

Course Name: Data Structures

Course Code: 121

Objectives:

- To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced computer science study.

Prerequisites:

Any programming language like C, C++

Contents:

1. Analysis of algorithms : **[5%]**

Introduction to Algorithm Analysis for Time and Space Requirements- Rate of growth, Basic Time Analysis of an Algorithm, Order notation , Space Analysis of an Algorithm.

2. Linear Data Structures: **[30%]**

Arrays, Storage Structure for Arrays, Structures & Arrays of Structures , Stack, Applications of Stacks, Queues, Simulation, Priority Queues, Pointers & Linked Allocation , Linked Linear Lists , Circularly Linked Linear Lists , Doubly Linked Linear Lists, Applications of Linked Linear Lists

3. Nonlinear Data Structures: **[30%]**

Trees , Operations on Binary Trees , Storage Representation & Manipulation of Binary Trees, Conversion of General Tree to Binary Trees , Sequential & Other Representation of Trees , Application of Trees - Manipulation of Arithmetic Expression, Graphs and their representation - Matrix Representation of Graphs , Graphic Representation of List Structures , Other Representation of Graphs , Breadth First Search (BFS) , Depth First Search (DFS) , Spanning Trees

5. Sorting : **[15%]**

Introduction , Sorting Techniques -Selection Sort , Bubble Sort , Insertion Sort, Merge Sort , Heap Sort , Quick Sort , Radix Sort

6. Searching: **[20%]**

Sequential Searching , Binary Searching , Search Trees - Binary Search tree, Overview of Balanced trees, Overview of m-ary Trees , Trie Structures , Hash Table Search Methods - Introduction , Hashing Functions , Collision Resolution Techniques

Main Reference Book(s):

1. "An Introduction to Data Structures with Applications", Jean-Paul Tremblay, Paul G. Sorenson, Tata McGraw-Hill, 2nd Edition, (2007)

Suggested Additional Reading:

1. "Data Structures and Algorithm Analysis in C", Mark Allen Weiss, , Pearson Education.
2. "Data Structures: A Pseudo-code Approach with C", Gilberg & Forouzan, , Cengage Learning.
3. "Data Structures Via C++: Objects by Evolution", A. Michael Berman, , Oxford Univ. Press (2004)
4. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-Freed, , University Press (2nd edition-2007)
5. "Data Structures Using C & C++", Tenenbaum, PHI.
6. "Data Structures & Algorithms" , A V Aho, J E Hopcroft, J D Ullman, , Pearson Education (1983).
7. "Sorting & Searching - The Art of Computer Programming" D E Knuth, , Vol. 3, Pearson Education (1998).
8. "Data structures and algorithms, concepts, Techniques and Applications" ,G. A.V. PAI, , TMH , 1st Edition (2008)
9. "Algorithm design-foundation, analysis & internet examples", Michel Goodrich, Roberto Tamassia, , Wiley
10. "Introduction to Algorithm", Cormen, Leiserson, Rivest, Stein, , PHI (2003), 2nd Edition,
11. "Design and Analysis of Algorithms" Parag Dave & Himanshu Dave, Pearson Education (2008).

Chapter wise Coverage from Main Reference Book(s):

1.4, 2.1, 2.2.2, 2.2.3, 2.4, 2.5.1, 2.5.3
3.1 to 3.8, 4.1, 4.2.1, 4.2.2, 4.2.3, 4.3
5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5, 5.2.1, 5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6
6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.1.6, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 2.3.4, 6.2.4

Accomplishments of the student after completing the Course:

- Ability to decide the appropriate data type and data structure for a given problem.
- Ability to select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.
- The algorithms as referred above would include various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching, Hash tables
- Ability to compare algorithms with respect to time and space complexity

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Course Name: Object Oriented Concepts and Programming

Course Code: 122

Objectives:

The programming for small devices like mobile phones, networking devices like routers, coding for graphics and multimedia, requires efficient coding as well as object oriented programming. The C++ language fits perfectly as a tool for this type of work. How this important language is to be mastered and how to use this knowledge in building efficient and flexible code is one of the prime requirements today. The course presented here is targeting to enable the student to master such skills. Aim of the course is to enable students to

1. Differentiate between procedural and object oriented programming.
2. Learn C++ as a language and various features of it.
3. Learn Object Oriented principles and their application using C++.

