Course Title: **Web Technology (3 Cr.)**
Course Code: **CACS205**
Year/Semester: **II/III**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Practical: 3 Hrs.)**

Course Description

This course covers different aspect of web technology such as HTML, CSS, issues of web technology, client tier, server tier and advanced server side issue.

Course Objectives

The general objectives of this course are to provide fundamental concepts of Internet, Web Technology and Web Programming.

Course Contents

Unit 1 HTML and CSS **15 Hrs.**

HTML Basic: HTML Tag Reference, Global Attributes, Document, Structure Tags, Formatting Tags, Text Level Formatting, Block Level Formatting, List Tags, Hyperlink Tags, Executable Content Tags.

Image & Imagemaps: Introduction, Client-Side Imagemaps, Server-Side Imagemaps, Using Server-Side and Client-Side Imagempas Together, Alternative Text for Imagemaps.

Tables: Introduction To HTML Tables and Their Structure, The Table Tags, Alignment, Aligning Entire Table, Alignment within a Row, Alignment within a Cell, Attributes, Content Summary, Background Color, Adding a Caption, Setting the Width, Adding a Border, Spacing Within a Cell, Spacing between the Cells, Spanning Multiple Rows or Columns, Elements that can be Placed in a Table, Table Sections and Column Properties, Tables as a Design Tool.

Frames: Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME>Tag, Targeting named Frames, Creating Floating Frames, Using Hidden Frames.

Forms: Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop Down and List Boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labeling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data.

Style Sheets: Definition, Importance, Different Approaches to Style Sheets, Using Multiple Approaches, Linking to Style Information in Separate File, Setting up Style Information, Using the <LINK>Tag, Embedded Style Information, Using <STYLE>Tag, Inline Style Information.

Unit 2 Issue of Web Technology **3 Hrs.**

Architectural Issues of Web Layer, Tier Technology: 2-Tier, 3-Tier and n-Tier.

Unit 3 The Client Tier **10 Hrs.**

Representing Content; Introduction to XML; Elements and Attributes; Rules for Writing XML; Namespaces; Schema: Simple Types and Complex Types, XSD Attributes, Default and Fixed Values, Facets, Use of Patterns, Order Indicators(All, Choice, Sequences), Occurrence Indicators (Maxoccurs, Minoccurs), DTD: Internal Declaration, Private External Declaration, Public External Declaration, Defining Elements and Attributes; XSL/XSLT; Xpath; Xquery; SAX; DOM , Creating XML Parser.

Unit 4 The Server Tier **8 Hrs.**

Web Server Concept, Creating Dynamic Content, Using Control Flow to Control Dynamic Content Generation, Sessions and State, Error Handling, Architecting Web Application, Using Tag Libraries, Writing Tag Libraries.

Unit 5 Introduction to Advanced Server Side Issues **9 Hrs.**

Database Connectivity; Creating an SQL statement: Select, Insert, Update, and Delete; Authentication: Anonymous Access, Authentication by IP address and Domain, Integrated Windows Authentication; Cookies; File Handling; Form Handling

Laboratory Works

Laboratory 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 works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). 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	-	60 (3 Hrs.)	20 (3 Hrs.)	100

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: **System Analysis and Design (3 Cr.)**
Course Code: **CACS203**
Year/Semester: **II/III**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr.)**

Course Description

This course mainly focuses on different aspect of system analysis and design such as foundation, planning, analysis, design, implementation and maintenance.

Course Objectives

The general objective of this course is to provide concepts related to information systems development in a systematic approach including foundations, planning, analysis, design, implementation and maintenance.

