VELS

INSTITUTE OF SCIENCE, TECHNOLOGY
& ADVANCED STUDIES (VISTAS)

(DEEMED TO BE UNIVERSITY Estd. u/s 3 OF THE UGC ACT, 1956)

NAAC ACCREDITED

PALLAVARAM - CHENNAI - INDIA

M.Sc
Computer Science

Curriculum and Syllabus

(Based on Choice Based Credit System)

Effective from the Academic year

2018-2019

Department of Computer Science

School of Computing Sciences

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO 1: Graduates will be acquired knowledge, both theoretical and applied, related to core areas of computer science.

PEO 2: Graduates will be prepared with Ethical Attitude, Effective Communication Skills and admit themselves as ethical and responsible citizens with social commitments.

PEO 3: Graduates will be demonstrated their ability to work effectively as a team member and/or leader in an ever-changing professional environment.

PEO 4: Graduates will be worked productively as computer professionals by demonstrating effective use of oral and written communication, working competently as a member of a team unit, adhering to ethical standards in the profession.

PEO 5: Graduates will be gain multidisciplinary knowledge through real-time projects to meet industry needs.

PROGRAM OUTCOMES (PO)

PO 1: Domain Expertise: Communicate computer science concepts, designs, and solutions effectively and professionally.

PO 2: Computing Skills and Ethics: Apply knowledge of computing to produce effective designs and solutions for specific problems.

PO 3: Lifelong Learning and Research: Identify, analyze, and synthesize scholarly literature relating to the field of computer science.

PO 4: Modern Tool Usage: Use software development tools, software systems, and modern computing platforms.

PO 5: Social Contribution: An understanding of professional, ethical, legal, security and social issues and responsibilities

PO 6: Ethics: Capable of evaluating personal and professional choices in terms of codes of ethics and ethical theories and understanding the impact of their decisions on themselves, their professions, and on society

PO 7: Life Long Learning: Apply design and development principles in the construction of software systems of varying complexity.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO 1: Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO 2: Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open source platforms.

PSO 3: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

Board of Studies Members

Chairman : **Dr.P.Swaminathan**, Dean,
School of Computing Sciences,
Vels Institute of Science, Technology and Advanced Studies,
Chennai.

Internal Board Member :
1. **Dr.P.Mayilvahanan**, Professor,
Department of Computer Applications,
School of Computing Sciences,
Vels Institute of Science, Technology and Advanced Studies,
Chennai.
2. **Dr.S.Prasanna**, HOD,
Department of Computer Applications,
School of Computing Sciences,
Vels Institute of Science, Technology and Advanced Studies,
Chennai.
3. **Dr.Kamalakannan**, HOD,
Department of Information Technology,
School of Computing Sciences,
Vels Institute of Science, Technology and Advanced Studies,
Chennai.
4. **Dr.K.Kalaiselvi**, HOD,
Department of Computer Science,
School of Computing Sciences,
Vels Institute of Science, Technology and Advanced Studies,
Chennai.

External Member : **Dr.K.R.Ananthapadmanaban**, Professor & HOD,
Department of Computer Science,
SRM Arts and Science College, Chennai.

Industry Member	**: Dr.P.Magesh Kumar**, Calibsoft Technologies Pvt Ltd., Chennai.
Special Invitees	**: Dr.Jothi Venkateswaran**, HOD, Department of Computer Science, Presidency College, Chennai.
Alumni Member	**: Mr.R.Balamurugan**, SCOPUS Ltd, Chennai.

M.Sc. COMPUTER SCIENCE

CURRICULUM

Total number of Credits: 90

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER I						
CORE	18MCS001	Linux Programming	4	0	0	4
CORE	18MCS002	Internet and Web authoring Tool	4	0	0	4
CORE	18MCS003	Theory of Automata	4	0	0	4
CORE	18MCS004	Linux Programming Lab	0	0	4	2
CORE	18MCS005	Internet and Web authoring Tool Lab	0	0	4	2
DSE		DSE - I	4	0	0	4
GE		GE - I	4	0	0	4
		TOTAL	20	0	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER II						
CORE	18MCS006	Advanced DBMS	4	0	0	4
CORE	18MCS007	Middleware Technologies	5	0	0	4
CORE	18MCS008	Advanced DBMS Lab	0	0	4	2
CORE	18MCS009	Middleware Technologies Lab	0	0	4	2

DSE		DSE - II	4	0	0	4
DSE		DSE - III	4	0	0	4
GE		GE – II	4	0	0	4
		TOTAL	20	0	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER III						
CORE	18MCS010	Mobile Application Development	4	0	0	4
CORE	18MCS011	Mobile Computing and Wireless Networking	4	0	0	4
CORE	18MCS012	Mobile Application Development Lab	0	0	4	2
CORE	18MCS013	Mini Project	0	0	4	2
DSE		DSE – IV	4	0	0	4
DSE		DSE – IV	4	0	0	4
GE		GE - III	4	0	0	4
		TOTAL	20	0	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER IV						
CORE	18MCS014	Project & Viva Voce	0	0	0	18
		TOTAL	0	0	0	18

List of Discipline Specific Elective Courses

18MCS101	Parallel Distributed System
18MCS102	Pattern Recognition
18MCS103	R Programming
18MCS104	Deep Learning
18MCS105	Software Metrics
18MCS106	Embedded System
18MCS107	Intrusion Detection System
18MCS108	Advanced Compiler Design
18MCS109	Agent Based Computing
18MCS110	Software Architecture
18MCS111	Data Compression
18MCS112	Natural Language Processing
18MCS113	Real Time Systems
18MCS114	Internet of Things
18MCS112	Bio - Informatics

List of Generic Elective Courses

18MCS121	Human Resource Management
18MCS122	Social Networking
18MCS123	Optimization Techniques
18MCS124	Business Intelligence
18MCS125	Quantum Computing
18MCS126	Geographic Information System
18MCS127	Statistical and Data Analysis
18MCS128	Cognitive Science
18MCS129	Robotics

Syllabus
Core Courses

18MCS001 LINUX PROGRAMMING 4 0 0 4

Course Objective

To familiarize students with the Linux environment, to learn the fundamentals of shell scripting/programming, to manage basic Linux administration, to explain execution procedure, debugging and kernel structure.

Course Outcome

CO-1: Focuses on open source software, an introduction to Linux systems and the use of Git, Understand the basics of Unix/Linux environment and Master the Linux administration.

CO-2: Learn how to install, configure and troubleshoot a operating system on a PC.

CO-3: Learn how to develop applications for the Linux environment. Know about History of Linux and what differentiates it from other UNIX -like operating systems

CO-4: Explore different types of editors in linux using for shell programming.

CO-5: Understand about Linux File Structures and Managing files.

CO-6: Manage Directories and file and directory permissions.

CO-7: Understand all the Linux utilities, and implement shell scripting. Write shell scripts to automate various tasks.

CO-8: Understand about control structures, text expressions and loops. Develop simple Shell scripts.

CO-9: How to administer, configure and upgrade Linux systems running on the major Linux distribution families: Red Hat, SUSE, Debian / Ubuntu.

CO-10: Get hands-on experience with the necessary tools and methods for Linux application development and learn about the features and techniques that are unique to Linux.

UNIT I LINUX OPERATING SYSTEMS 12

Introduction – History of UNIX and Linux – System Features – Software Features – Differences between Linux and Other Operating System – hardware requirements - sources of Linux Information Linux Startup and Setup: User accounts – Accessing the Linux system – Linux Commands.

UNIT II THE SHELL **12**

The command line – Command line Editing - Creating files using the vi editor: Text editors – The vi editor - Managing Documents: Locating files in LINUX – Standard files – Redirection – Filters – Pipes - Ending Processes: ps and kill - The C Shell: Command Line Editing and - C Shell Command Line Editing - C Shell History - The TCSH Shell - TCSH Command Line Completion - TCSH History Editing - The Z-shell

UNIT III LINUX FILE STRUCTURE **12**

Linux file types – File structures – managing Files - Managing Directories – File and Directory operation – File Management Operation : File and Directory permissions.

UNIT IV THE SHELL SCRIPTS AND PROGRAMMING **12**

Shell Variables – Definition of Variables - Variable values - Strings – Values from Linux commands – Shell Scripts – User Defined commands - Executing Scripts –Script Arguments – Environment Variables and Subshells Variable – Control Structures – Test operations – Conditional Control Structures –Test Expressions – Shell conditions – Shell loops – Simple Programs using shell scripts.

UNIT V LINUX SOFTWARES **12**

Software Management -Software Package Types - Red Hat Package Manager(RPM) - Debian - Installing Software from Compressed Archives: .tar.gz - Command and Program Directories - Office and Database Applications - Running Microsoft Office on Linux: Cross Over OpenOffice.org - KOffice - KOffice Applications - GNOME Offi ce - Document Viewers - PDA Access - Database Management - SQL Databases (RDMS) - Xbase Databases - Editors - GNOME Editor: Gedit - K Desktop Editors.

Total : 60 Hours

Text Books:

1. Richard Petersen, “Linux: The Complete Reference”, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.
2. Neil Matthew, Richard stones, Alan Cox, “Beginning Linux Programming”, Wrox Publication.

References:

1. NIIT ,“Operating System LINUX”, PHI, Eastern Economy Edition, 2006

18MCS002 INTERNET AND WEB AUTHORING TOOL 4 0 0 4

Course Objective

To build web applications using HTML and client side script technologies use with Microsoft's IIS. To build web applications with style sheets and Data object in order to provide secure web design.

Course Outcome

CO-1: Apply the knowledge of the internet concepts in understanding the web application development.

CO-2: Understand, analyze and apply the role of markup languages like HTML, DHTML, and XML in the working of the web and web applications.

CO-3: Use knowledge of HTML, CSS code and HTML editor to create personal and/or business websites following current professional and/or industry standards.

CO-4: Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites

CO-5: Work within a modern content management system (CMS), specifically WordPress

CO-6: Recognize the various tools to plan, design, code, and share projects/documents

CO-7: Understand the role of the primary dynamic languages of modern web development

CO-8: Understand basic usability, user experience, and accessibility principles

CO-9: Ability to function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors.

CO-10: Understanding the impact of web designing in the current market place where everyone use to prefer electronic medium for shopping, commerce, fund transfer and even social life also.

UNIT I INTRODUCTION TO INTERNET AND HTML 12

Internet - Evolution of Internet - The World Wide Web, Uniform Resource Locator- HTML: HTML Documents - Structure of an HTML document - Creating an HTML document- Mark up Tags & HTML Tags - Elements of HTML - Working with Text - Working with Lists, Tables and Frames - Working with Hyperlinks - Images and Multimedia -Working with Forms and controls.

UNIT II CASCADING STYLE SHEET 12

CSS Properties - CSS Styling(Background, Text Format, Controlling Fonts) - Working with

block elements and objects - Working with Lists and Tables - CSS Id and Class - Box Model (Introduction ,Border properties ,Padding Properties , Margin properties) - CSS Advanced (Grouping , Dimension, Display, Positioning , Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)- Creating page Layout and Site Designs.

UNIT III SCIRPTING LANGUAGE 12

Client Side Script - Browser Languages – XHTML: Forms, Frames, Tables etc. DHTML: Cascading Style Sheets - Object Model - Event Model - Filters and Transitions - Data Controls - Handling of Multimedia Data – XML - Introduction, Syntax, Document structure - Document type Definitions - namespaces - XML schemas - Displaying raw XML documents - Displaying XML documents with CSS - XSLT stylesheets - XML Processors.

UNIT IV WEB PUBLISHING OR HOSTING 12

Introduction XSL - XML transformed -XSL elements transforming with XSLT - Static vs. Dynamic web pages - Need of Server Side Scripting - Server Side scripting - Multitier Web Architecture - Creating the Web Site - Saving the site - Working on the web site - Creating web site structure - Creating Titles for web pages – Themes - Publishing web sites.

UNIT V WEB CONTENT MANAGEMENT SYSTEM 12

Introduction - Building a CMS - Content Markup Languages - XML and Content Management - Processing Content - Building Collection Systems - Building Management Systems - Building Publishing Systems - Case Studies - Study of various CMS Tools – Joomla - Drupal.

Total : 60 Hours

Text Books:

1. P I. Bayross, “Web Enable Commercial Application Development Using HTML, DHTML, Java Script, CGI”, BPB Publications, 2000.
2. T. A. Powell, “Complete Reference HTML”, Third Edition, TMH, 2002.
3. Patrick Carey, “HTML, XHTML and XML, Course Technology”, CENGAGE Learning, 2010.