Prerequisites:

1. Knowledge of C language
2. Programming concepts including algorithm building and logic

Contents :

1. Introduction to Object Oriented Programming and C++ (10%)

Basic concepts of object oriented programming, Benefits & Applications of OOP. Introduction to C++ - Identifiers and constants (Literals), Keywords, Data Types, Reference variables, The Operators, Expressions, New Casting Operators. The Conditional structures and Looping Constructs. Classes and objects, The Difference between struct and class in C++, Static Data members of a class

2. Functions (10%)

Introduction, The inline function, Default Arguments to the function, Functions with object as parameters, Call by reference and return by reference, Prototyping and Overloading, Friend functions, Const and Volatile functions, Static functions, Private and Public functions, Function Pointers

3. Constructors and Destructors (10%)

Introduction to constructors, The explicit constructors, Parameterized constructors, Having multiple constructors, Constructors with default arguments, Dynamic Initialization of objects, Dynamic constructor, copy constructors, The member initialization list, destructors

4. Operator Overloading and User Defined Conversions (15%)

Introduction, Overloading - Unary Operators, Binary Operators, Overloading using friend functions, Overloading other Operators, Type conversions

5. Templates (5%)

Function Templates, Non Generic (Non Type) Parameters in Template functions, Template function and specialization, Overloading a template function, Using Default Arguments, Class Templates, Classes with multiple generic data types

6. Inheritance (15%)

Introduction, Defining derived class using single base class, Derivation using public, private and protected access modifiers, multiple inheritance, multilevel inheritance, Hierarchical inheritance Hybrid inheritance, Virtual base class, containership

7. Pointers and Runtime polymorphism by virtual functions (10%)

Compile Time and Runtime Polymorphism, Pointers to Objects, This pointer, Compatibility of Derived and base class pointers, Virtual functions, Virtual destructors, Pure virtual functions

8. IO Streams (5%)

Need for streams, Advantages of using C++ I/O over C IO, The C++ Predefined streams, Formatting IO, Formatting using ios members, Manipulators, Creating our own manipulator

9. Using Files for IO (10%)

Introduction, Text and binary streams, Opening and closing files, Dealing with text files Dealing with binary files, Providing Random Access using seek, IO Modes, Handling Errors

10. Namespaces (5%)

Introduction and need, Defining namespaces, Extending the namespace, Unnamed namespaces, Nested Namespaces, Namespace aliases

11. Exception handling (5%)

Basics of Exception handling, Throwing and catching mechanism, Rethrowing an exception, Specifying Exceptions

Main Reference Book:

- ✓ Object Oriented Programming with C++ by E. Balagurusami, Tata McGraw Hill Publication.

Suggested Additional Reading:

1. Programming with ANSI C++ by Bhushan Trivedi, Oxford University Press
2. C++ FAQs by Pearson Education
3. C++ Primer by Stanley Lippmann Pearson Education
4. The C++ Programming Language by Bjarne Stroustrup, Pearson Education
5. Effective C++ by Scott Mayer Addison Wesley
6. Complete Reference C++ by Herbert Schildt McGraw Hill Publications

Chapter-wise coverage from main reference book :

Chapters : 1,2,3,4,5,6,7,8,9,10,11,12,13,16

Accomplishments of the student after completing the course :

- ✓ Ability to understand and appreciate the Object Oriented approach of programming
- ✓ Awareness of the working and architectural model of C++.
- ✓ Ability to solve problems using C++ with keeping balance between efficiency and flexibility.

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Course Name: Client Server Architecture & Interface

Course Code: PGDCSA123

Objectives: The course aims at providing the students with the knowledge and skills needed to develop applications for the .NET platform. The focus is on user interface, program structure, language syntax and implementation details.

Prerequisites: Windows navigation skills, experience at developing in either graphical or non-graphical environment, understanding of the basics of structured programming, including concepts such as flow control, variables and parameters, and function calls and knowledge of HTML and Structured Query Language.

