

Course Name: Client Server Architecture & Interface

Course Code: MCA211

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 Basic 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: Java Programming

Course Code: MCA 212

Objectives:

- To develop proficiency in creating console based and GUI based applications using the Java Programming Language.
- To be able to understand the concepts of Object Oriented Programming Language and easily use Java.
- To get a good understanding of developing multi-threaded applications using the Java Programming Language.
- To be able to develop Applets for embedding in a web page.

Prerequisites:

Knowledge of the C programming language.

Contents:

1 Introduction:

- Features of the Java Language,
- Java Environment (5%)
- Object Oriented Programming in Java
- Java Program Structure.
- Java and Unicode

2 Data Type, Variables and Constants, Loops and Logic:

- Data and Variables
- Integer Data Types, Floating Point Data Types
- Arithmetic Calculations, Mixed Arithmetic expressions, the op= operator, Mathematical functions and constants, Bitwise operators
- Enumerated data type
- Boolean Variables (10%)
- Operator precedence
- Program comments
- Loops and Logic
 - Making decisions, Logical operators, The Conditional Operator, The switch Statement
 - Variable scope, Loops, Assertions.

3 Arrays and Strings:

- Arrays
- Strings (5%)
- Operations on Strings
- Mutable Strings

- 4 **Defining Classes:**
- What is a class?, defining classes.
 - Defining methods, Defining constructors.
 - Defining and using a class.
 - Method overloading, Using Objects. **(15%)**
 - Understanding packages, controlling access to class members
 - Nested classes
 - The finalize() method
 - Native method
- 5 **Extending classes and inheritance:**
- Class inheritance, choosing base class access attributes
 - Polymorphism
 - Multiple Levels of inheritance
 - Abstract classes
 - The Universal superclass **(15%)**
 - Methods accepting a variable number of arguments
 - Casting Object
 - Enumeration in detail
 - Using the final modifier
 - Interfaces
 - Anonymous classes
- 6 **Exceptions:**
- Types of Exceptions
 - Dealing with exceptions **(5%)**
 - Exception Objects
 - Defining your own exceptions
- 7 **Stream based I/O:**
- Understanding Streams
 - Accessing Files and Directories **(15%)**
 - Writing Files
 - Reading Files
 - Serializing Objects
- 8 **Generic Class Types and Collection Framework:**
- Generic Class Type
 - What are Generic types?
 - Defining a Generic Class Type
 - Generic Type and Generic Interfaces
 - Variables of a Raw Type
 - Using wildcards as type parameter arguments
 - Arrays and parameterized types **(15%)**
 - The Collection Framework
 - Collections of Object
 - Iterators
 - Collection Classes
 - Using Vectors
 - Linked Lists
 - Using Maps

- 9 **A Collection of useful classes:**
- Utility Methods for Arrays
 - Observable and Observer Objects
 - Generating Random Numbers
 - Dates and Times
 - Regular Expressions
- (5%)**
- 10 **Thread:**
- Understanding Threads
 - Managing Threads
 - Thread Priorities
- (10%)**
- 11 **GUI Programming:**
- Creating Windows
 - Creating a Window
 - Components and Containers
 - Basics of Components
 - Using Containers
 - Containers Layout Managers
 - Adding a Menu to a Window
 - Applets
 - Handling Events
 - The Event Handling Process
 - Event Classes
 - Semantic Event Handling in Applets
 - Semantic Event Handling in an Application
 - Drawing in a Window
 - Co-ordinate Systems in a Component
 - Drawing on a Component
 - Shapes
 - Filling Shapes
 - Extending the GUI
 - Using Dialogs
 - Choosing Custom Colors
- (15%)**

Notes:

Term work is to be carried out as per the above syllabus.