Reference Books:

1. Paul Wilton, “Beginning Java Script”, Wiley, India, 2004.
2. http://www.webstyleguide.com/wsg3/index.html
3. http://designingfortheweb.co.uk/

18MCS003 THEORY OF AUTOMATA 4 0 0 4

Course Objective

The goal of this course is to provide an understanding of basic concepts in the theory of computation. Students will learn about a variety of issues in the mathematical development of computer science theory, particularly finite representations for languages and machines.

Course Outcome

CO - 1: Master structural representation and finite automata.

CO - 2: Be familiar with application of finite automata.

CO - 3: Understand Regular Expression and its concepts.

CO - 4: Implement the concepts of Regular Expression.

CO - 5:.Master context-free languages, push-down automata.

CO - 6: Apply the concept of CFG

CO - 7: Master Turing recognizable languages.

CO - 8: Utilize the ideas of turing machines

CO - 9. Be exposed to a broad overview of the theoretical foundations of computer science.

CO - 10: Be familiar with thinking analytically and intuitively for problem-solving situations in related areas of theory in computer science.

UNIT I AUTOMATA THEORY 12

Introduction – Structural representation – Automata and Complexity –Alphabets – Strings – Languages – Problems. Finite Automata: Introduction– Deterministic Finite Automata – Non-Deterministic Finite Automata - Application: Text Search – Finite Automata with Epsilon-Transitions.

UNIT II REGULAR EXPRESSIONS 12

Regular Expressions – Finite Automata and Regular Expressions – Applications of Regular Expressions - Algebraic Laws for Regular Expressions – Proving Languages not to be Regular – Decision Properties of Regular Languages – Equivalence and Minimization of Automata – Moore and Mealy Machines.

UNIT III CONTEXT-FREE GRAMMARS 12

Definition – Derivations using a Grammar – Leftmost and Rightmost Derivations – The Language of a Grammar – Sentential Forms - Parse Trees - Pushdown Automata: Definition –

Languages of a PDA – Equivalence of PDA's and CFG's - Deterministic Pushdown Automata.

UNIT IV TURING MACHINE **12**

Introduction – Notation - Description – Transition Diagram – Languages – Turing Machines and Halting – Programming Techniques for Turing Machines – Multitape Turing Machine – Restricted Turing Machines – Turing Machines and Computers.

UNIT V INTRACTABLE PROBLEMS **12**

The Classes P and NP - The NP Complete Problem – Complements of Languages in NP – Problems solvable in polynomial space.

Total : 60 Hours

Text Books:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education, 2001.

Reference Books:

1. S.P.Eugene Xavier, "Theory of Automata, Formal Languages and Computation", New Age International, 2004.
2. A.M.Natarajan, A.Tamilarasi, P.Balasubramani, "Theory of Computation, New Age International", 2003.
3. E.V.Krishnamurthy, "Introductory Theory of Computer Science", East-West Press Pvt. Ltd, 1983.
4. Bernard M. Moret, " The Theory of Computation", Pearson Education, 1998.
5. Web resource: www.nptel.ac.in.
6. Webresource:www.ocw.mit.edu/courses/mathematics/18-404j-theory-of-computation-fall-2006.
7. Web resource: www.coursera.org/courses.

12MCS004 LINUX PROGRAMMING LAB 0 0 4 2

Course Objective

This course gives practical training in Linux programming to perform the various commands in shell script. It gives hands on training in File operations in C Programming.

1. Write a shell script to perform the file operations using Linux commands.
2. Write a shell script to perform the operations of basic Linux utilities.
3. Write a shell script to perform nCr calculation using recursion.
4. Write the shell script to find the grade of student's marks.
5. Write a Shell script to display the numbers between 1 and 9999 in words.
6. Write a Shell script for Palindrome Checking.
7. Write a shell script to find the biggest of three numbers using command line arguments.
8. Write a shell script to find the number of characters, words and lines for a given file without using "wc" command.
9. Write a C program for implementation of system calls: a) open b) read & close c)create & write d) fork & exec
10. Write a C program for the following commands: a) cp b) mv c) delete
11. Write a C program to convert starting lowercase letter of each word into uppercase in a file.
12. Write a C program to print the contents of the file in reverse order.

Total: 60 Hours

18MCS005 INTERNET AND WEB AUTHORING TOOL LAB 0 0 4 2

Course Objective

To build web applications using HTML5.2 and client side script technologies use with Microsoft's IIS. It provides website authoring, collaboration, and administration tools that will help users with little knowledge of web programming languages or markup languages to create and manage website content.

1. Create a web page with the following using HTML
    a. Implementation of Basic HTML Tags.
    b. Implementation of Tables & Frames
    c. Design a FORM in HTML (Yahoo registration form)
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML
4. Acquaintance with creating style sheet, CSS properties and styling
5. Working with HTML elements box properties in CSS
6. Working with Positioning and Block properties in CSS
7. Program using XML
    a. Create any catalog
    b. Display the catalog created using CSS or XSL
8. Programs using XSLT/XSL
9. Create an e-book having left side of the page name of the chapters and right side of the page display the contents of the chapters clicked on left side.
10. Develop an E-Commerce Web Site.
11. Creation of interactive web sites Design using HTML and authoring tools
12. Creation of Personal Information System using WCMS

Total: 60 Hours

18MCS006 ADVANCED DATABASE MANAGEMENT SYSTEM 4 0 0 4

Course Objective

This course aims to give students in depth information about system implementation techniques, data storage, representing data elements, database system architecture, the system catalog, query processing and optimization, transaction processing concepts, concurrency control techniques, distributed databases and client server architecture, advanced database concepts, and emerging technologies and applications.

Course Outcome

CO-1: Ability to define a problem at the view level & ability to understand the physical structure of the database to handle data.

CO-2: Students would be able to apply the logic in different applications.

CO-3: Ability to normalize the database & understand the internal data structure.

CO-4: Students would clearly understand the transaction system & could extract data efficiently.

CO-5: Define user accounts and associated resources and privileges

CO-6: Make backup copies and recover the state of the DB after a system failure

CO-7: Establish and manage audit controls

CO-8: Understand the notion of transaction and its ACID properties

CO-9: Have knowledge of concurrency control mechanisms

CO-10: Define links between databases on different nodes and work with the multiple databases

UNIT I QUERY EXECUTION 12

Introduction to Physical-Query-Plan Operators - One-Pass Algorithms for Database – Operations - Nested-Loop Joins - Two-Pass Algorithms Based on Sorting - Two-Pass - Algorithms Based on Hashing - Index-Based Algorithms - Buffer Management - Parallel Algorithms for Relational Operations - Using Heuristics in Query Optimization - Basic Algorithms for Executing Query Operations.

UNIT II CONCURRENCY CONTROL SERIALIZABILITY 12

Enforcing - Serializability by Locks - Locking Systems With Several - Lock Modes - Architecture for a Locking Scheduler Managing Hierarchies of Database Elements -

Concurrency Control by Timestamps - Concurrency Control by Validation - Database recovery management.

UNIT III TRANSACTION PROCESSING 12

Introduction of transaction processing - advantages and disadvantages of transaction processing system - online transaction processing system -serializability and recoverability - view serializability - resolving deadlock - distributed locking - Transaction management in multi-database system - long duration transaction - high-performance transaction system.

UNIT IV DISTRIBUTED DATABASE 12

Introduction of DDB - DDBMS architectures - Homogeneous and Heterogeneous databases - Distributed data storage - Advantages of Data Distribution - Disadvantages of Data Distribution Distributed Transactions -Commit protocols – Availability - Concurrency control & recovery in distributed databases - Directory systems - Data Replication - Data Fragmentation - Distributed database transparency features - distribution transparency.

UNIT V DATABASE APPLICATION 12

Active database - starburst, oracle, DB2, chimera - Applications of active database, design principles for active rules - Temporal database, special, text and multimedia database - Video database management: storage management for video - video preprocessing for content representation and indexing, image and semantic- based query processing - real time buffer management.

Total : 60 Hours

Text Books:

1. Date C. J, “An Introduction to Database Systems”, Addison Wesley Longman, 8th Edition, 2003.
2. Catell, R.G.G., Barry, D.K., Berler, M., et al, “The Object Data Standard: ODMG 3.0”, Morgan Kaufmann, 2000.
3. Silberschatz A., Korth H., and Sudarshan S, “Database System Concepts”, McGraw-Hill, 6th Edition, 2010.

Reference Books:

1. Charles F. Goldfarb, Paul Prescod, “The XML Handbook, Prentice Hall”, 5th Edition, 2004.
2. Thomas M. Connolly, Carolyn Begg, “Database Systems: Practical approach to Design, Implementation and Management”, Pearson Education Limited, 6th edition, 2012.

18MCS007 MIDDLEWARE TECHNOLOGIES 4 0 0 4

Course Objective

This course introduces the concepts of Middleware Technologies and gives in depth knowledge of RMI, CORBA, WEB SERVICES , EJB and .NET.

Course Outcome

CO-1: Provides sound knowledge in various middleware technologies

CO-2: Describes the benefits and architecture of Client Server Technology.

CO-3: familiarizes between various web service architectures and their standards

CO-4: Applies the components of Remote method Invocations

CO-5: Applies the components of Servlet and JSP

CO-6: Classify the architecture of CORBA and mapping the CORBA with existing Programming languages like Java.

CO-7: To design web services and Real-time Middleware

CO-8: To outline the functionalities of various types of middleware technologies

CO-9: Learn to make judgment in choosing a suitable middleware for application problems;

CO-10 : Implement integration of component based architectures with Enterprise applications

UNIT I INTRODUCTION 12

Emergence of Middleware - Client server – File server – Database server – Group server – Object server – Web server – Middleware – General Middleware– J2EE architecture – DOTNET architecture – MVC architecture.

UNIT II PRESENTATION SERVICES, INTERACTION SERVICES & EJB 12

Presentation services - Servlets – JSP – Interaction services: RMI – CORBA – Exploring CORBA alternatives – Architecture overview – Data Management services: JDBC- Component model - EJB - Session Beans - Stateless and Stateful – Entity Beans – CMP and BMP - Message Driven Beans.

UNIT III ASP.NET 12

ASP.NET - Architecture – ASP.NET Runtime – Internet Information Services – Visual Web Developer Web Server – ASP.NET Parser – Assembly – Page class. Web Server Controls – HTML Controls – AdRotator and Calendar controls – Validation Controls – Security

Management – Provider objects and Consumer objects – Disconnected data access – Grid View – Form View.

UNIT IV WEB SERVICES **12**

Web Services - Provider – WSDL – UDDI – SOAP – HTTP – Developing simple web services – Connecting a Web Service to a data source – Developing ASP.NET Clients for Web Services.

UNIT V COM AND CASE STUDIES **12**

COM – Data types – Interfaces – Proxy and stub – Marshalling - Implementation of web services with RMI and Dot Net Applications.

Total: 60 Hours

Text Books:

1. Justin Couch and Daniel H Steinberg, "J2EE bible", Willey India Pvt. Ltd, New Delhi, 2002.
2. Paul Tremblett, "Instant Enterprise Java Beans", TMH Publishing Company, New Delhi, 2001.
3. Clemens Szyperski, “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, 2003.
4. Alex , “Professional ASP.NET 1.1”, Wrox Publications, 2nd Edition, 2004.
5. Michael Otey and Denielle Otey, “ADO.NET Complete Reference”, Tata Macraw Hill Publication, 4th Edition, 2007.

Reference Books:

1. Ed Roman, “Mastering Enterprise Java Beans”, John Wiley & Sons Inc., 1999.
2. Mowbray, “Inside CORBA”, Pearson Education, 2003.
3. Freeze, “Visual Basic Development Guide for COM & COM+”, BPB Publication, 2001.
4. Hortsamann, Cornell, “CORE JAVA Vol-II” Sun Press, 2002.Core Course – XI (CC) XML and Web Services.
5. K. Moss, “ Java Servlets”, Tata McGraw Hill, Second edition, 1999.
6. D. R.Callaway, “ Inside Servlets”, Addison Wesley, 2nd Edition, 1999.
7. Joseph O“Neil, “Java Beans from the Ground Up”, Tata McGraw Hill, 2nd Edition, 1998.

8. Tom Valesky , “Enterprise JavaBeans”, Addison Wesley, 2nd Edition, 2001.
9. Cay S Horstmann & Gary Cornell, “Core Java Vol II Advanced Features”, Addison Wesley, 3rd Edition, 2002.
10. J. McGovern,R. Adatia,Y. Fain, “J2EE 1.4 Bible”, Wiley-dreamtech Publication, 2003.