Contents:

- 1 : Introduction to Visual Basic 2008 & VB Language (15%)**
Exploring the IDE, Understanding the IDE Components, Variables, Data Types, Control Flow using Loops and Conditions, Procedures, Functions, Event-Driven Programming
- 2 : Windows Application in Visual Basic 2008 (15%)**
Working with Forms, Loading and Showing Forms, Building Dynamic Forms at Runtime, Designing Menus, TextBox Control, ListBox Control, CheckedListBox Control, ComboBox Control, ScrollBar Control, TrackBar Control, Common Dialog Controls, RichTextBox Control, Handling Strings and Characters, Handling Dates and Times
- 3: Databases in Visual Basic 2008 and Report Generation Using Crystal Reports (30%)**
Database Connections, Basic Data-Access Classes, Storing Data in DataSets, Updating the Database with the DataAdapter, Working with Typed DataSets, Data Binding, Designing Data-Driven Interfaces, Working with SQL Expressions, Building Report, Modifying Report, Formatting Fields and Objects, Report Structure, Working with Formula Fields, Parameter Fields, Group and Special Fields
- 4 : Object-Oriented Programming in Visual Basic 2008 (20%)**
Classes and Objects, Building a Minimal Class, Issues in Object-Oriented Programming, Inheritance, Polymorphism
- 5 : Introduction to ASP.NET 3.5 (20%)**
Building Web Applications, Understanding HTML and XHTML, Cascading Style Sheets, JavaScript, Working with Standard Controls, Navigation Controls, Validation Controls, Login Controls, Introduction to ASP.NET Objects, Building the StyleSheet, Creating the Content Master, Adding Elements, Building the Site Navigation, Adding Authentication, Adding Content Pages, Working with Data, Using ASP.NET Web Services and WCF, Creating a simple ASP.NET Web Service

Main Reference Book:

- ✓ **Mastering Microsoft Visual Basic 2008** by Evanvgelos Petroustos, Wiley India Edition, 2008

Suggested Additional Reading:

- 1. Visual Basic 2008 Programming Black Book**
By Kogent Solutions Inc. – Dreamtech Press
- 2. Crystal Reports Xi – Complete Reference**
By George Peck – Tata McGraw Hill
- 3. ASP.NET 3.5 Black Book**
By Kogent Solutions Inc. – Dreamtech Press
- 4. Professional ASP.NET 3.5 in C# and VB**
By Bill Evjen, Scott Hanselman & Devin Rader – Wrox

Chapter wise Coverage from the Main Reference Book:

- 1: Chp. 1 to 4
- 2: Chp. 6 to 8, 13
- 3: Chp.22 to 24 and refer Suggested Reading Book # 2 for Report Generation Using Crystal Reports
- 4: Chp. 10 to 11
- 5: Chp. 25 to 27

Software Requirement: Visual Studio 2008

Accomplishments of the student after completing the course:

- ✓ Use Visual Basic 2008 to develop robust software solutions for deployment on both Windows and Web environments.
- ✓ Take advantage of the Microsoft 2008 framework to create powerful, full-featured Visual Basic applications.
- ✓ Create Windows and Web applications that access a database.
- ✓ Apply object-oriented programming techniques to Visual Basic projects.

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Course Name: Accounting and Financial Management

Course Code: 124

Objectives:

To provide awareness of the underlying financial structure and procedure of the organization so that the interaction of financial systems with information systems can be understood by the information system designers.

Prerequisites: ---

Contents:

1. Introduction to accounting [20%]
2. Analysis and Interpretation of Financial Statements [10%]
3. Fixed Assets and Depreciation Accounting [15%]
4. Standards for Control [15%]
5. Budgetary Control [20%]
6. Project Management [20%]

Main Reference Book(s):

Accounting and Financial Management by D.R. Patel, Atul Prakashan.

Suggested Additional Reading:

1. Accounting for Management by N.P. Srinivasan, M. Sakthivel Murugan, S. Chand.
2. A textbook of Financial Cost and Management Accounting by Dr. P. Periasamy, Himalaya Publishing House.