Course Contents

Unit 1 System Development Fundamentals — 9 Hrs.

a. The Systems Development Environment

Introduction, Modern Approach of System Analysis and Design, Information System and its Type, Developing Information Systems and the Systems Development Life Cycle, The Heart of the Systems Development Process, The Traditional Waterfall SDLC, Approaches for Improving Development, CASE Tools, Rapid Application Development, Service-Oriented Architecture, Agile Methodologies, eXtreme Programming, Object- Oriented Analysis and Design

b. The Origins of Software

Introduction, System Acquisition, Reuse

c. Managing the Information Systems Project

Introduction, Managing Information Systems Project, Representing and Scheduling Project Plans, Using Project Management Software

Unit 2 Planning — 7 Hrs.

a. System Development Projects: Identification and Selection

Introduction, Identifying and Selecting Systems Development Projects, Corporate and Information Systems Planning

b. System Development Projects: Initiation and Planning

Introduction, Initiating and Planning Systems Development Projects, Process of Initiating and Planning IS Development Projects, Assessing Project Feasibility, Building and Reviewing the Baseline Project Plan

Unit 3 Analysis — 13 Hrs.

a. System Requirements

Introduction, Performing Requirements Determination, Traditional Methods for Determining Requirements, Contemporary Methods for Determining System Requirements, Radical Methods for Determining System Requirements,

Requirements Management Tools, Requirements Determination Using Agile Methodologies

b. System Process Requirements

Introduction, Process Modeling, Data Flow Diagramming Mechanics, Using Data Flow Diagramming in the Analysis Process, Modeling Logic with Decision Tables

c. System Data Requirements

Introduction, Conceptual Data Modeling, Gathering Information for Conceptual Data Modeling, Introduction to E-R Modeling, Conceptual Data Modeling and the E-R Model, Representing Super-types and Sub-types, Business Rules, Role of Packaged Conceptual Data Models – Database Patterns

Unit 4 Design **12 Hrs.**

a. Designing Databases

Introduction, Database Design, Relational Database Model, Normalization, Transforming E-R Diagrams into Relations, Merging Relations, Physical File and Database Design, Designing Fields, Designing Physical Tables

b. Designing Forms and Reports

Introduction, Designing Forms and Reports, Formatting Forms and Reports, Assessing Usability

c. Designing Interfaces and Dialogues

Introduction, Designing Interfaces and Dialogues, Interaction Methods and Devices, Designing Interfaces and Dialogues in Graphical Environments

Unit 5 Implementation and Maintenance **4 Hrs.**

a. System Implementation

Introduction, System Implementation, Software Application Testing, Installation, Documenting the System, Training and Supporting Users, Organizational Issues in Systems Implementation

b. System Maintenance

Introduction, Maintaining Information Systems, Conducting Systems Maintenance

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

Text Book

1. Jeffrey A. Hoffer, Joey George, Joe Valacich, "*Modern Systems Analysis and Design*", 6/E, Prentice Hall India.

Reference Book

2. Jeffery Whitten, Lonnie Bentley, "*Systems Analysis and Design Methods*", 7/E, McGraw-Hill

Course Title: **Probability & Statistics (3 Cr.)**
Course Code: **CACS202**
Year/Semester: **II/III**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 1 Hr.)**

Course Description

This course covers basic concept of statistics, measurement of central tendency, correlation & regression analysis, probability, sample survey, sample survey methods and design of experiment. These topics are essential tools for research.

Course Objective

The general objectives of this course are to provide fundamental concept of Statistics, Probability, Sample Survey and their applications in the area of Social Science and Computer Application.

Course Contents

Unit 1 Introduction to Statistics — 3 Hrs.

Meaning, Scope and Limitations of Statistics, Types and Sources of Data, Methods and Problems of Collection of Primary and Secondary Data.

Unit 2 Descriptive Statistics — 6 Hrs.

Measure of Central Tendency (Arithmetic Mean, Median, Partition Values, Mode); Measure of Dispersion (Absolute and Relative Measures: Range, Quartile Deviation, Mean Deviation, Standard Deviation, and Coefficient of Variation)

Unit 3 Correlation and Regression Analysis — 6 Hrs.

Correlation: Definition, Scatter diagram, Karl Pearson's coefficient of correlation, Numerical problems for determination of Correlation Coefficients.

Regression: Definition, Dependent and Independent Variables, Least Square method only, Numerical Problems.