18MCS008 ADVANCED DATABASE MANAGEMENT LAB 0 0 4 2

Course Objective

The student learns to work in DDL, DML, TCL and DCL, Joins. The student will be able to create cursors, manage users.

1. Learning basic DDL, DML, DCL and TCL commands
2. Working with dual table.
3. Use of Joins and Sub queries.
4. Views, sequences and indexes.
5. Managing users, privileges and roles.
6. PL/SQL-Data types, control structures.
7. Creating procedures with PL/ SQL.
8. Error handling in PL/ SQL.
9. Cursor Management in PL/ SQL.
10. Writing Programs on Packages & triggers.
11. Embedding PL/SQL in high level language.
12. Implementation of Triggers & Assertions for Bank Database.

Total: 60 Hours

18MCS009 MIDDLEWARE TECHNOLOGIES LAB 0 0 4 2

Course Objective

This course implements the concepts of Middleware Technologies and gives in depth knowledge of Servlet, JSP, RMI, Java Beans and ASP.NET.

1. HTML to Servlet & Servlet to HTML Communications.
2. Applet to Servlet & Servlet to Applet Communication.
3. Designing online applications with JSP.
4. Creating JSP program using JavaBeans.
5. Performing Java Database Connectivity.
6. Creating Web services with RMI.
7. Demonstration of validation controls in ASP.NET .
8. Deployment of Calendar Control in ASP.NET.
9. Traversing and selecting a Product Name displayed in dropdown list, through coding in the Form Load Event in ASP.NET.
10. Creation of Web Application in ASP.NET for Conditions-based book issue in a Library.
11. Deployment of Data Grid in ADO.NET for viewing product details.
12. Construction of Banking Application with Implementation of Web-user control for Dynamic Login Process.

Total: 60 Hours

18MCS010 MOBILE APPLICATION DEVELOPMENT 4 0 0 4

Course Objective

Understand system requirements for mobile applications, Generate suitable design using specific mobile development frameworks, Generate mobile application design, Implement the design using specific mobile development frameworks, Deploy the mobile applications in marketplace for distribution.

Course Outcome

CO-1: Able to know the requirements for mobile applications.

CO-2: Understand the basic Frameworks and tools used in mobile application.

CO-3: Understand the Develop design for mobile applications for specific requirements

CO-4: Able to understand the gesture based UIs.

CO-5: Understand the memory management.

CO-6: Implement the design using JSON.

CO-7: Deploy mobile applications in Android and iPhone marketplace for distribution.

CO- 8: Understand the capabilities and limitations of mobile devices.

UNIT I INTRODUCTION 12

Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Software Engineering – Frameworks and Tools – Mobile devices Profiles.

UNIT II USER INTERFACE 12

Generic UI Development – VUIs and Mobile Applications – Text to Speech techniques – Designing the right UI – Multimodal and Multichannel UI – Gesture based UIs – Screen Elements and Layouts – Voice XML – Java API.

UNIT III APPLICATION DESIGN 12

Memory Management – Design patterns for limited memory – Work flow for Application Development – Techniques for composing Applications – Dynamic Linking – Plug ins and rules of thumb for using DLLs – Concurrency and Resource Management – Look and feel.

UNIT IV APPLICATION DEVELOPMENT **12**

Intents and Services – Storing and Retrieving data –Communication via the Web – Communication Methods(JSON)- Notification and Alarms – Graphics and Multimedia – Video Streaming-Telephony – Location based services – Map Integration -Packaging and Deployment – Designing APP across multiple devices and operating systems(Phonegap)- Security and Hacking.

UNIT V TOOLS **12**

Google Android Platform – Eclipse Simulator – Android Application Architecture –Event based programming – Apple iPhone Platform – UI tool kit interfaces – Event handling and Graphics services – Layer Animation.

Total: 60 Hours

Text Books:

1. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, "Programming Android", O"Reilly, 2011.
2. Reto Meier, Wrox Wiley, "Professional Android 2 Application Development", 2010.
3. Alasdair Allan, "iPhone Programming", O"Reilly, 2010.

References:

1. Wei-Meng Lee, "Beginning iPhone SDK Programming with Objective-C", Wrox Wiley, 2010.
2. Stefan Poslad, "Ubiquitous Computing: Smart Devices, Environments and interactions", Wiley, 2009.

18MCS011 MOBILE COMPUTING AND WIRELESS NETWORKING 4 0 0 4

Course Objective

To study the specifications and functionalities of various protocols/standards of mobile networks, to study about Wireless networks, protocol stack and standards, to study about fundamentals of 3G Services, its protocols and applications, to study about evolution of 4G Networks, its architecture and applications.

Course Outcome

CO-1: Conversant with the latest 3G/4G and WiMAX networks and its architecture.

CO-2: Design and implement wireless network environment for any application using latest wireless protocols and standards.

CO-3: Implement different type of applications for smart phones and mobile devices with latest network strategies.

CO-4: Independently understand basic computer network technology.

CO-5: A wide explanation on Data Communications System and its components.

CO-6: Identifies the different types of network topologies and protocols.

CO-7: Enumerates the layers of the OSI model and TCP/IP. Explains the function(s) of each layer.

CO-8: Identifies the different types of network devices and their functions within a network

CO-9: Understanding and building the skills of subnetting and routing mechanisms.

CO-10: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT I INTRODUCTION TO MOBILE COMMUNICATIONS AND COMPUTING 12

Mobile Computing (MC) - Introduction to MC, novel applications, limitations, and architecture - GSM - Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT II WIRELESS MEDIUM ACCESS CONTROL 12

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT III MOBILE NETWORK LAYER 12

Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, Dynamic Host Configuration Protocol (DHCP)-Mobile transport layer- Mobile adhoc Networks(MANET'S) –Introduction - properties of MANET's - Routing algorithms - Security in MANETs - WAP and MAC Layer introduction, applications.

UNIT IV WIRELESS WIDE AREA NETWORK 12

Overview of UTMS Terrestrial Radio access network - UMTS Core network Architecture - 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC – Firewall - DNS/DHCP - High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V 4G NETWORKS 12

Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies - Multicarrier Modulation - Smart antenna techniques - OFDM-MIMO systems - Adaptive Modulation and coding with time slot scheduler - Cognitive Radio.

Total: 60 hours

Text Books :

1. Jochen Schiller, "Mobile Communications", Addison-Wesley.(Chapters 4,7,9,10,11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, ISBN 0471419028, 2002.
3. Vijay Garg ,"Wireless Communications and networking", First Edition, Elsevier, 2007.

Reference Books :

1. RezaBehravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004.
2. ErikDahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
3. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
4. SimonHaykin, Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education , 2013.

18MCS012 MOBILE APPLICATION DEVELOPMENT LAB 0 0 4 2

Course Objective

Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles, Understand how to work with various mobile application development frameworks, Learn the basic and important design concepts and issues of development of mobile applications, Understand the capabilities and limitations of mobile devices.

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.
12. Gaming applications.(Using Sun Java Wireless toolkit)

Total: 60 Hours

Discipline Specific Electives

18MCS101 PARALLEL AND DISTRIBUTED COMPUTING SYSTEM 4 0 0 4

Course Objective

To learn parallel and distributed algorithm development techniques for shared memory and message passing models , to study the main classes of parallel algorithms, to study the complexity and correctness models for parallel algorithms.

Course Outcome

CO-1: Able to understand the basic concepts of Parallel computing systems.
CO-2: Provide Knowledge about Cluster Computing systems.
CO-3: Understand about Message Passing Technique.
CO-4: Evaluating Parallel programs and debugging.
CO-5: Understanding of Pipelining Techniques and examples.
CO-6: Able to know about Synchronous Computations.
CO-7: Provides knowledge about programming with shared memory.
CO-8: Able to learn about, load balancing, distributed termination examples.
CO-9: Provides knowledge about Distributed shared memory systems.
CO-10: Able to implement different sorting and numerical algorithms.

UNIT I INTRODUCTION **12**

Basic Techniques - Parallel Computers for increase Computation speed - Parallel & Cluster Computing

UNIT II PARALLEL PROGRAMS **12**

Message Passing Technique - Evaluating Parallel programs and debugging - Portioning and Divide and Conquer strategies examples

UNIT III PIPELINING TECHNIQUES **12**

Pipelining - Techniques computing platform - pipeline programs examples.

UNIT IV SHARED MEMORY **12**

Synchronous Computations - load balancing - distributed termination examples - programming with shared memory - shared memory multiprocessor constructs for specifying parallel list - sharing data parallel programming languages and constructs - open MP.

UNIT V DISTRIBUTED SHARED MEMORY SYSTEMS: 12

Distributed shared memory systems and programming achieving constant memory distributed shared memory programming primitive - algorithms – sorting and numerical algorithms.

Total : 60 hours

Text Books:

1. Barry Wilkinson, Michael Allen, “Parallel Programming”, Pearson Education, 2nd Edition.
2. Jaja, “Introduction to Parallel algorithms”, Pearson, 1992.

Reference Books:

1. Calvin Lin, Larry Snyder , “Principles of Parallel Programming”, Addison-Wesley, 2008.

18MCS102 PATTERN RECOGNITION 4 0 0 4

Course Objective

To enable students to critically analyze, design and create innovative products and solutions for the real life problems. To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to tackle gaps.

Course Outcome

CO-1: Apply mathematical foundations, algorithmic principles and computer science theory in the modeling and design of computer based systems of varying complexity.

CO-2: Critically analyze a problem, identify, formulate and solve problems in the field of Computer Science and Engineering considering current and future trends.

CO-3:.Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health, safety, and sustainability in the field of computer engineering

CO-4: Demonstrate an ability to engage in lifelong learning for professional development

CO-5: Demonstrate advanced knowledge of a selected area within the computer science discipline.

CO-6: Critically analyze existing literature in an area of specialization and develop innovative and research oriented methodologies to tackle gaps identified.

CO-7: Apply performance evaluation methods for pattern recognition and critique comparisons of techniques made in the research literature.

CO-8: Apply pattern recognition techniques to real-world problems such as document analysis and recognition.

CO-9: Implement simple pattern classifiers, classifier combinations and structural pattern recognizers.

CO-10: Explain and compare a variety of pattern classification, structural pattern recognition and pattern classifier combination techniques.

UNIT I PATTERN CLASSIFIER 12

Overview of pattern recognition – Discriminant functions – Supervised learning – Parametric estimation – Maximum likelihood estimation – Bayesian parameter estimation – Perceptron algorithm – LMSE algorithm – Problems with Bayes approach – Pattern classification by

distance functions – Minimum distance pattern classifier.

UNIT II UNSUPERVISED CLASSIFICATION 12

Clustering for unsupervised learning and classification – Clustering concept – C- means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

UNIT III STRUCTURAL PATTERN RECOGNITION 12

Elements of formal grammars – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammars and applications – Graph based structural representation.

UNIT IV FEATURE EXTRACTION AND SELECTION 12

Entropy minimization – Karhunen – Loeve transformation – Feature selection through functions approximation – Binary feature selection.

UNIT V RECENT ADVANCES 12

Neural network structures for Pattern Recognition – Neural network based Pattern associators – Unsupervised learning in neural Pattern Recognition – Self-organizing networks – Fuzzy logic – Fuzzy pattern classifiers – Pattern classification using Genetic Algorithms.

Total: 60 Hours

Text Books:

1. Robert J.Schalkoff, " Pattern Recognition Statistical, Structural and Neural Approaches", John Wiley & Sons Inc., New York, 1992.
2. Tou and Gonzales, " Pattern Recognition Principles" , Wesley Publication Company, London,1974.

Reference Books:

1. Duda R.O. and Har P.E., "Pattern Classification and Scene Analysis", Wiley, New York, 1973.
2. Morton Nadier and Eric Smith P, "Pattern Recognition Engineering", John Wiley & Sons, New York, 1993.

18MCS103 **R PROGRAMMING** **4 0 0 4**

Course Objective

To provide a basic understanding of R programming, data structures, functions, how to work with packages, files and know about the data visualization and data management techniques.

Course Outcome

CO-1: Understand the basics of R programming including matrix and vectors etc.
CO-2: Recognize and make appropriate use of different types of data structures.
CO-3: Identify and implement appropriate control structures to solve a particular programming problem.
CO-4: Design and write functions in R and implement simple iterative algorithms.
CO-5: Write functions including generic functions using various methods and loops.
CO-6: Install various packages and work effectively in the R environment.
CO-7: Become proficient in writing a fundamental program and perform analytics with R.
CO-8: To know how to work with files in R.
CO-9: To study about data visualization and data management techniques.
CO-10: Use R to create sophisticated figures and graphs.