Chapter Wise Coverage from Main Reference Book(s):

1. Introduction to Accounting, Accounting Mechanics-1: Basic Records, Accounting Mechanics-2: Preparation of Final Accounts (Chapter 1 to 3).
2. Analysis of Financial Statements (Chapter 4) excluding Du pont Chart.
3. Fixed Assets and Depreciation Accounting (Chapter 5) excluding implication of the cost concepts and financial accounting treatment of depreciation, cash flow implications of depreciation, taxation and depreciation accounting, accounting standards for depreciation.
4. Standard Costing, Inventory Valuation and Break Even Analysis (Chapters 8,9 and 10).
5. Forecasting and Budgetary Control (Chapter 11) excluding methods of forecasting and proforma financial statements.
6. Project Management (Chapter 12), only project appraisal techniques.

Accomplishments of the student after completing the course:

Students will have insight of preparation and analysis of final accounts and they will be able to assemble the appropriate quantitative information to support managerial decisions.

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Course Name : Basic Networking & Network Administration

Course Code : 125

Objectives:

- Appreciate the use of Computer networking as a resource sharing mechanism.
- Building, Administering and Securing Computer networks.
- Configuring various Network and Internet services.
- To develop a base for Professional Certifications.

Pre-requisites : Basic Knowledge of Computer Hardware and Operating Systems.

1	Networking Basics Understanding Networks, Understanding Network Protocols and Standards, Understanding Network Hardware, Understanding Network Operating Systems, Network Addresses.	[10 %]
2	Building a Network Planning a Network, Installing Network Hardware, Setting Up a Network Server, Configuring Windows XP and Vista Clients, Configuring Other Network Features, Verifying the Network Installation	[10%]
3	Networking Administration and Security Job Description for a Network Administrator, Security , Managing User Accounts, Firewalls and Virus Protection, Managing Network Software, Solving Network Problems, Network Performance, Backing Up the data, Disaster Recovery and Business Continuity Planning	[10%]
4	TCP/IP and the Internet Introduction to TCP/IP and the Internet, Understanding IP Addresses, Understanding DHCP, DNS, FTP, Telnet, HTTP, SMTP, POP, IMAP, NAT, Proxies, TCP/IP Tools and Commands	[20%]
5	Configuring Windows and Linux Servers Configuring various Network and Internet Services	[15%]
6	Wireless Networking Understanding Wireless media, Setting Up a Wireless Network, Securing a Wireless Network, Hotspotting, Troubleshooting a Wireless Network, Wireless Networking with Bluetooth	[10%]
7	Networking Tools Wireshark, Nessus, Snort, Tcpdump, Nmap etc.	[05%]
8	Linux Shell Programming Linux commands, Shell programming with network administrators perspective	[20%]

Main Reading Book :

1. “Networking all-in-one desk reference”, 3rd Ed. Author : Doug Lowe, Wiley India
2. “Introduction to Unix & Shell Programming”, Author: M.G. Venkateshmurthy, Pearson Education
3. “Networking for Home and Small Businesses”, CCNA Discovery Learning Guide, Authors: Allan Reid, Jim Lrenz, Pearson Education

Suggested Additional Reading :

1. “Network+ Study Guide”, 2nd Ed. Author: David Groth, Sybex Publication
2. “Linux Administration Beginner’s Guide, 3rd Ed. Author : STEVEN GRAHAM & STEVE SHAH, Wiley India
3. “Windows Server – Administrators Guide”, Microsoft Press
4. “Data Communication and Networking” , 4th Ed. Author: Behrouz Forouzan, TMH Publication

Chapter-wise coverage from main reference book :

<u>Unit</u>	<u>Book Chapters</u>
1	Main Reading Book1 : Book1 -> Chapters 1, 2, 3, 4
2	Main Reading Book1 : Book 2 -> Chapters 1, 2, 3, 4, 6, 7
3	Main Reading Book1 : Book 3 -> Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9
4	Main Reading Book1 : Book 4 -> Chapters 1, 2, 3, 4, 5, 6
5	Main Reading Book1 : Book 7 & Book 9 (Practical Implementations)
6	Main Reading Book1 : Book 5 -> Chapters 1, 2, 3, 4, 5

Accomplishments of the student after completing the Course:

- Ability to decide the appropriate network infrastructure.
- Ability to perform the duties of Network Administrator.