Main Reference Book(s):

- ✓ Ivor Horton's "Beginning Java 2" JDK 5 Edition, Wiley Computer Publishing, (2007)

Suggested Additional Reading:

- 1) Cay S Horstmann, Gary Cornell, "Core Java 2, Volume 1 – Fundamentals", Pearson Education(7th edition – 2005)
- 2) Cay Horstmann, "Big Java", Wiley Computer Publishing (2nd edition – 2006),
- 3) Ken Arnold, James Gosling, David Holmes, "The Java Programming Language", Addison-Wesley Pearson Education (4th Edition – 2005)
- 4) Sharan Zakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoeber "The Java Tutorial", Addison-Wesley Pearson Education(4th Edition) , available for online reference at <http://java.sun.com/docs/books/tutorial/index.html>

- 5) James Gosling, Bill Joy, Guy Steele, Gilad Bracha, “The Java Language Specifications”, Addison-Wesley Pearson Education(3rd edition), available for download at <http://java.sun.com/docs/books/jls/download/langspec-3.0.pdf>
- 6) K. Somasundaram, “ Advanced Programming in Java2 ”, Jayco Publishing House

Chapter wise Coverage from Main Reference Book(s):

- Ch. 1 - 4
- Ch. 5 Except for section on Recursion
- Ch. 6 - 9
- Ch. 10 Except for sections on Channels and Buffers
- Ch. 11 Except for sections on File Channel Read Operations
- Ch. 12 Except for sections on Read/Write Operations with a single File Channel and Memory Mapped
- Ch. 13 Except for sections on Parameterized Methods and Parameterized Types and Inheritance
- Ch. 14
- Ch. 15 Except for section on Using a Scanner
- Ch. 16 - 17
- Ch. 18 Except for section on Using Actions and Adding a Toolbar
- Ch. 19 Except for section on Using a Model/View, Managing shapes, Drawing using the mouse and Defining your own shape classes.
- Ch. 20 Only sections on Using Dialogs and Choosing Custom Colors are included.

Accomplishments of the student after completing the Course:

- ✓ Ability to create appropriate classes using the Java Programming Language to solve a problem using Object Oriented Approach.
 - ✓ Ability to write console based and GUI based applications in the Java Programming Language.
 - ✓ Ability to develop to multi-threaded applications using the Java Programming Language
 - ✓ Ability to create Applets using the Java Programming Language
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Course Name: Computer Oriented Statistical Methods

Course Code: MCA 213

Objectives:

- To develop proficiency in applying statistical techniques that helps in decision making while solving real-world problems
- To introduce the use of computers to analyze the data
- The emphasis is on developing statistical reasoning skills and concepts; computational skill is secondary

Prerequisites: None

Contents:

1: Descriptive statistics:

(15%)

- Introduction to statistics, Data, Scales of measurements, Sample vs. population
- Introduction to frequency distribution including types of classes, types of class limits etc. (Only uni-variate)
- Measures of central tendency: Mean, median, mode, weighted mean, basic mathematical properties and applications of these measures
- Measures of dispersion: absolute and relative measures of range, quartile deviation, standard deviation, basic mathematical properties and applications of the measures
- Measures based on shape of distribution : Skewness and Kurtosis (basic concepts only, introduction using curve, possible values of these measures, relationship (distance) between mean, median, mode
- Measures of association between two variables (Correlation: for paired observations only): Covariance, Types of correlation: (+ve, -ve, 0), (Linear, non-linear), Karl Pearson's correlation coefficient, its mathematical properties, Spearman's correlation coefficient, applications
- Regression: concept of regression, difference between correlation and regression, linear regression equations, properties of regression coefficients, use in forecasting/estimation

2: Probability and Probability distributions: (25%)

(a) Probability:

Basic probability concepts (Experiment, sample space, events, exclusive events, exhaustive events, independent events, dependent events), methods for assigning probability (Classical method, relative frequency method, subjective method), events and their probability, addition rule (not to be proved or derived), conditional probability, multiplication rule (not to be proved or derived), Bayes' theorem (statement only, not to be proved or derived)

(b) Probability distribution:

Random variable, Discrete and continuous random variable, expected value and variance of random variable, Probability distribution, Binomial distribution, Poisson distribution, Hypergeometric distribution, Uniform distribution, Normal distribution,

Normal approximation of Binomial, exponential distribution, relationship between Poisson and Exponential distribution

Note: Discuss pmf/pdf, properties and applications of all distribution

3: Statistical Inference: (30%)