UNIT I INTRODUCTION TO R **12**

Overview of R programming - Evolution of R - Applications of R programming - Basic syntax - Basic Concepts of R: Reserved Words, Variables & Constants, Operators, Operator Precedence, Data Types, Input and Output - Data structures in R: Vectors, Matrix, List in R programming Data Frame, Factor.

UNIT II FUNCTIONS **12**

Control flow - If...else, If else() Function - Programming for loop - While Loop, Break & next, Repeat Loop - Functions - R Functions - Function Return Value - Environment &Scope - R Recursive Function R Infix Operator - R Switch Function - Strings: String construction - rules - String Manipulation functions.

UNIT III PACKAGES AND RESHAPING **12**

R packages - Study of different packages in R - R Data Reshaping: Joining Columns and Rows in a Data Frame - Merging Data Frames - Melting and Casting.

UNIT IV FILES AND R OBJECTS CLASS **12**

Working with files - Read and writing into different types of files - R object and Class Object and Class: R S3 Class - R S4 Class R Reference Class - R Inheritance.

UNIT V DATA VISUALIZTION AND DATA MANAGEMENT **12**

Data visualization in R and Data Management - Bar Chart, Dot Plot, Scatter Plot (3D), Spinning Scatter Plots, Pie Chart - Histogram (3D) [including colorful ones], Overlapping Histograms – Boxplot, Plotting with Base and Lattice Graphics Missing Value Treatment - Outlier Treatment - Sorting Datasets - Merging Datasets - Binning variables.

Text Books:

1. Norman Matloff , “The Art of R Programming-a tour of statistical software design”, William Pollock, 2011.
2. Paul Teetor “R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics”, O'Reilly Cookbooks, O'Reilly Media , 2011.

Reference Books:

1. Rob Kabacoff, “R in Action Book”, Manning Publications Co, 2011.
2. Nina Zumel , John Mount , Jim Porzak, “Practical Data Science with R”, Dreamtech, 2014.
3. Richard Cotton, “Learning R: A Step-by-Step Function Guide to Data Analysis”, O'Reilly Media, 2013.

18MCS104 **DEEP LEARNING** **4 0 0 4**

Course Objective

Deep Learning has received a lot of attention over the past few years and has been employed successfully by companies like Google, Microsoft, IBM, Facebook, Twitter etc. to solve a wide range of problems in Computer Vision and Natural Language Processing. In this course we will learn about the building blocks used in these Deep Learning based solutions. Specifically, we will learn about feedforward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms. At the end of this course students would have knowledge of deep architectures used for solving various Vision and NLP tasks.

Course Outcome

CO-1: Thoroughly Understanding the fundamentals of Deep Learning.

CO-2: To know the main techniques in deep learning and the main research in this field.

CO-3: To know the main variants of deep learning (such convolutional and recurrent architectures), and their typical applications.

CO-4: Gaining knowledge of the different modalities of Deep learning currently used.

CO-5: Able to visualize the Convolutional Neural Networks, and study vectorial **r**epresentations of Words.

CO-6: Gaining Knowledge about State-of the art models and Other Important Works in recent years.

CO-7: Be able to design and implement deep neural network systems.

CO-8: Be able to identify new application requirements in the field of computer vision.

CO- 9: Implement deep learning algorithms and solve real-world problems.

CO-10: Be able to structure and prepare scientific and technical documentation describing project activities.

UNIT I HISTORY OF DEEP LEARNING **12**

Deep Learning Success Stories- McCulloch Pitts Neuron- Thresholding Logic- Perceptrons - Perceptron Learning Algorithm - Multilayer Perceptrons (MLPs)- Representation Power of MLPs- Sigmoid Neurons - Gradient Descent - Feedforward Neural Networks - Representation Power of Feedforward Neural Networks – Feed Forward Neural Networks – Backpropagation.

UNIT II ALGORITHMS 12

Gradient Descent (GD)- Momentum Based GD- Nesterov Accelerated GD- Stochastic GD – AdaGrad – RMSProp – Adam- Eigenvalues and eigenvectors - Eigenvalue Decomposition Basics - Principal Component Analysis and its interpretations – Singular Value Decomposition.

UNIT III AUTOENCODERS AND REGULARIZATION 12

Autoencoders and relation to PCA - Regularization in autoencoders – Denoising autoencoders - Sparse autoencoders - Contractive autoencoders - Regularization: Bias Variance Tradeoff - L2 regularization - Early stopping - Dataset augmentation - Parameter sharing and tying - Injecting noise at input - Ensemble methods – Dropout.

UNIT IV GREEDY LAYERS AND CONVOLUTIONAL NEURAL NETWORKS 12

Greedy Layerwise Pre-training - Better activation functions - Better weight initialization methods - Batch Normalization - Learning Vectorial Representations of Words - Convolutional Neural Networks - LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet - Visualizing Convolutional Neural Networks - Guided Backpropagation - Deep Dream, Deep Art - Fooling Convolutional Neural Networks

UNIT V RECURRENT NEURAL NETWORKS AND APPLICATIONS 12

Recurrent Neural Networks - Backpropagation through time (BPTT) - Vanishing and Exploding Gradients - Truncated BPTT, GRU, LSTMs - Encoder Decoder Models - Attention Mechanism - Attention over images - Applications: Vision, NLP, Speech.

Total: 60 Hours

Text Books:

1. Ian Good fellow and Yoshua Bengio and Aaron Courville, “Deep Learning, An MIT Press book”, http://www.deeplearningbook.org

Reference Books:

1. Raúl Rojas, “Neural Networks: A Systematic Introduction” , 1996.
2. Christopher Bishop, “Pattern Recognition and Machine Learning”, 2007.

18MCS105 SOFTWARE METRICS 4 0 0 4

Course Objective

To provide a basic understanding and knowledge of the software metrics, measurement techniques and concepts. To understand the importance of Metrics data collection and analysis, Metrics for object-oriented systems, external product attributes, Dynamic Metrics and Resource measurement.

Course Outcome

CO-1: Able to understand the basics and techniques of software measurement.

CO-2: Analyze the importance of measurements in software engineering.

CO-3: To perform empirical investigation and planning experiments.

CO-4: Discuss data collection methods, analysis and statistical methods.

CO-5: Study the product metrics as internal and external attributes.

CO-6: To perform quality measurement analyzes

CO-7: Describe the different types of quality metrics and its importance.

CO-8: Analyze the different Case studies with an example

CO-9: Give an overview of management metrics

CO-10: Explain the business requirements and defect classifications.

UNIT I MEASUREMENT THEORY 12

Fundamentals of measurement – Measurements in Software Engineering – Scope of Software metrics – Measurement theory – Goal based framework – Software measurement validation.

UNIT II DATA COLLECTION AND ANALYSIS 12

Empirical investigation – Planning experiments – Software metrics data collection – Analysis methods – Statistical methods.

UNIT III PRODUCT METRICS 12

Measurement of internal product attributes – Size and structure – External product attributes – Measurement of quality.

UNIT IV QUALITY METRICS 12

Software quality metrics – Product quality – Process quality – Metrics for software

maintenance–Case studies of Metrics Program – Motorola – HP and IBM.

UNIT V MANAGEMENT METRICS 12

Quality management models – Rayleigh Model – Problem Tracking report (PTR) model – Reliability growth model – Model evaluation – Orthogonal defect classification.

Total: 60 Hours

Text Books:

1. Normal. E – Fentor Shari Lawrence Pfllegar, “Software Metrics”, International Thomson Computer Press, 1997.
2. Fenter Norman, E., “Software Metrics ; A Rigorous approach”, Chapmen & Hall, London, 1991.

References Books:

1. Stephen H.Kin, “Metric and Models in Software Quality Engineering”, Addison Wesley, 1995.
2. William. A. Florac and Aretitor D Carletow, “ Measuring Software Process”, Addison Wesley, 1995.

18MCS106 EMBEDDED SYSTEM 4 0 0 4

Course Objective

To learn parallel and distributed algorithm's development techniques for shared memory and message passing models. To study the main classes of parallel algorithms. To study the complexity and correctness models for parallel algorithms.

Course Outcome

CO-1: Able to understand the concept of Embedded system and General Computing systems.

CO-2: Understand the History and Classification of Embedded systems.

CO-3: Understand the Major Application Areas, Purpose of Embedded Systems.

CO-4: Understand about the Core of the Embedded System.

CO-5: Provide understanding of General Purpose and Domain Specific Processors.

CO-6: Understanding about Embedded Firmware.

CO-7: Provides knowledge about Embedded Firmware Design Approaches and Development Languages.

CO-8: Able to learn about RTOS Based Embedded System Design.

CO-9: Provides knowledge about associative memory networks.

CO-10: Able to implement different concepts and algorithms for practical applications.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 12

Definition of Embedded System - Embedded Systems Vs General Computing Systems - History of Embedded Systems - Classification, Major Application Areas - Purpose of Embedded Systems - Characteristics and Quality Attributes of Embedded Systems.

UNIT II TYPICAL EMBEDDED SYSTEM: 12

Core of the Embedded System - General Purpose and Domain Specific Processors - ASICs, PLDs, Commercial Off- The Shelf Components (COTS) - Memory - ROM, RAM - Memory according to the type of Interface - Memory Shadowing - Memory selection for Embedded Systems - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces.

UNIT III EMBEDDED FIRMWARE 12

Reset Circuit - Brown-out Protection Circuit - Oscillator Unit - Real Time Clock - Watchdog Timer - Embedded Firmware Design Approaches and Development Languages.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 12

Operating System Basics - Types of Operating Systems – Tasks - Process and Threads - Multiprocessing and Multitasking - Task Scheduling.

UNIT V TASK COMMUNICATION 12

Shared Memory - Message Passing - Remote Procedure Call and Sockets - Task Synchronization: Task Communication/Synchronization Issues - Task Synchronization Techniques - and Device Drivers - Case-Study: How to Choose an RTOS.

Total: 60 hours

Text Books:

1. Shibu K.V, “Introduction to Embedded Systems”, McGraw Hill., 2009
2. Raj Kamal, “Embedded Systems”, TMH, 2nd edition, 2008.
3. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley, 2002.

Reference Books:

1. Lyla, “Embedded Systems”, Pearson, 2013.
2. David E. Simon, “An Embedded Software Primer”, Pearson Education, Ist Edition, 2002.

18MCS107 INTRUSION AND DETECTION SYSTEM 4 0 0 4

Course Objective

The learner understands the basic concepts of Intrusion and Detection system. To learn about Fundamental knowledge in Operating Systems and Networks. It refers when, where, how and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise. It Applies knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems.

Course Outcome

CO -1: Explain the fundamental concepts of Network Protocol Analysis.

CO- 2: Demonstrate the skill to capture and analyze network packets.

CO-3: Use various protocol analyzers and Network Intrusion Detection Systems as security tools.

CO-4: How to detect network attacks and troubleshoot network problems.

CO-5: To understand the concepts of Prior strong experience in operating system and Prior hands-on experience.

CO-6: Prevention introduces the tools, methods and resources to help identify network activity.

CO- : To learn about analyzing of packets to find special patterns in network traffic to detect and prevent intrusions.

CO-8: To explore the types of the systems and also demonstrate Snort as an Intrusion detection System.

CO-9: To monitor network traffic and take action when an intrusion occurs based on prescribed rules.

CO-10: Learn about configure Intrusion Prevention Systems and analyze results and prevent network intrusions.

UNIT I INTRODUCTION 12

History of Intrusion detection - Audit, Concept and definition - Internal and external threats to data attacks - Need and types of IDS - Information sources Host based information sources - Network based information sources.

UNIT II SYSTEM RESPONSE 12

Intrusion Prevention Systems - Network IDs protocol based IDs - Hybrid IDs - Analysis schemes - thinking about intrusion. A model for intrusion analysis - techniques Responses requirement of responses - types of responses mapping responses to policy Vulnerability analysis - credential analysis non credential analysis.

UNIT III SNORT PROCEDURE 12

Introduction to Snort - Snort Installation Scenarios - Installing Snort - Running Snort on Multiple - Network Interfaces - Snort Command Line Options. Step-By-Step - Procedure to Compile and Install Snort Location of Snort Files - Snort Modes Snort Alert Modes.

UNIT IV FILES AND MODULES 12

Working with Snort Rules - Rule Headers - Rule Options - The Snort - Configuration File etc. Plugins - Preprocessors and Output Modules - Using Snort with MySQL.

UNIT V DEVELOPMENT 12

Using ACID and Snort Snarf with Snort - Agent development for intrusion detection - Architecture models of IDs and IPs.

Total: 60 hours

Text books:

1. Rafeeq Rehman, "Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003.
2. Christopher Kruegel, Fredrik Valeur, Giovanni Vigna, "Intrusion Detection and Correlation Challenges and Solutions", 1st Edition, Springer, 2005.

