessment

Assignments / Project / Presentation
Mid Term test.

List of Text Books:

- 1.Theory and Problem of Data Structures by Seymour Lipschutz, Mc Graw Hill
2. Data Structures and Algorithms Made Easy 2nd Edition, Narasimha Karumanchi, Careermonk Publications

List of Reference Books:

1. Data Structure And Algorithm by Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman – Pearson Education
 2. Fundamentals of Data Structure by Ellis Horowitz, Sartaj Sahni – Galgatia Booksource
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S.Y. B.Sc.IT

Course: S.ITS.4.05

Title: Statistical Techniques and Operation Research

Learning Objective:

To develop the skill of decision making using statistical techniques and Operation Research

Number of lectures: 75

Unit1

(13 lectures)

Basic statistics

Basic of statistics, mean, median, mode, measures of variation, mean deviation, standard deviation, variance, measures of Skewness, regression and correlation.

Unit 2

(12 lectures)

Discrete and continuous distribution

Binomial distribution:

- Properties of binomial distribution
- Constants of binomial distribution
- Importance of binomial distribution
- Fitting of binomial distribution

Poisson distribution

- Constants of Poisson distribution
- Role of the Poisson distribution
- Fitting a Poisson distribution

Normal distribution:

- Graph of normal distribution
- Importance of normal distribution
- Area under the normal curve
- Fitting a Normal distribution

Unit 3:

(12 lectures)

Sampling theory and testing of hypothesis

Hypothesis testing:

Procedure of testing hypothesis ,

Two tailed and one tailed tests of hypothesis,

Test of significance of large samples.

Tests of significance **of small samples**

Students t-distribution:

Properties of t-distribution,

Application of the t distribution.

The Chi Square Distribution:

Constants of Chi square distribution,

Use of Chi square test,
Conditions for applying chi square test,
Applications of chi square test

Unit 4

(13 lectures)

Linear Programming

Introduction to O.R in business and industry, scope of O.R in modern management and decision making Linear Programming: various definition, statements of basic theorems and properties, advantages , limitations and application areas of Linear Programming. Linear programming formulation,
Identification of decision variables, constructing objective functions and constraints, graphical methods, simplex method

Unit 5:

(13 lectures)

Transportation problem and Assignment problems

The transportation algorithm,
Formulation of TP,
Determination of initial solution,
Stepwise improvement to optimal solution,
Degeneracy concepts.
The assignment model:
Formulation,
Unbalanced assignment problems,
dual of assignment problem.

Unit 6

(12 lectures)

PERT and CPM

Network representation of simple projects ,
critical path computation, construction of time schedule,
basic difference between PERT and CPM,
arrow networks , time estimates, earliest expected time ,
occurrence time, forward pass computation ,
backward pass computation probability of meeting scheduled date of completion,
various floats for activities

Continuous Internal Assessment

Problem solving
Mid Term test.

List Of Text Books

1. operation research by Kanti Swaroop
2. Introduction to statics by Gupta and Kapoor

List Of Recommended Reference Books

1. Quantitative techniques in management ND VOHRA
2. Operation research an introduction---Hamdy A Taha
- 3.Introduction to statistics---Ronald E Walpole
- 4.Operation research principles and practice—Ravindran, Philips

Practical – I:

MODERN OPERATING SYSTEMS (MOS)

MULTIMEDIA SYSTEMS

Number of lectures: 90

MODERN OPERATING SYSTEMS (MOS)

Learning Objective: To develop database using advanced SQL concepts.

Number of lectures: 45

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

MOS practicals

- I) Create a Shell Program for accepting first name and last name as argument
- II) Write a Shell Program for finding whether a number is even or odd
- III) Write a Shell Program for finding the sum of digits of a given number.
- IV) Write a Shell Program for finding maximum of 3 numbers
- V) Write a Shell Program for accepting percentage and displaying grade
- VI) Write a Shell Program for accepting date and display day assuming date 1 is
- VII) Write a Shell Program for displaying factorial of a number
- VIII) Write a C Program for finding all prime numbers within a given range
- IX) Write a C Program for checking whether a word is a palindrome or not
- X) Write a C Program for displaying Fibonacci series

MULTIMEDIA SYSTEMS

Learning Objective:

To learn to program with multimedia application using java.

Number of lectures: 45

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Multimedia Systems practicals

- I) Write a program in java applet to show a bouncing ball.
- II) Write a program using java to display different images on selection of image name from combobox .
- III) Write a program using java to play different songs on selection of song name from combobox .
- IV) Write a program in java to control the play of video file using start , stop button
- V) Write a program in java to play the audio file based on the key pressed .
- VI) Write a program in java to play two different video files using threads.
- VII) Write a program in java to compress an image
- VIII) Write a program in java to change the image every 3 seconds
- IX) Write a java program to play the song file only when the user clicks on image.
- X) Song should be stopped when the user clicks the image again
- XI) Write a java program to play the video file only when the user clicks on image. The image should also change Video should be stopped when the user clicks the image again.

Continuous Internal Assessment

MCQ / Viva test during practicals
Mid Term practical test.

S.Y. B.Sc.IT

Course : S.ITS.3.PR

Practical – II:

DATA STRUCTURE USING JAVA

STATISTICAL TECHNIQUES AND OPERATION RESEARCH

Number of lectures: 90

DATA STRUCTURE USING JAVA

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Learning Objective:

To study different data structures and algorithms used in programs.

Number of lectures: 45

Data Structure Using Java practicals

- I) Implement a Queue in Java and perform the following operations:
 - a. Create,
 - b. Insert,
 - c. Delete,
 - d. Search a data item

- II) Implement a Stack in Java and perform the following operations:
 - a. Create,
 - b. Push,
 - c. Pop,
 - d. Search

- III) Write a program in Java for implementing Tower of Hanoi.

- IV) Implement a Linked List in Java and perform the following operations:
 - a. Create,
 - b. InsertFirst,
 - c. InsertLoc,
 - d. DeleteFirst,
 - e. DeleteLoc,
 - f. Search a data item

- V) Implement a Binary Search Tree in Java and perform the following operations:
 - a. Create,
 - b. Insert,
 - c. Search a data item

- VI) Implement Traversing (Preorder, Inorder, Postorder) of Binary Tree in Java

- VII) Implement Deletion of a node in Binary Search Tree

- VIII) Implement Heap in Java and perform the following operation:
 - a. Create,

- b. Insert, and
- c. Delete

IX) Implement Traversing (Breadth-First Search, Depth-First Search) in Java

X) Implement following Sorting Algorithms in Java:

- a. Bubble Sort,
- b. Insertion Sort,
- c. Selection Sort,
- d. Heap Sort

STATISTICAL TECHNIQUES AND OPERATION RESEARCH

For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

Learning Objective:

To develop analytical skill and programming logic.

Number of lectures: 45

Statistical Techniques and Operation Research practicals

- I) write a program to implement simplex method
- II) write a program to implement L.P using north west corner method
- III) write a program to implement T.P using least cost method
- IV) write a program to implement Assign problem
- V) write a program to calculate mean ,median, mode
- VI) write a program to calculate S.D, variance
- VII) write a program to implement correlation
- VIII) Write a program to implement discrete distribution
- IX) Write a program to implement continuous distribution
- X) Write a program to implement testing of hypothesis.

Continuous Internal Assessment

MCQ / Viva test during practicals

Mid Term practical test.