Unit 4 Probability — 8 Hrs.

Definition of Probability, Two basic Laws of Probability(without proof), Conditional Probability; Probability Distributions (Binomial, Poisson and Normal); simple numerical problems.

Unit 5 Sample Survey — 6 Hrs.

Concept of Population and Sample; Needs of Sampling; Censuses and Sample Survey; Basic Concept of Sampling; Organizational Aspect of Sample Survey; Questionnaire Design; Sample Selection and Determination of Sample Size; Sampling and Non Sampling Errors.

Unit 6 Sample Survey Methods — 10 Hrs.

Types of Sampling; Simple Random Sampling with and without Replacement;

Stratified Random Sampling; Ratio and Regression Method of Estimation under Simple and Stratified Random Sampling; Systematic Sampling; Cluster Sampling; Multistage Sampling; Probability Proportion to Size Sampling (PPS), Estimation of Population Total and its Variance. Sampling Distributions (t, x^2, z) and Related Problems.

Unit 7 Design of Experiment **6 Hrs.**

Concept of Analysis of Variance (ANOVA), F -Statistic and its Distribution, Linear Model in ANOVA, Analysis of One Way, Two Way Classification (1 and m observations per cell) in Fixed Effect Model.

Laboratory Works

Techniques for using the computer as a tool in the analysis of statistical problems will be introduced. SPSS software should be used for data analysis

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. Mukhopadhyay P., "*Theory and Methods of Survey Sampling*", Prentice Hall of India, New Delhi, 1998.
2. Sheldon M. Ross, "*Introduction to Probability and Statistics for Engineers and Scientists*", 3rd Edition, India, Academic Press, 2005.

Reference Books

1. Cochran W.G., "*Sampling Techniques*", 3rd edition, John Wiley and Sons, Inc. New York, 1977.

2. Hoggg & Tanis, "*Probability and Statistical Inference*", 6th edition, First Indian Reprint, 2002
3. Montgomery Douglas C., "*Design and Analysis of Experiments*", 5th edition, John Wiley & Sons Inc., 2001.
4. Upadhayay, H. P., Paudel, K.C & et al, "*Elements of Business Mathematics*", Pinnacle Publication.

Course Title: **Object Oriented Programming in Java (3 Cr.)**
Course Code: **CACS204**
Year/Semester: **II/III**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course covers preliminary concepts of object-oriented approach in programming with basic skills using Java. Control structures, Classes, methods and argument passing and iteration; graphical user interface basics Programming and documentation style.

Course Objectives

The general objectives of this course are to provide fundamental concepts of Object Oriented Programming and make students familiar with Java environment and its applications.

Course Contents

Unit 1 Introduction to Java **2 Hrs.**

Definition, History of Java, The Internet and Java's Place in IT, Applications and Applets, Java Virtual Machine, Byte Code- not an Executable code, Procedure-Oriented vs. Object-Oriented Programming, Compiling and Running a Simple Program, Setting up your Computer for Java Environment, Writing a Program, Compiling, Interpreting and Running the Program, Handling Common Errors

Unit 2 Tokens, Expressions and Control Structures **5 Hrs.**

Primitive Data Types: Integers, Floating-Point types, Characters, Booleans; User-Defined Data Types, Declarations, Constants, Identifiers, Literals, Type Conversion and Casting, Variables: Variable Definition and Assignment, Default Variable Initializations; Command-Line Arguments, Arrays of Primitive Data Types, Comment Syntax, Garbage Collection, Expressions, Using Operators: Arithmetic, Bitwise, Relational, Logical, Assignment, Conditional, Shift, Ternary, Auto-increment and Auto-decrement; Using Control Statements(Branching: if, switch; Looping: while, do-while, for; Jumping statements: break, continue and return)

Unit 3 Object Oriented Programming Concepts **9 Hrs.**

Fundamentals of Classes: A Simple Class, Creating Class Instances, Adding methods to a class, Calling Functions/Methods; Abstraction, Encapsulation, Using 'this' keyword, Constructors, Default constructors, Parameterized constructors, More on methods: Passing by Value, by Reference, Access Control, Methods that Return Values, Polymorphism and Method Overloading, Recursion; Nested and Inner Classes.