Reference Books:

1. Carl Endorf, Eugene Schultz and Jim Mellander , " Intrusion Detection & Prevention", 1st Edition, Tata McGraw-Hill, 2004.
2. Stephen Northcutt, Judy Novak, "Network Intrusion Detection", 3rdEdition, New Riders Publishing, 2002.
3. T. Fahringer, R. Prodan, "A Text book on Grid Application Development and Computing Environment", 6th Edition, Khanna Publishers, 2012.

18MCS108 ADVANCED COMPILER DESIGN 4 0 0 4

Course Objective

This course gives an insight into introduction, parsing techniques of compiler, working with syntax, grammar and semantics of programming languages proving students with an analogy to help them understand how grammar works for programming languages.

Course Outcome

CO-1: To understand the introduction of compiler and phases of compiler.

CO-2: Explains the concepts of lexical analyzer and Finite Automation.

CO-3: To master the key concepts of context-free grammar.

CO-4: Understand and apply different parsing techniques and construction of syntax tree.

CO-5: To master the advanced features of automatic parsing techniques specifically LR parser, SLR parser.

CO-6: Analze the concepts of construction of LR, SLR parsing table.

CO-7: Explains a syntax directed translation concepts.

CO-8: To understand the concepts of intermediate code generation.

CO-9: Describes code generation algorithm and local code optimization.

CO-10: Explains the steps of code generating algorithm to construct code generator.

UNIT I INTRODUCTION 12

Introduction – Structure of a optimizing Compiler – Compiler writing tools – Basic constructs of High level programming languages – Data structures – Parameter transmission. Lexical Analysis – Role of Lexical analyzer – Finite Automata – Regular Expressions to Finite Automata – Minimizing number of states of Deterministic Finite Automaton –Implementation of Lexical analyzer in C.

UNIT II PARSING TECHNIQUES 12

Parsing Techniques – Context free Grammars – Derivations and Parse trees –Ambiguity – Capabilities of Context free grammar-Handling errors in Context free grammars-Parsers and Recognizers - Top down and Bottom up Parsing –Grammar analysis Algorithm- Handles – Shift Reduce parsing – Operator precedence parsing – Recursive Descent parsing – Predictive Parsing.

UNIT III AUTOMATIC PARSING TECHNIQUES 12

Automatic Parsing Techniques – LR parser – Canonical Collection of LR(0) items – Construction of SLR parsing tables – LR(1) sets of items construction-LALR(1) – Construction of canonical LR parsing tables- Use of Bison or YACC.

UNIT IV INTERMEDIATE CODE 12

Syntax Directed Translation – Semantic action – Implementation of syntax directed translators – Intermediate code: Prefix notation, Quadrples, Triples, Indirect triples –Methods of translation of assignment statements, Boolean expressions and Control statements.

UNIT V LOWER BOUND ALGORITHM 12

Symbol Tables and Code Generation: Representing information in a symbol table –Data structures for symbol table – Introduction to code optimization – Basic blocks –DAG representation – Error detection and Recovery – Semantic Processing- Code generation and local code optimization.

Total: 60 Hours

Text Books:

1. V.Aho, Ravi Sheethi, "Compilers-Principles, Techniques and Tools", Pearson Education, 3rd Edition, 2007.
2. David Galles, "Modern Compiler Design", Pearson Education Asia, 2007.

Reference Books:

1. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2000.
2. C. N. Fisher and R. J. LeBlanc, " Crafting a Compiler with C", Pearson Education, 2000.

18MCS109 AGENT BASED INTELLIGENT SYSTEMS 4 0 0 4

Course Objective

The Students should be able to understand the concepts of software agents, intelligent agent learning, Rule learning and disciple shell architecture. The students should also understand the detailed methods available in rule learning and disciple shell architecture.

Course Outcome

CO-1: Students will understand the basic intelligent software agents and practical design.

CO-2: Gathering intelligent agent systems, practical design knowledge helps students to understand the software agent in detail.

CO-3: Acquiring adequate knowledge in base development of intelligent agent learning, knowledge in representation and generalization in agent can be useful to students in building up of software agent.

CO-4: Understanding basic knowledge in intelligent agent learning approaches can be useful for solving various problems in agent system.

CO-5: Students can able to understand concepts in rule learning with detailed problems description.

CO-6: Rule refinement method can help students to understand the enhancement method available in agent based system.

CO-7: Detailed architecture design of Disciple shell can give a clear idea about interaction made among agent systems.

CO-8: Adequate knowledge in Rule experimentation and verification systems helps the students to understand the agent system fine tuning process.

CO-9: Discussed case studies will give adequate information about building the intelligent based agent system.

CO-10: Case studies about behavior of agent, agent platform, agent communication languages, interaction protocols and JADE can be useful for students to build the agent system with multi agent system architecture.

UNIT I INTRODUCTION TO SOFTWARE AGENTS 12

Introduction to Software Agents: What is a software agent? - Why software agents? - Applications of Intelligent software agents-Practical design of intelligent agent systems -

UNIT II INTELLIGENT AGENT LEARNING 12

Intelligent Agent Learning - Approaches to Knowledge base development - Disciple approach for building intelligent agents - Knowledge representation – Generalization - Problem solving methods Knowledge elicitation.

UNIT III RULE LEARNING 12

Rule learning - Rule learning problem - Rule learning method - Learned rule characterization. Rule refinement: Rule refinement problem - Rule refinement method - Rule experimentation and verification - Refined rule characterization - Agent interactions.

UNIT IV DISCIPLE SHELL 12

Disciple shell - Architecture of Disciple shell - Methodology for building Intelligent Agents Expert - Agent interactions during knowledge elicitation process – Expert - Agent interactions during rule learning process – Expert - Agent interactions during rule refinement process.

UNIT V CASE STUDIES IN BUILDING INTELLIGENT AGENTS 12

Case studies in building intelligent agents - Intelligent Agents in portfolio management - Intelligent Agents in financial services - Java Agent Development framework [JADE]: Creating multi-agent systems with JADE - Agent platform - Agent Tasks and behaviors - Agent Communication Language - Interaction protocols - Using JADE from Java.

Total: 60 Hours

Text Books:

1. Jeffrey M Bradshaw, "Software Agents", AAAI Press / The MIT Press, 2000.
2. Nicholas R Jennings, Michael J Wooldridge (Eds.), "Agent Technology – Foundations, Applications and Markets", Springer, 1997.
3. Gheorghe Tecuci et al., "Building Intelligent Agents", Academic Press, 2003.
4. Eduardo Alanso, Daniel Kudenko, Dimitar Kazakov (Eds.), "Adaptive Agents and Multi Agent Systems", Springer Publications, 2003.
   jade.tilab.com/doc/programmersguide.pdf.

Reference Books:

1. Michael Wooldridge, " An Introduction to Multi Agent Systems", II edition, John Wiley & Sons, Ltd. 2009.

2. Fabio Bellifemine, Giovanni Caire, Dominic Greenwood, “Developing Multi agent Systems with JADE”, John Wiley and Sons Ltd, 2007.
3. Gerhard Weiss, “Multi Agent Systems: A Modern Approach to Distributed Artificial Intelligence”, The MIT press, 2000.
4. http://www.ru.lv/~peter/zinatne/ebooks/Gerhard%20Weiss%20-20Multiagent%20Systems%20%20A%20Modern%20Approach%20To%20Distributed%20Artificial%20Intelligence.pd

18MCS110 SOFTWARE ARCHITECTURE 4 0 0 4

Course Objective

This course introduces the basic concept of architecture of software and design Patterns. It gives an overview of architectural structures, styles and Software architecture documentation.

Course Outcome

CO-1: Understanding the architecture, creating it and moving from one to any, different structural patterns.

CO-2: Analyze the architecture and build the system from the components.

CO-3: Ability to design creational and structural patterns.

CO-4: Learn about behavioral patterns and views.

CO-5: Do a case study in utilizing architectural structures and styles.

CO-6: Ability of applying knowledge to create architecture for given application.

CO-7: To be able to explain the role of analyzing architectures.

CO-8: Ability to identify different structural patterns.

CO-9: To understand the tools for architectural design.

CO-10: Learn about Software architecture Documentation and reconstruction.

UNIT I ENVISIONING ARCHITECTURE 12

Introduction – software design levels – software engineering discipline – architecture business cycle – architectural patterns – reference models – architectural structures, views.

UNIT II ARCHITECTURAL STYLES 12

Architectural styles – pipes and filters – object-orientation – invocation – layered systems – repositories – interpreters – process control – heterogeneous architectures – case studies.

UNIT III ANALYZING ARCHITECTURES 12

Architecture and functionality – architecture qualities – architecture in the lifecycle - Architectural design - Shared information systems – database integration – integration in software development environments – architectural structures for shared information systems.

UNIT IV ARCHITECTURAL DESIGN 12

Architectural design guidance – design space – design rules – applying design space – quantified design space – formal models and specification – formalizing architectural style, design space - z – notation.

UNIT V CREATING AN ARCHITECTURE 12

Linguistic issues – requirements for architectural description languages – first class connectors – adding implicit invocation to traditional programming languages – tools for architectural design – universal connector language - Software architecture Documentation – reconstruction.

Total: 60 Hours

Text Books:

1. Mary shaw and David Garlan, "Software Architecture – Perspectives on an emerging discipline", Pearson education, 2008.
2. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Addison Wesley, 2003.

Reference Books:

1. Christine Hofmeister, Robert Nord, DilipSoni, "Applied Software Architecture: A Practical Guide for Software Designers", Addison Wesley, 1999.
2. David M. Dikel, David Kane, James R. Wilson, "Software Architecture: Organizational Principles and Patterns", Prentice Hall, 2001.
3. Jan Bosch, Morven Gentleman, Christine Hofmeister, Juha Kuusela, "Software Architecture: System Design, Development and Maintenance", Springer, 2002.

18MCS111 DATA COMPRESSION 4 0 0 4

Course Objective

This course provides an overview of classical and modern techniques and algorithms of various types data compression. It covers statistical and dictionary methods, lossless and lossy compression algorithms in graphics, video and audio compression.

Course Outcome

CO-1 : To learn basics about data compression.

CO-2 : To understand the idea of Lossless and Lossy compression

CO-3 : To learn basics about data compression algorithms.

CO-4 : To understand the concepts of Huffman coding algorithm and its procedure

CO-5 : To learn basics about coding, image compression

CO-6 : To know about concepts like Dictionary Techniques, applications and basic algorithm.

CO-7 : To know basic ideas about various Quantization.

CO-8 : To understand the concepts of Scalar, Uniform, non-uniform Quantization

CO-9 : To know the advantages of Quantization

CO-10 : To understand the concepts of vector Quantizers, Gary algorithm

UNIT I COMPRESSION TECHNIQUES 12

Compression Techniques - Loss less compression- Lossy Compression- Measures of performance - Modeling and coding- Mathematical Preliminaries for Lossless compression - A brief introduction to information theory- Models: Physical models-Probability models- Markov models- composite source model Coding: uniquely decodable codes- Prefix codes.

UNIT II THE HUFFMAN CODING ALGORITHM 12

The Huffman coding algorithm - Minimum variance Huffman codes- Adaptive Huffman coding-Update procedure - Encoding procedure- Decoding procedure - Golomb codes- Rice codes- Tunstall codes - Applications of Hoffman coding: Loss less image compression- Text compression- Audio Compression.

UNIT III APPLICATIONS 12

Coding a sequence - Generating a binary code- Comparison of Binary and Huffman coding - Applications: Bi-level image compression-The JBIG standard- JBIG2- Image compression.

Dictionary Techniques - Introduction- Static Dictionary - Diagram Coding- Adaptive Dictionary - The LZ77 Approach - The LZ78 Approach - Applications: File Compression- UNIX compress- Image Compression: The Graphics Interchange Format (GIF)- Compression over Modems: V.42 bits- Predictive Coding: Prediction with Partial match (ppm): The basic algorithm-The ESCAPE SYMBOL-length of context - The Exclusion Principle- The Burrows-Wheeler Transform: Move to-front coding – CALIC – JPEG-LS, Multi-resolution Approaches- Facsimile Encoding- Dynamic Markoy Compression.

UNIT IV QUANTIZATION **12**

Distortion criteria - Models-Scalar Ouantization - The Quantization problem - Uniform Quantizer - Adaptive Quantization - Non uniform Quantization.

UNIT V VECTOR QUANTIZATION **12**

Advantages of Vector Quantization over Scalar Quantization - The Linde-Buzo-Gray Algorithm -Tree structured Vector Quantizers - Structured Vector Quantizers.