Sampling methods, sampling distribution, central limit theorem (statement only), point and interval estimation, sampling distribution of sample mean, sampling distribution of sample proportion, Hypothesis tests: Null & alternative hypothesis, Type I & II errors, one and two tailed test, rejection rule using p-value and critical value approach, test of hypothesis about population mean (σ known, σ unknown and small sample), test of hypothesis about population proportion, Sampling distribution and test of hypothesis about difference between two population means (known and unknown σ_1 and σ_2), sampling distribution and test of hypothesis about difference between two population proportions, analysis of variance (1-way, two-way), introduction of randomized block design

4: Non – Parametric Methods: (20%)

Sign Test, Wilcoxon Signed-Rank Test, Mann-Whitney-Wilcoxon Test, Kruskal-Wallis Test, Chi-square test for goodness of fit and independence

5: Time series analysis: (10%)

Components of a Time Series, measurement of secular trend (moving average method, least square method), measurement of seasonal trend (ratio-to-moving average method, ratio-to-trend method)

Note: Formulae may be provided for parametric and non – parametric tests.

Main Reference Book:

- ✓ Anderson, Sweeney, Williams, “Statistics for business and economics”, 9th edition, Thomson Publication

Suggested Additional Reading:

1. Bharat Jhunjhunwala, “Business Statistics”, first edition, S Chand, 2008
2. Richard Levin, David Rubin, “Statistics for management”, 7th edition, PHI
3. S P Gupta, “Statistical methods”, 30th edition, S Chand
4. Nabendu Pal, Sahadeb Sarkar, “Statistics-Concepts and Applications”, 2nd edition, PHI,

Chapter wise Coverage from the main reference book:

Chapter 3 (except article 3.4).

Chapter 4, Chapter 5, Chapter 6

Chapter 7, Chapter 8, Chapter 9, Chapter 10, Chapter 13, (except articles 13.3, 13.7)

Chapter 12, Chapter 19

Chapter 18 (except articles 18.5, 18.6)

Accomplishments of the student after completing the course:

- ✓ Ability to apply statistical techniques in decision making in solving real-world problems
 - ✓ Ability to use computers to analyze the data
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Course Name: System Software

Course Code: MCA 214

Objectives:

- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers, macro processor, linker and compiler.
- To have an understanding of loader, system software tools.
- To understand and know the working of device drivers

Prerequisites:

Basic knowledge of computer architecture and C programming.

Contents :

- 1. Introduction to System Software and software tools (15%)**
Language Processors: Introduction, Language Processing Activities, Fundamentals of Language Processing & Language Specification, Language Processor Development Tools.
Data Structures for Language Processing: Search Data structures, Allocation Data Structures.
Software Tools: Software Tools for Program Development, Editors, Debug Monitors, Programming Environments, and User Interfaces.
- 2. Assemblers (15%)**
Assemblers: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, A single pass Assembler for IBM PC.
- 3. Macro Processors (15%)**
Macros and Macro Processors: Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a Macro Preprocessor.
- 4. Compilers and Interpreters (30%)**
Scanning and Parsing: Introduction to NFA and DFA, Approaches of parsing, Different types of parsing techniques namely, Recursive decent parser, LL(1) parser, Operator precedence parser. (First and follow technique for generating a parse table is to be taught), Phases of the Compiler, Aspects of compilation, Memory allocation. Compilation of expressions and control structures. Code optimization. Interpreters: Use and overview of interpreters, pure and impure interpreters
- 5. Linkers and Loaders (15%)**
Introduction to linkers, Relocation and Linking Concepts. Design of a Linker, Self-Relocating Programs. A Linker for MS-DOS, Linking for Overlays. Introduction to Loaders.

6. Device drivers

(10 %)

Design and anatomy of UNIX device driver, Types of device driver, General design of UNIX character device driver, General design of UNIX block device driver, UNIX device driver installation.

Main Reference Book(s):

1. "Systems Programming and Operating Systems", Second Revised Edition, D. M. Dhamdhare, Tata McGraw-Hill, 1999.
2. "Writing UNIX device drivers", George Pajari, Pearson Education Asia.