Unit 4 Inheritance & Packaging **3 Hrs.**

Inheritance: Using 'extends' keyword, Subclasses and Superclasses, 'super' keyword usage, Overriding Methods, Dynamic Method Dispatch; The Object class, Abstract and Final Classes, Packages: Defining a Package, Importing a Package: Access Control; Interfaces: Defining an Interface, Implementing and applying interfaces.

Unit 5 Handling Error/Exceptions **2 Hrs.**

Basic Exceptions, Proper use of exceptions, User defined Exceptions, Catching Exception: try, catch; Throwing and re-throwing: throw, throws; Cleaning up using the finally clause.

Unit 6 Handling Strings **2 Hrs.**

Creation, Concatenation and Conversion of a String, Changing Case, Character Extraction, String Comparison, Searching Strings, Modifying Strings, String Buffer.

Unit 7 Threads **3 Hrs.**

Create/Instantiate/Start New Threads: Extending java.lang.Thread, Implementing java.lang.Runnable Interface; Understand Thread Execution, Thread Priorities, Synchronization, Inter-Thread Communication, Deadlock

Unit 8 I/O and Streams **2 Hrs.**

java.io package, Files and directories, Streams: Byte Streams and Character Streams; Reading/Writing Console Input/Output, Reading and Writing files, The Serialization Interface, Serialization & Deserialization.

Unit 9 Understanding Core Packages **3 Hrs.**

Using java.lang Package: java.lang.Math, Wrapper classes and associated methods (Number, Double, Float; Integer, Byte; Short, Long; Character, Boolean); Using java.util package: Core classes (Vector, Stack, Dictionary, Hashtable, Enumerations, Random Number Generation).

Unit 10 Holding Collection of Data **3 Hrs.**

Arrays And Collection Classes/Interfaces, Map/List/Set Implementations: Map Interface, List Interface, Set Interface, Collection Classes: Array List, Linked List, Hash Set and Tree Set; Accessing Collections/Use of An Iterator, Comparator.

Unit 11 Java Applications **8 Hrs.**

About AWT & Swing, About JFrame (a top level window in Swing), Swing components (JLabel, About text component like JTextField, JButton, Event Handling in Swing Applications, Layout Management using Flow Layout, Border Layout, Grid Layout, Using JPanel, Choice components like JCheck Box, JRadio

Button, Borders components, JCombo Box & its events, JList & its events with MVC patterns, Key & Mouse Event Handling, Menus in swing, JText Area, Dialog boxes in swing, JTable for Displaying Data in Tabular form, MDI using JDesktop Pane & JInternal Frame, Using IDE like Netbeans, JBuilder for building java applications using Drag & Drop), Adapter classes

Unit 12Introduction to Java Applets **1 Hr.**

Definition, Applet lifecycle methods, Build a simple applet, Using Applet Viewer, Adding Controls: Animation Concepts.

Unit 13Database Programming using JDBC **2 Hrs.**

Using Connection, Statement & Result Set Interfaces for Manipulating Data with the Databases

Laboratory Works

Laboratory 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. Deitel & Dietel, "*Java: How to program*", 9th Edition, Pearson Education, 2011, ISBN: 9780273759768
2. Herbert Schildt, "*Java: The Complete Reference*", Seventh Edition, McGraw-Hill 2006, ISBN: 0072263857

Reference Books

1. Bruce Eckel, "*Thinking in Java*", 4th Edition, Prentice Hall, 2006, ISBN: 0-13-187248-6
2. Cay Horstmann and Grazy Cornell, "*Core Java Volume I-Fundamentals*", Ninth Edition, Prentice Hall, 2012, ISBN: 978-0137081899
3. E. Balagurusamy, "*Programming with Java: A Primer*", 4th Edition, Tata McGraw Hill Publication, India,

Course Title: **Data Structures and Algorithms (3 Cr.)**
Course Code: **CACS201**
Year/Semester: **II/III**
Class Load: 6 **Hrs. / Week (Theory: 3 Hrs., Practical: 3 Hrs.)**

Course Description

This course includes fundamental concept of data structures such as stack, queue, list, linked list, trees and graph; application of these data structures along with several algorithms.