Total: 60 Hours

Text Books:

1. Khalid Sayood, “Introduction to Data Compression”, Morgan Kaufmann Publishers, 2000.
2. David Salomon , “Data Compression: The Complete Reference “, 4th Edition, Springer, 2006.

Reference Books:

1. Timothy C. Bell, “Text Compression”, 1st Edition ,Prentice Hall, 1990.
2. Drozdek , “Elements of Data Compression”, Cengage Learning, 2009.

18MCS112 NATURAL LANGUAGE PROCESSING 4 0 0 4

Course Objective

The Course provides the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks, such as speech recognition, machine translation, spam filtering, text classification and spell checking.

Course Outcome

CO-1: An ability to apply core computer science concepts and algorithms, such as dynamic programming.

CO-2: To understand the linguistic phenomena and to explore the linguistic features relevant to each NLP task.

CO-3: Can apply the methods to new NLP problems and will be able to apply the methods to problems outside NLP.

CO-4: The student will be familiar with some of the NLP literature and will read and suggest improvements to published work.

CO-5: The student will also analyze experimental results and write reports for each course project to develop scientific writing skills.

CO-6: To understand natural language processing and to learn how to apply basic algorithms in this field.

CO-7: To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data .

CO-8: Understanding of state-of-the-art algorithms and techniques for text-based processing of natural language.

CO-9: To demonstrate understanding of human languages and be familiar with the most main stream descriptive and theoretical frameworks for handling their properties.

CO-10: To be able to determine when a problem's complexity requires an NLP solution.

UNIT I OVERVIEW AND LANGUAGE MODELING 12

Overview - Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.

UNIT II WORD LEVEL AND SYNTACTIC ANALYSIS 12

Word Level Analysis - Regular Expressions - Finite-State Automata - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging. Syntactic Analysis – Context - free Grammar - Constituency - Parsing - Probabilistic Parsing.

UNIT III SEMANTIC ANALYSIS AND DISCOURSE PROCESSING 12

Semantic Analysis - Meaning Representation - Lexical Semantics – Ambiguity - Word Sense Disambiguation - Discourse Processing – cohesion - Reference Resolution - Discourse Coherence and Structure.

UNIT IV NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION 12

Natural Language Generation - Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.

UNIT V INFORMATION RETRIEVAL AND LEXICAL RESOURCES 12

Information Retrieval - Design features of Information Retrieval Systems – Classical - Non-classical - Alternative Models of Information Retrieval – valuation Lexical Resources: World Net - Frame Net - Stemmers - POS Tagger - Research Corpora.

Total: 60 Hours

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.

Reference Books:

1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, 2nd Edition, Prentice Hall, 2008.
2. James Allen, “Natural Language Understanding”, 2nd edition, Benjamin /Cummings publishing company, 1995.

18MCS113 REAL TIME SYSTEMS 4 0 0 4

Course Objective

The objective of this course is to study the basic of tasks and scheduling , understand programming languages and databases, analyze real time communication and analyze evaluation techniques and reliability models for Hardware Redundancy.

Course Outcome

CO-1: Understand the structure of Real Time System.

CO-2: Familiar with task assignment and Scheduling algorithms.

CO-3: Master Uniprocessor and multiprocessor scheduling concepts.

CO-4: Implementation knowledge of scheduling algorithms.

CO-5: Understand Real time Communication concepts.

CO-6: Familiar with transmission of periodic and aperiodic messages.

CO-7: Gain knowledge about real time databases.

CO-8: Understand the various techniques in real time systems.

CO-9: Master real time system modelling.

CO-10: Discuss about case studies related with real time modelling.

UNIT I INTRODUCTION TO TASK SCHEDULING 12

Introduction - Issues in Real Time Computing, Structure of a Real Time System, Task classes, Performance Measures for Real time Systems - Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms - RM algorithm with different cases - Priority ceiling precedence constraints - using of primary and alternative tasks.

UNIT II UNI AND MULTI PROCESSOR SCHEDULING 12

Uniprocessor scheduling of IRIS tasks - Task assignment - Utilization balancing – Next fit-Bin packing - Myopic off-line - Focused addressing and bidding- Buddy strategy- Fault Tolerant Scheduling - Aperiodic scheduling - Spring algorithm - Horn algorithm - Bratley - Sporadic scheduling.

UNIT III REAL TIME COMMUNICATION 12

Introduction – VTCSMA – PB CSMA- Deterministic collision resolution protocol - DCR for multi packet messages- dynamic planning based - Communication with periodic and aperiodic messages.

UNIT IV REAL TIME DATABASES 12

Basic Definition - Real time Vs General purpose databases - Main Memory Databases- Transaction priorities - Transaction Aborts - Concurrency control issues - Disk Scheduling Algorithms – Two phase Approach to improve Predictability - Maintaining Serialization Consistency - Databases for Hard Real Time System.

UNIT V REAL-TIME MODELING AND CASE STUDIES 12

Petrinets and applications in real - time modeling - Air traffic controller system – Distributed air defense system.

Total Hours: 60 hours

Text Books:

1. C.M. Krishna, Kang G. Shin, “Real Time Systems”, Tata McGraw – HilL, 2010.

Reference Books:

1. Giorgio C. Buttazzo , “Hard real-time computing systems: predictable scheduling algorithms and applications” , Springer, 2008.
2. C. Siva Ram Murthy, G. Manimaran, “Resource management in real-time systems and networks”, PHI, 2009.
3. Web resource: www.nptel.ac.in
4. Web resource: www.coursera.org

18MCS114 INTERNET OF THINGS 4 0 0 4

Course Objective

To understand the fundamentals of Internet of Things and to apply the concept in Real World Scenario.

Course Outcome

CO-1: To assess the vision and introduction of IoT.

CO-2: To Understand IoT Market perspective.

CO-3: To Implement Data and Knowledge Management and use of Devices in IoT technology.

CO-4: To Understand State of the Art - IoT Architecture.

CO-5: To classify Real World IoT Design Constraints, Industrial Automation in IoT.

CO-6: To understand where the IoT concept fits within the broader ICT industry and possible future Trends

CO-7: To Understand and be able to explain the role of big data, cloud computing and data analytics in a typical IoT system

CO-8 : Able to understand building blocks of Internet of Things and characteristics.

CO-9: Able to understand the application areas of IOT.

CO-10: Apply effective techniques to create IoT based projects.

UNIT I OVERVIEW 12

IoT-An Architectural Overview- Building an architecture - Main design principles and needed capabilities - An IoT architecture outline - Standards considerations.

UNIT II M2M AND IOT TECHNOLOGY FUNDAMENTALS 12

Devices and gateways- Local and wide area networking- Data management- Business processes in IoT- Everything as a Service (XaaS) - M2M and IoT Analytics- Knowledge Management.

UNIT III REFERENCE ARCHITECTURE 12

Introduction - IoT reference Model - IoT Reference Architecture-Functional View- Information View- Deployment and Operational View- Other Relevant architectural views.

UNIT IV REAL-WORLD DESIGN CONSTRAINT 12

Introduction- Technical Design constraints - Data representation and visualization, Interaction and remote control. IoT systems management - IoT Design Methodology - specifications - Integration and Application Development.

UNIT V REAL TIME APPLICATIONS 12

Various Real time applications of IoT- Connecting IoT to cloud - Cloud Storage for Iot - Data Analytics for IoT - Software & Management Tools for IoT.

Total Hours: 60 hours

Text Boks:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Aves and, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

Reference Books:

1. Peter Waher, "Learning Internet of Things", PACKT publishing, Birmingham, Mumbai, 2005.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2012.

18MCS115 BIOINFORMATICS 4 0 0 4

Course Objective

Bioinformatics is an interdisciplinary program offering substantial training in both the biological sciences, physical and mathematical sciences. This program emphasizes the integration of computer science with genetics and molecular biology. A foundation in mathematics and statistics provides the basis for acquiring computer programming, data basing, and operating system skills. Students attracted to this program have dual interests in computer science and biology and find it an excellent choice for their broad interests.

Course Outcome

CO-1: Able to understand scope of Bioinformatics.
CO-2: Understand the popular bioinformatics databases.
CO-3: Learn Fundamentals of Databases and Sequence alignment.
CO-4: Understand the basic features of databases.
CO-5: Analyze the importance of sequence similarity.
CO-6: Implement the Bioinformatics concepts in computer programming languages.
CO-7: Apply Perl in biological problems.
CO-8: Learn to use python for handling the biological databases.
CO-9: Understand the fundamentals of quality control and the methods used to control systems and processes.
CO-10: Gain the knowledge of structural and functional properties of carbohydrates, proteins.

UNIT I INTRODUCTION TO BIOINFORMATICS AND DATA GENERATION 12

What is bioinformatics - Relation with molecular biology - Examples of related Tools - FASTA, BLAST, BLAT, RASMOL- Databases: GENBANK, Pubmed, PDB -Software: RASMOL, Ligand Explorer - Data generation - Generation of large scale molecular biology data - Applications of Bioinformatics.

UNIT II BIOLOGICAL DATABASE AND ITS TYPES 12

Introduction to data types and Source - Population and sample - Classification and Presentation of Data - Quality of data -private and public data sources -General Introduction of Biological Databases - Nucleic acid databases: NCBI, DDBJ, and EMBL - Protein

databases: Primary, Composite, and Secondary - Specialized Genome databases: SGD, TIGR, and ACeDB - Structure databases : CATH, SCOP, and PDB sum.

UNIT III DATA STORAGE AND RETRIEVAL AND INTEROPERABILITY 12

Flat files - relational, object oriented databases and controlled vocabularies - File Format - Genbank – DDBJ - FASTA – PDB –SwissProt - Introduction to Metadata and search – Indices – Boolean – Fuzzy - Neighboring search - The challenges of data exchange and integration – Ontologies - interchange languages and standardization efforts - General Introduction to XML -UMLS – CORBA – PYTHON.

UNIT IV ELEMENTS OF PROGRAMMING LANGUAGES 12

C and PERL - Data base concept - Database management system - Database browsing and Data retrieval - Sequence database and genome database - Data Structures and Databases - Databases such as GenBank - EMBL – DDBJ – Swissprot – PIR – MIPS – TIGR - Hovergen –TAIR – PlasmoDB - ECDC - Searching for sequence database like FASTA and BLAST algorithm.

UNIT V METHODS FOR MODELLING 12

Homology modelling - Threading and protein structure prediction - Structure-structure Comparison of macromolecules with reference to proteins - Force fields - Molecular energy Minimization - Monte Carlo and molecular dynamics simulation.

Total Hours: 60 hours

Text Books:

1. Cynthia Gibas and Per Jambeck, “Developing Bioinformatics Computer Skill”, 1st Edition, O’Reilly Publication, 2001.
2. O'Sullivan, D. and D. Unwin, “Geographic Information Analysis”, 2nd Edition, John Wiley and Sons, 2010.
3. Mitchell L Model, “Bioinformatics Programming Using Python”, O’Reilly media, Cambridge, 2010.

Reference Books:

1. S.C. Rastogi & others, “Bioinformatics - Concepts, Skills, and Applications”, CBS Publishing, 2003.
2. C S V Murthy, “ Bioinformatics”, Himalaya Publishing House, 1st Edition, 2003.

General Electives

18MCS121 HUMAN RESOURCE MANAGEMENT 4 0 0 4

Course Objective

To teach relevant, practical and applicable human resource management skills to equip the student with the foundation competencies for working as HR practitioners in business. To highlight the important challenges facing managers and employees in today's business climate. To introduce contemporary theory and practice in modern human resource management and the range of tools and methods available to address HR challenges and problems.

Course Outcome

CO-1: Discuss the History and evolution of HRM.

CO-2: Explain the importance of HRM in the organizations through their Roles and responsibilities, challenges etc.

CO-3: Assess the major HRM functions and processes of HRM planning, job analysis and design, recruitment, selection, training and development, compensation and benefits, and performance appraisal.

CO-4: Identify strategic HR planning and the HRM process to the organization's strategic management and decision making process.

CO-5: To explain how training helps to improve the employee performance.

CO-6: Debate the concept of career development and various career stages.

CO-7: Compare the difference between coaching and mentoring.

CO-8: Analyze the emerging trends, opportunities and challenges in performance appraisal.

CO-9: Apply the Concept of job application and how it is practically applied in the organization.

CO-10: Restate various recent techniques related to HRM.

UNIT I HUMAN RESOURCE MANAGEMENT 12

Meaning - Scope & Objectives of HRM - Evolution of HRM - Difference between PM & HRM - HRM function's - HR as a Strategic Business Partner - HR Policy & procedures - Competitive challenges influencing HRM Qualities & qualification of HR Manager - Roles and Responsibilities of HR Manager / Departments.