Suggested Additional Reading:

1. "System Software – An Introduction to Systems Programming", 3rd Edition, Leland L. Beck, Pearson Education Asia, 2000.
2. "System Software", Santanu Chattopadhyay, Prentice-Hall India, 2007
3. "Compilers: Principles, Techniques, and Tools", 2nd Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Education Asia
4. "Compiler Construction: Principles and Practice", Kenneth C. Loudon, (Thomson/Cengage)

Chapter-wise coverage from main reference book :

Book 1 : Chapters : 1,2,3,4,5,6,7,8

Book 2 : Chapters : 1,2,5,13

Accomplishments of the student after completing the course :

- ✓ Good understanding of basic design and implementation of various system software.
 - ✓ Ability to design and implement better and more efficient programs/applications as a result of the knowledge gained.
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Course Name: Operating System

Course Code: 215

Objectives:

- To provide an understanding of the functions of operating systems.
- To provide an insight into internals and functional modules of operating systems.
- To study the concepts underlying the design and implementation of operating systems.
- Prepare a base for advanced subjects in Computer Science and Applications.

Prerequisites:

- Basic knowledge of Computer hardware and software
- Knowledge of programming language like C/C++

Contents:

- 1 Introduction and System Structures (5%)**
Overview of Computer System and Architecture, Introduction to Operating Systems – Structure & Architecture , Functions of Operating Systems, Types of Operating systems, Operating system Interface, OS services, System calls and its types, Operating Systems Structure, design and its implementation, Virtual Machines.
- 2 Process management (18%)**
Process-concept, Process scheduling and its algorithms, Operations on Processes, Inter-process Communication, multi-processor scheduling
Threads: Multi-threading models, Thread Libraries, Thread Scheduling
Synchronization: Critical section problem, Peterson’s solution, synchronization hardware, semaphores, monitors, Classical problems of synchronization, (Dinning philosopher’s problem Bounded buffer problem, Reader’s- Writers problem)
- 3 Deadlocks (7%)**
Deadlock characterization, deadlock detection, deadlock prevention, deadlock avoidance, Recovery from deadlock
- 4 Memory management (13%)**
Need, Swapping, contiguous memory allocation, Fragmentation, Paging, Structure of Page table, Segmentation
Virtual memory management: Demand paging, Page replacement algorithms, Allocation of frames, Thrashing, Copy-on-Write

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| 5 | Storage Management - File System
File concepts, access methods, Directory structure, Mounting, File sharing, Protection, File system structure, File system implementation, Directory implementation, allocation methods, free space management, Efficiency and performance, recovery | (10%) |
| 6 | Storage Management – Secondary Storage
Overview of Storage devices, Disk structure, Disk attachment, Disk scheduling, Disk Management, Swap-Space Management, RAID, Tertiary Storage Structure | (10%) |
| 7 | I/O management
I/O hardware, Application I/O Interface, Kernel I/O subsystems, Streams, Device drivers | (7%) |
| 8 | Special Purpose Systems
Distributed OS (Introduction)
Real time systems (System characteristics, features of Real time kernels),
Multimedia systems (Characteristics of multimedia systems, OS issues, requirement of multimedia kernels) | (5%) |
| 9 | System protection: Protection goals, Access matrix, access control, Security problem, threats, Introduction to security measures | (10%) |
| 10 | Linux commands and Shell scripting
Introduction to Linx, Linux file system, shell, kernel
LINUX COMMANDS : general purpose commands, file handling commands, working with shell, Process handling commands, Communication related commands, pipes and filters, redirection, shell programming | (15%) |

1. Case Study of Linux / Unix / XP is desirable.
2. Practicals will be based on Linux. Students must implement shell scripts in the practical exam.