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Course Name : Structured and Object Oriented Analysis and Design

Course Code : 126

Objectives :

System Analysis and Design is practical field that relies on a core set of concepts and principles. The objective of this course is to teach the students tried-and-true techniques widely embraced by the experienced analyst plus new and emerging tools and techniques that recent graduates are expected to apply on the job. The course is meant to give balanced exposure to both traditional structured approaches and object oriented approaches to system analysis and Design

Prerequisite :

Fundamentals of Structured Programming and Fundamentals of Object Oriented Programming

Contents :

1. System development approaches & Role of System Analyst (10%)

Role of System analyst - as Business problem solver , in Strategic planning , as System developer, Required Skills of system analyst, System Development Life Cycle, Activities in each SDLC phase, Methodologies, Models, Tools, and Techniques, Approaches to System Development, System Development Life Cycle Variations, Current Trends in Development, Tools to Support System Development, Project Management, project Planning, Project Scheduling, Feasibility analysis, Staffing and Launching the project, System requirements investigation, Analysis phase, Business process reengineering, System requirement, Stakeholders, Technique for information gathering, Requirements validation

2. Analysis Modeling (20%)

Traditional and Object – Oriented Views of Activities / Use Cases, Data Flow Diagrams , Documentation of DFD Components, Information Engineering Models, Locations and Communication through Networks

3. Designing input, Output control and interfaces (10%)

Identifying and classifying Inputs and Outputs, Understanding the User Interface, Guidelines for Designing User Interfaces, Documenting Dialog Designs , Guidelines for designing Windows and Browser Forms, Guidelines for Designing Web Site, Identifying System Interfaces, Designing System Inputs, Designing System Outputs, Designing Integrity Controls, Designing Security Controls

4. System Implementation Conversion & support (10%)

Program Development, Quality Assurance, Data Conversion, Installation, Documentation, Training and User support, Maintenance and System enhancement

5. Introduction to OOAD & Unified process of Software development (5%)

Object orientation, OOAD methodologies, Unified Process, Phases of Unified Software development process, Best practices in Unified Process , Workflow of the Unified Process

6. Use case modeling (15%)

Actors and Use cases, Use case relationships, Writing Use cases , How to identify System boundary , How to Actors and Use case, Use case for Varification and Validation, Use case realization.

7. Data Modeling (10%)

Classes, Objects, Attributes , Operations, Scope and Visibility of Attributes and Operations , Role names, Qualified Associations, Ternary Associations, Recursive Associations, Multiple Associations between classes, Aggregation, Generalization, Abstract class, Subclass partitioning, Generalization set, Interfaces, Paramerterzied classes.

8. Behavioral Modeling (10%)

Interaction diagrams , Creating new objects, Combining fragments (Condition and Loop) Communication diagrams, State Machines, Events, States, Diagrams, Substates, Modeling complex transitions, History Indicator, Junction State, Sync State, Activity diagrams, swimlanes, Dynamic Concurrency, Decomposing an activity

9. Architectural modeling (10%)

Closed Layered Architecture, Open Layered Architecture, Broker Architecture for Distributed Systems , Model View Controller architecture, Component Diagrams, Deployment diagrams

Main Reference Book :

1. System Analysis & Design by Satzinger, Jackson ,Burd , CENGAGE Learning, India Edition
2. Object Oriented Analysis and Design Using UML by Mahesh P. Matha, PHI Publication

Suggested Additional Reading :

1. Object Modeling Techniques by Rumbaugh, Booch , Jacobson , PHI Publication
2. "The Unified Modeling Language - User Guide" - Booch , Jacobson, Rumbaugh, Addison Wiley Publication
3. Object Oriented Analysis and Design With the Unified Process by Satzinger, Jackson ,Burd, Thomson Learning
4. Object Oriented Modeling and Design With UML by Blaha, rumbaugh, Pearson Education
5. System Analysis and Design by Kendall & Kendall, Pearson education
6. Analysis & Design of Information Systems by James Sen

Chapter-wise coverage from main reference book :

Book-1 : Chapters : 1-4, 6, 13, 14, 15

Book-2 : Chapters : 1-7

Accomplishments of the student after completing the course :

After completing the course the students should be well verse with

- ✓ Role of System Analyst
- ✓ Modern structured analysis approaches
- ✓ Key modeling concepts that apply to both the traditional structured approach and the newer object-oriented approach
- ✓ Unified Process and use of UML for Object-Oriented Analysis and Design

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