UNIT II HUMAN RESOURCE PROCESS **12**

Human Resource Planning – Job Analysis and Design - Recruitment - Selection and placement process – Types of interviews – Placement - Orientation & Induction - Determining training needs - Training Approaches - Separation process & Exit interview.

UNIT III MANAGING CAREERS **12**

Career Development vs Employee development - Career stages – Career Choices and Preferences - Mentoring and Coaching - Time Management.

UNIT IV PERFORMANCE MANAGEMENT **12**

Purposes of Performance Management - Performance Appraisal Methods - Punishment and Promotion, Job evaluation - Wage & Salary administration – Concepts - Pay structure - Incentives – Bonus - Insurance.

UNIT V CONTEMPORARY ISSUES IN HRM **12**

Talent Management - Competency Mapping - Industrial Relations – Health & Safety issues - grievance handling - D Work Life Balance - Quality of Work Life - HRD in India - International HRM.

Total: 60 Hours

Text Books:

1. Aswathappa.K, “Human Resource Management, Text and Cases”, Tata McGraw Hill, New Delhi, 2014.
2. Gupta. S.C, “Advanced Human Resource Management, Strategic Perspective”, ANE Books Pvt. Ltd, New Delhi, 2009.

Reference Books:

1. Angela Baron and Michael Armstrong, “Human Capital Management (Achieving Added Value Through People)”, Kogan Page Limited, United States, 2007.
2. Anuradha Sharma and Aradhana Khandekar, “Strategic Human Resource Management”, Response Books, New Delhi, 2006.
3. Beer et al, “Managing Human Assets”, The Free Press: Maxwell Mac Millan Inc, New York, 1984.
4. Dreher Dougherty, “Human Resource Strategy: A behavioral perspective for the General Manager”, McGraw – Hill Higher Education, Singapore, 2001.

18MCS122 SOCIAL NETWORKING 4 0 0 4

Course Objective

The Students should be able to understand the concept of sematic web and related applications by acquiring adequate knowledge from ontology. The students will also be able understand the human behavior in social web and visualizing the social networks.

Course Outcome

CO-1: Students be able to understand the basic knowledges and limitations of semantic web.

CO-2: Electronic sources for network analysis, various information's about blogs and online communities can be learned.

CO-3: Ontology based semantic web modelling and aggregation for social network can be deeply grasped by students.

CO-4: Students can acquire adequate knowledge in aggregating and reasoning with social network data in advance representation.

CO-5: Basic knowledge about web social networks with detailed extraction evolution of web communities can be learned.

CO-6: Students can able to know various applications of community mining algorithms with tools for detecting social network infrastructures.

CO-7: Students can understand behavioral patterns followed by humans in social communities and concepts about trust network analysis in reality mining

CO-8: Trust derivation based on trust comparison can be learned with deep knowledge in spectrum attack and counter measures.

CO-9: Students can gather knowledge about visualizing the analyzed semantic web with various visualizing technologies.

CO-10: Students can able to understand various applications and theories available for social networks visualization.

UNIT 1 INTRODUCTION 12

Introduction to Semantic Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 12

Ontology and their role in the Semantic Web - Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 12

Extracting evolution of Web Community from a Series of Web Archive –Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 12

Understanding and predicting human behavior for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and counter measures.

UNIT 5 VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 12

Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-citation networks.

Total: 60 Hours

Text Books:

1. Peter Mika, "Social Networks and the Semantic Web", Ist Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

Reference Books:

1. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", 1st Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

18MCS123 OPTIMIZATION TECHNIQUES 4 0 0 4

Course Objective

After successful completion of this course, student will be able to understand the importance of optimization in industrial process management and apply basic concepts of mathematics to formulate an optimization problem. Analyse and appreciate variety of performance measures for various optimization problems.

Course Outcome

CO-1 : To introduce the basic concepts of linear programming.

CO-2 : To understand the idea of Simplex method.

CO-3 : To educate on the advancements in Linear programming techniques.

CO-4 : To understand the concepts of Dual simplex, Transportation problems etc.,

CO-5 : To introduce non-linear programming techniques.

CO-6 : To get familiar in concepts like Kuhn-Tucher method, Quadratic programming etc.,

CO-7 : To introduce the interior point methods of solving problems

CO-8 : To understand the concepts of projection scaling, affine algorithms.

CO-9 : To introduce the dynamic programming method

CO-10 : To understand ethical issues, environmental impact and acquire management skills.

UNIT I LINEAR PROGRAMMING 12

Introduction – formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method.

UNIT II ADVANCES IN LPP 12

Dualit theory- Dual simplex method – Sensitivity analysis–-Transportation problems– Assignment problems-Traveling sales man problem -Data Envelopment Analysis.

UNIT III NON LINEAR PROGRAMMING 12

Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

UNIT IV INTERIOR POINT METHODS **12**

Karmarkar's algorithm – Projection Scaling method – Dual affine algorithm – Primal affine algorithm Barrier algorithm.

UNIT V DYNAMIC PROGRAMMING **12**

Formulation of Multi stage decision problem–Characteristics–Concept of sub-optimization and the principle of optimality–Formulation of Dynamic programming–Backward and Forward recursion– Computational procedure–Conversion of final value problem in to Initial value problem.

Total: 60 Hours

Text Books:

1. Hillier and Lieberman, "Introduction to Operations Research", TMH, 2000.
2. R. Panneer Selvam, "Operations Research", PHI, 2006.

Reference Books:

1. Hamdy A.Taha, "Operations Research –An Introduction", Prentice Hall India, 2003.
2. Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
3. Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

18MCS124 BUSINESS INTELLIGENCE 4 0 0 4

Course Objective

This course focuses on how to design and build a Business Intelligence solution, Students will also learn how to design and build a data warehouse within the context of student BI projects, Students can develop their own projects within collaborative teams or be assigned an existing data source to develop a project, To ensure success during the implementation phase, students will plan for and gather business requirements, as well as design the data warehouse in order to develop an effective BI plan.

Course Outcome

CO-1: Design and implement OLTP, OLAP and Warehouse concepts.

CO-2: Design and develop Data Warehouse using Various Schemas & Dimensional modelling.

CO-3: Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and loading of data.

CO-4: Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence (BI).

CO-5: Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI.

CO-6: Use Analytics concepts like data mining, Exploratory and statistical techniques for Predictive analysis in Business Intelligence.

CO-7: Demonstrate application of concepts in BI.

CO-8: Outline the definitions, concepts, and enabling technologies of big data analytics.

CO-9: Describe how analytics are powering consumer applications and creating a new opportunity for entrepreneurship for analytics.

CO-10: Effectively communicate course work in writing and oral presentation.

UNIT I IMPORTANT CONCEPTS 12

Introduction to Data, Information, and Knowledge - Design and implementation aspect of OLTP - Introduction to Business Intelligence and Business Models - Design and implementation aspect of OLAP/Data Warehouse - BI Definitions & Concepts - Business

Applications of BI - Role of DW in BI – BI system components - Components of Data Warehouse Architectures.

UNIT II DIMENSIONAL MODELLING AND DW DESIGN 12

Star schema - Snow flake schema and Fact Constellation schema - Grain of dimensional model – Transactions - Recurring Snapshots - Accumulating Snapshots- Dimensions (SCD types- conformed dimensions) Clickstream Source Data (Google Analytics as a Clickstream Data Source)- Facts (additive, semi-additive, non-additive) - Hierarchy in dimensions - Parent Child relationships - Many-Many Dimensional relationship - Multi Valued Dimensions and Dimension Attributes.

UNIT III ETL 12

Data Quality - Data profiling- Data enrichment-Data duplication- ETL Architecture and what is ETL - Extraction concept and Change data capture - Transformation concept –Lookups- Time lag formats – Consistency - Loading concept - Initial and Incremental loading - Late arriving fact - What is Staging – Data marts – Cubes- Scheduling and dependency matrix.

.UNIT IV REPORTING 12

Metadata Layer- Presentation Layer- Data Layer- Use of different layers and overall Reporting architecture - Various report elements such as Charts – Tables – Prompts- Data aggregation: Table based - Materialized views- Query rewrite – OLAP – MOLAP – Dashboards- Ad-hoc reports-Interactivity in analysis(drill down, drill up) - Security: Report level - Data level (row, column) -Scheduling.

UNIT V ANALYTICS 12

Analytics concepts and use in Business Intelligence- Exploratory and statistical techniques- Cluster analysis- Data visualization- Predictive analysis – Regression- Time series- Data Mining – Hierarchical clustering- Decision tree Text analytic- Text mining- In-Memory Analytics and In-DB Analytics- Case study: Google Analytic- Recent Trends: Big data like HIVE- PIG and DW appliances like Netezza – Teradata- Smart Change data capture using log based techniques- Real time BI- Operational BI- Embedded BI- Agile BI- BI on cloud- BI applications.

Total Hours: 60 hours

Text Books:

1. Reema Thareja, “Data Warehouse”, Oxford University Press, 2009.
2. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining: concepts and techniques”, 2nd Edition, Elsevier/Morgan Kaufmann, 2012.
3. Ralph Kimball, Margy Ross, “The Data Warehouse Toolkit”, 3rd edition, Wiley, 2013.

Reference Books:

1. William Inmon, “Building the Data Warehouse”, Wiley publication 4th edition, 2005.
2. Efrem G. Mallach, “Decision Support And Data Warehouse Systems”, 1st Edition Tata McGraw-Hill Education, ISBN-10: 0072899816, 2010.
3. Efraim Turban, Ramesh Sharda, Dursun Delen, David King, “Business Intelligence”, ISBN-10: 013610066X, Prentice Hall ,ISBN-13: 9780136100669, 2007.
4. Dorian Pyle, “Business Modeling and Data Mining”, Elsevier Publication MK, 2003.

18MCS125 QUANTUM COMPUTING 4 0 0 4

Course Objective

This inter-disciplinary survey course explores the evolution and current direction of quantum computing technology. Topics include quantum circuits, quantum algorithms (including factoring and search), and quantum key distribution. It describes to think critically about the tradeoffs of this evolving technology. Prerequisites: familiarity with basic notions of computing, quantum theory, and linear algebra.

Course Outcome

CO-1 : Provides an interdisciplinary introduction to the emerging field of quantum computer science.

CO-2 : Explaining basic quantum mechanics and quantum entanglement.

CO-3 : Introduces qubits structure and its physical consequences.

CO-4 : Discussions of some key algorithms and protocols.

CO-5 : To understand the concepts of diagrammatic reasoning and diagrammatic presentation.

CO-6 : It describes structural understanding of some basic quantum mechanics.

CO-7 : To learn about quantum theory and its applications.

CO -8: To explore the diagrammatic reasoning as an alternative form of mathematics.

CO-9 : To monitor basic linear algebra, finite-dimensional vector spaces and matrices.

CO-10: Learn about understanding of quantum features while eliminating the need for complex calculations.

UNIT I INRODUCTION 12

History of quantum computing and quantum key distribution - Information Physics and Computation - Fundamental Terminology - Landauer's Principle - Quantum bits – superposition - quantum register - Toffoli Gate - Fredkin Gate.

UNIT II QUANTUM MECHANICS AND PROTOCOLS 12

Superposition and parallelism - Qubits vs. classical bits - Quantum circuit model - Computational complexity and introductory quantum algorithms - no cloning theorem – uncollapsing – Terminology.

UNIT III QUANTUM ALGORITHMS 12

Represent the algorithm and data - interface to the quantum computer - Deutsch-Jozsa's Algorithm - Simon's algorithm - Quantum Fourier transform - phase estimation - Order finding - Shor's algorithm. Teleportation - load and run the machine.

UNIT IV PHYSICAL IMPLEMENTATION 12

Ways of creating qubits in the physical world - Ion traps - Quantum dots - Nuclear magnetic resonance - Semiconductor spins - Holographic- Circuit quantum electrodynamics - Quantum Search - Mixed states - Quantum operations - parallel and sequential composition of diagrams.

UNIT V QUANTUM COMPUTER ARCHITECTURE 12

Distributed quantum computation - quantum information theory - quantum error correction - Quantum programming languages - classical key distribution - QKD algorithms and protocols - Physical implementations of QKD.

Total: 60 hours

Text Books:

1. Rafeeq Rehman, " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003.

Reference Books:

1. David McMahon, "Quantum Computing Explained", Student Edition, Wiley, 2016.
2. Mermin N David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.
3. M. Nielsen and I. Chuang, "Quantum Computation and Quantum Information", Cambridge University Press, 10th Anv edition, 2011.