Main Reference Book(s):

- (1) Silberschatz, A., Peter B. Galvin and Greg Gagne, Operating System Principles, Wiley – Indian Edition, 8th Ed., 2009.
- (2) Sumitabha Das, Unix concepts and Applications, Fourth edition, , Tata McGrawHill.
- (3) Venkateshmurthy, Introduction to Unix and Shell Programming, Pearson Education (India)

Suggested Additional Reading:

- (1) Stallings W, "Operating Systems", 6th edition, Prentice Hall India
- (2) Bach M J, "The Design of Unix Operating System", Prentice Hall India, 1993.
- (3) Flynn I. M, "Understanding Operating Systems", Cengage India Publication
- (4) Tanenbaum A.S., "Modern Operating Systems", 4th Edition, PHI, 2001.
- (5) Eric Foster, John Welch, Micah Anderson, "Beginning Shell Scripting", Wrox Publication (2007)
- (6) Gary Nutt, "Operating Systems- A Modern perspective", 3rd Edition, Pearson, 2000.
- (7) Randal K. Michael, "Mastering Unix/Linux/Solaris Shell Scripting", Wiley India
- (8) Sibsankar Haldar, Alex Aravind, "Operating Systems", 1st Edition Pearson Education, 2009.

Chapter wise Coverage from Main reference book (s):

Book 1	Chapter 1 - 8 Chapter 9 (9.1 to 9.6) Chapter 10 -14 Chapter 16 (16.1, 16.2) Chapter 19 (19.1 to 19.3) , Chapter 20 (20.1 to 20.3)
Book 2	Chapter 1 to 14
Book 3	Shell Programs

Accomplishments of the student after completing the Course:

- ✓ Understanding the principles and internals of Operating System
 - ✓ Working knowledge of Linux System
 - ✓ Harnessing the facilities provided by Operating System in application development.
 - ✓ Ability to develop Parallel Programs & Kernel Modules.
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Course Name: Technical Writing and Communication Skills (TWCS)

Course Code: MCA 216

Objectives:

Technical Communication is most essential for students and professionals. Thus there is a drastic need for effective communication. Due to the various phenomenal changes in the business environment, recruiters are now looking for students with good computer knowledge as well as good communication skills. Thus, the objective of this course is to equip the students with the basics of communication skills and technical writing, so that they can put it into use in their day-to-day activities.

Prerequisites: None

Contents:

- 1 : Introduction to Communication (20%)**
What is Communication, Levels of Communication, Importance of Technical Communication, Barriers to Communication, Non-Verbal Communication, Technology-Enabled Communication, Impact of Technology, Selection of Appropriate Communication Technology
- 2 : Oral Forms of Communication (20%)**
Effective listening, Active vs Passive Listening, Effective Presentation Strategies, Effective Use of Visual Aids, Understanding the Nuances of Delivery, Interviews, Types of Interviews, Group Discussion, Meetings, Conferences
- 3 : Introduction to Essential English Grammar (20%)**
Punctuation and Capitalization, Nouns and Verbs, Pronouns, Adjectives, Prepositions, Conjunctions, Tenses, Active and Passive Voice, Use of Articles, Common Errors in Usage, Words Commonly Misspelt
- 4 : Effective Writing (20%)**
Words and Phrases, Guidelines for Effectiveness, Sentence Construction, Paragraph Development, Precis Writing, Reading Comprehension
- 5 : Written Forms of Communication (20%)**
Letter Writing, Memorandums, E-mails, Report Writing, Technical Proposals, Research Paper, Dissertation, Thesis, Instruction Manuals, Technical Description

Main Reference Books:

1. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press, Sixteenth Impression 2007.
2. Business Communication by Meenakshi Raman & Prakash Singh, Oxford University Press, Seventh Impression 2008.
3. High School English Grammar and Composition by Wren & Martin

Suggested Reading:

1. Effective Business Communication by Herta A Murphy, Herbert W. Hilderbrandt & Jane P Thomas, Seventh Edition, Tata McGraw Hill Publication
2. Effective Business Communication by Asha Kaul, Prentice-Hall India Pvt. Ltd., March 2008
3. Technical Writing by B. N. Basu, Prentice-Hall India Pvt. Ltd., 2007

Chapter wise Coverage from the Main Reference Book(s):

Book 1 Chapter 1 – 17, Appendix A, B & C

Book 2 Chapter 2, 14

Book 3

Accomplishments of the student after completing the course:

- ✓ Gain an insight into the types of communication
 - ✓ Build good body language and communication skills while making presentations in a classroom, or boardroom.
 - ✓ Would be better equipped in writing letters, technical reports etc.
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