Course Objectives

The general objective of this course is to provide fundamental concepts of data structures, different algorithms and their implementation.

Course Contents

Unit 1 Introduction to data structure **2 Hrs.**

Definition, Abstract Data Type, Importance of Data structure.

Unit 2 The Stack **3 Hrs.**

Introduction, Stack as an ADT, POP and PUSH Operation, Stack Application: Evaluation of Infix, Postfix, and Prefix Expressions, Conversion of Expression.

Unit 3 Queue **3 Hrs.**

Introduction, Queue as an ADT, Primitive Operations in Queue, Linear and Circular Queue and Their Application, Enqueue and Dequeue, Priority Queue

Unit 4 List **2 Hrs.**

Introduction, Static and Dynamic List Structure, Array Implementation of Lists, Queues as a List

Unit 5 Linked Lists **5 Hrs.**

Introduction, Linked List as an ADT, Dynamic Implementation, Insertion & Deletion of Node To and From a List, Insertion and Deletion After and Before Nodes, Linked Stacks and Queues, Doubly Linked Lists and Its Advantages

Unit 6 Recursion **4 Hrs.**

Introduction, Principle of Recursion, Recursion vs. Iteration, Recursion Example: TOH and Fibonacci Series, Applications of Recursion, Search Tree

Unit 7 Trees **5 Hrs.**

Introduction, Basic Operation in Binary tree, Tree Search and Insertion/Deletion, Binary Tree Traversals (pre-order, post-order and in-order), Tree Height, Level, and Depth, Balanced Trees: AVL Balanced Trees, Balancing Algorithm, The Huffman Algorithm, Game tree, B-Tree

Unit 8 Sorting **5 Hrs.**

Introduction, Internal and External Sort, Insertion and Selection Sort, Exchange Sort, Bubble and Quick Sort, Merge and Radix Sort, Shell Sort, Binary Sort, Heap Sort as Priority Queue, Efficiency of Sorting, Big 'O' Notation

Unit 9 Searching **5 Hrs.**

Introduction to Search Technique; essential of search, Sequential search, Binary search, Tree search, General search tree, Hashing: Hash function and hash tables, Collision resolution technique, Efficiency comparisons of different search technique

Unit 10Graphs **5 Hrs.**

Introduction, Graphs as an ADT, Transitive Closure, Warshall's Algorithm, Types of Graph, Graph Traversal and Spanning Forests, Kruskal's and Round-Robin Algorithms, Shortest-path Algorithm, Greedy Algorithm, Dijkstra's Algorithm

Unit 11Algorithms **5 Hrs.**

Deterministic and Non-deterministic Algorithm, Divide and Conquer Algorithm, Series and Parallel Algorithm, Heuristic and Approximate Algorithms

Laboratory Works

There shall be 10 lab exercises based on C or Java

1. Implementations of different operations related to Stack
2. Implementations of different operations related to linear and circular queues
3. Solutions of TOH and Fibonacci Series using Recursion
4. Implementations of different operations related to linked list: singly and doubly linked
5. Implementation of trees: AVL trees, Balancing of AVL
6. Implementation of Merge sort
7. Implementation of different searching technique: sequential, Tree and Binary
8. Implementation of Graphs: Graph traversals
9. Implementation of Hashing
10. Implementations of Heap

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 Book

1. Y. Langsam, M.J. Augenstein and A. M. Tenenbaum, "*Data Structures using C and C++*", PHI

Reference Books

1. G. W. Rowe, "*Introduction to Data Structure and Algorithms with C and C++*", PHI
2. Robert Lafore, *Data Structures and Algorithms in Java (2nd Edition)*, Sams Publishing.