18MCS126 GEOGRAPHICAL INFORMATION SYSTEM 4 0 0 4

Course Objective

GIS is a combination of software and hardware with capabilities for manipulating, analyzing and displaying spatially-referenced information. By linking data to maps, a GIS can reveal relationships not apparent with traditional item-referenced information systems and data base management products, and by displaying information in a graphic form can communicate complex spatial patterns succinctly. The course emphasizes the concepts needed to use GIS correctly and effectively for manipulating, querying, analyzing, and visualizing spatial-based data.

Course Outcome:

CO-1: Understand the fundamental concepts of geographic information systems and their differences from other types of information systems.

CO-2: Able to understand the basic necessary to work with GIS.

CO-3: Utilize modern industry-standard GIS software for conducting basic GIS analyses and producing cartographic output.

CO-4: predominantly using ESRI's ArcGIS software .

CO-5: Gain critical thinking skills in solving geospatial problems.

CO-6: Understand competency with the ArcMap software to enhance and interpret data.

CO-7: Develop and execute a project requiring GIS as a management, analytical, and visualization tool

CO-8: Identify and accessing publicly available data sets.

CO-9: Learn queries in GIS Analysis Formulate applications of GIS technology.

CO-10: Use GIS to identify, explore, understand, and solve spatial problems.

UNIT I INTRODUCTION TO GIS 12

What is GIS - What GIS can do - Types of GIS projects - Remote sensing, GPS, SDSS Continental Drift – Representing Geography - Geographic Representations - Nature of Geographic Data - Spatial Autocorrelation - Spatial Sampling - Georeferencing - Global Navigation Systems.

UNIT II CREATING, MAINTAINING AND USING GEOGRAPHIC DATABASES 12

GIS Data Collection and Correction - Geographic Databases - Accessing Geographic Data - Distributed GIS- Geographic Data Analysis : Geovisualization - Vectors and Rasters - Measurement and Transformation- Uncertainty in GIS - ArcGIS : Exploring ArcGIS - Spatial Data - Metadata - ArcCatalog - ArcToolbox.

UNIT III WORKING WITH ARCMAP 12

Map documents - Windows and Menus - Help system - Data frames – Layers - Symbols and styles - Map scales and labeling - Coordinate Systems and Map Projections - Map projections and GIS - Coordinate Systems - Spheroids and datums - Common projection systems - Projecting data. Basic Editing in ArcMap : Editing overview - The Editor Toolbar - Snapping features - Creating adjacent polygons - Editing features - Editing attributes - Saving work.

UNIT IV COORDINATE SYSTEMS AND MAP PROJECTIONS 12

Map projections and GIS - Coordinate Systems - Spheroids and datums - Common projection systems - Projecting data - Drawing and Symbolizing Features - Types of maps - Classifying numeric data - Using map layers - Editing symbols and using styles - Displaying rasters.

UNIT V WORKING WITH TABLES 12

Tables - Joining tables - Statistics - Summarizing tables - Editing and calculating tables - Queries - What are queries - Selecting - Using queries in GIS analysis - Spatial Joins - Types of joins - Setting up a spatial join - Spatial Data Modeling : Types of Models - Tools for Modeling – Future GIS – Case study with GIS.

Total: 60 hours

Text Books

1. Longley, Paul A., Michael F. Goodchild, David J. Maguire, David W. Rhind, " Geographic Information Systems and Science", 4th Edition, John Wiley & Sons, 2012.
2. O'Sullivan, D. and D. Unwin , "Geographic Information Analysis", 2nd Edition, John Wiley and Sons, 2010.

Reference Books:

1. Longley, Goodchild, Maguire, Rhind, " Geographic Information Systems and Science", 2nd Edition, Wiley, 2005.
2. Gorr, W and Kurland K. " GIS Tutorial: Workbook for ArcView 9", ESRI Press, 2005.

18MCS127 STATISTICAL AND DATA ANALYSIS 4 0 0 4

Course Objective

This course will introduce concepts, Techniques and Tools they need to deal with various facets of Data Science Practice, including Data Collection and Integration, Exploratory Data Analysis, Predictive Modeling, Descriptive Modeling, Data Product Creation, Evaluation, and Effective Communication.

Course Outcome

CO-1: To know about Data Science and the skill sets needed to be a data scientist.

CO-2: To Understand Meaning of Statistical Inference, to identify probability distributions commonly used as foundations for statistical modeling and to fit a model to data.

CO-3: To learn to use R for basic statistical modeling and analysis and to learn the significance of exploratory data analysis (EDA) in data science.

CO-4: To describe the Data Science Process and how its components

CO-5: Applying EDA and the Data Science process in a Real Time Applications.

CO-6: To explore Basic machine learning algorithms for predictive modeling and to identify common approaches used for Feature Generation.

CO-7: Identify basic feature selection algorithms and its use in applications.

CO-8: To Learn fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine deeply.

CO-9: Creating effective visualization of given data.

CO-10: Understanding around ethical and privacy issues in data science .

UNIT I INTRODUCTION 12

What Is Data Science? - Big Data And Data Science Hype – And Getting Past The Hype - Why Now? – Datafication. Statistical Inference: Populations and Samples - Statistical Modeling- Probability Distributions- Fitting a Model - Introduction To R.

UNIT II EXPLORATORY DATA ANALYSIS AND THE DATA SCIENCE PROCESS 12

Basic Tools (Plots, Graphs And Summary Statistics) Of EDA - Philosophy Of EDA - The Data Science Process. Three Basic Machine Learning Algorithms: Linear Regression - K-Nearest Neighbors (K-NN) - K-Means-Real Time Applications.

UNIT III OTHER MACHINE LEARNING ALGORITHMS 12

Naive Bayes - Feature Generation And Feature Selection - Feature Generation Algorithms - Feature Selection Algorithms – Filters – Wrappers - Decision Trees - Random Forests.

UNIT IV RECOMMENDATION SYSTEMS 12

Building a User-Facing Data Product - Algorithmic Ingredients of a Recommendation Engine - Dimensionality Reduction: Singular Value Decomposition - Principal Component Analysis.

UNIT V MINING SOCIAL-NETWORK GRAPHS 12

Social Networks As Graphs - Clustering Of Graphs - Direct Discovery of Communities in Graphs - Partitioning of Graphs - Neighborhood Properties in Graphs - Data Visualization - Basic principles, ideas and tools for Data - Data Science and Ethical Issues: Discussions on Privacy, Security, Ethics - A Look Back at Data Science – Next - Generation Data Scientists.

Total Hours: 60 hours

Text Books:

1. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.

Reference Bookss:

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, "Mining Of Massive Datasets", V2.1, Cambridge University Press, 2014.
2. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", ISBN 0262018020, 2013.
3. Foster Provost and Tom Fawcett, "Data Science For Business: What You Need To Know About Data Mining and Data-Analytic Thinking", ISBN 1449361323, 2013.

18MCS128 COGNITIVE SCIENCE 4 0 0 4

Course Objective

To learn the basics of Cognitive Science with focus on acquisition, representation, and use of knowledge by individual minds, brains, and machines. To study the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics. To understand the role of neuro science in the cognitive field.

Course Outcome

CO-1: Explain and analyze the major concepts, philosophical and theoretical perspectives, empirical findings.

CO-2: Know about historical trends in cognitive science, related to cultural diversity and living in a global community.

CO-3: Use cognitive science knowledge base to create their own methods for answering novel questions of either a theoretical or applied nature, and to critically evaluate the work of others in the same domain

CO-4: Be proficient with basic cognitive science research methods, including both theory-driven and applied research design, data collection, data analysis, and data interpretation.

CO-5: Eagerness to work across disciplinary fields creatively to address questions about the mind/brain and mental life of human beings.

CO-6: Demonstrate understanding of the methodologies, concepts and theories used by psychologists, philosophers, linguists, computer scientists and cognitive neuroscientists to address questions of mind/brain and information processing.

CO-7: Demonstrate competence in the techniques commonly used in the fields that comprise cognitive science, including: Computational tools, Statistical methods, Experimental design and Linguistic analyses.

CO-8: Synthesize research findings from two or more disciplines in the cognitive sciences, formulating and evaluating questions involving the mind/brain or information processing.

CO-9: Can construct a readable, well-supported research report.

CO-10: Are ready for significant scholarly participation in the several fields of cognitive science.

UNIT I INTRODUCTION TO COGNITIVE SCIENCE 12

The Cognitive view –Some Fundamental Concepts – Computers in Cognitive Science – Applied Cognitive Science – The Interdisciplinary Nature of Cognitive Science – Artificial Intelligence: Knowledge representation - The Nature of Artificial Intelligence - Knowledge Representation – Artificial Intelligence: Search, Control, and Learning.

UNIT II COGNITIVE PSYCHOLOGY 12

Cognitive Psychology – The Architecture of the Mind - The Nature of Cognitive Psychology- A Global View of The Cognitive Architecture- Propositional Representation- Schematic Representation- Cognitive Processes, Working Memory, and Attention- The Acquisition of Skill- The Connectionist Approach to Cognitive Architecture.

UNIT III COGNITIVE NEUROSCIENCE 12

Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind - Organization of Cognitive systems - Strategies for Brain mapping – A Case study: Exploring mindreading.

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UNIT IV LANGUAGE ACQUISITION, SEMANTICS AND PROCESSING MODELS

Milestones in Acquisition – Theoretical Perspectives- Semantics and Cognitive Science – Meaning and Entailment – Reference – Sense – Cognitive and Computational Models of Semantic Processing – Information Processing Models of the Mind- Physical symbol systems and language of thought- Applying the Symbolic Paradigm- Neural networks and distributed information processing- Neural network models of Cognitive Processes.

UNIT V HIGHER-LEVEL COGNITION 12

Reasoning – Decision Making – Computer Science and AI: Foundations & Robotics – New Horizons - Dynamical systems and situated cognition- Challenges – Emotions and Consciousness – Physical and Social Environments – Applications

Total: 60 HOURS

Text Books:

1. Neil Stillings, Steven E. Weisler, Christopher H. Chase and Mark H. Feinstein, "Cognitive Science: An Introduction", Second Edition, MIT press ,1995.
2. José Luis Bermúdez, "Cognitive Science: An Introduction to the Science of the Mind", Cambridge University Press, New York, 2014.
3. Robert L. Solso, Otto H. MacLin and M. Kimberly MacLin, "Cognitive Psychology, Pearson Education, 2007.

Reference Books:

1. J. Friedenberg and G. Silverman, "Cognitive Science: An Introduction to the Study of Mind", 2011.
2. Steven Pinker, "How the mind works", W. W. Norton & Company; Reissue edition, 2009.
3. Carolyn Panzer Sobel and Paul Li, "Cognitive Science: An Interdisciplinary Approach", 2013.

18MCS129 **ROBOTICS** **4 0 0 4**

Course objective

This course introduces the basic concepts of robotics, sensors, robot controls, robot cell design, and micro robotics and Nano robotics system.

Course Outcome

CO-1: To understand the basics of robot like accuracy, speed of robot, joint and links in robots.

CO-2: Explains Hydraulic, Pneumatic and Electric system and architecture of robotic system**.**

CO-3: To understand the purpose of end effectors like magnetic grippers, vacuum grippers and gripper design**.**

CO-4: To understand the purpose of robot controls like point to point control, path control and control system for robot joint.

CO-5: To analyze robot transformations like 2D, 3D, scaling, rotation and translation.

CO-6: Explains various sensors like touch sensors, tactile sensor, vision sensors, light and pressure sensors which are used in robots.

CO-7: Effectively discuss safety monitoring device in robot and actuation using Matlab**.**

CO-8: Explains robot applications like Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.

CO-9: Effectively discuss Actuators of Micro/Nano robotic system.

CO-10: Explains communication techniques, grippers and various types of Nano robots.

UNIT I INTRODUCTION **12**

Robot anatomy – Definition - law of robotics - History and Terminology of Robotics- Accuracy and repeatability of Robotics - Simple problems - Specifications of Robot - Speed of Robot - Robot joints and links - Robot classifications - Architecture of robotic systems- Robot Drive systems - Hydraulic, Pneumatic and Electric system.

UNIT II END EFFECTORS AND ROBOT CONTROLS **12**

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type- Magnetic grippers - Vacuum grippers - Air operated grippers-Gripper force analysis - Gripper design - Simple problems - Robot controls - Point to point control, Continuous path

control, Intelligent robot - Control system for robot joint - Control actions - Feedback devices - Encoder, Resolver, LVDT - Motion Interpolations - Adaptive control.

UNIT III ROBOT TRANSFORMATIONS AND SENSORS 12

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation - Homogeneous coordinates, multiple transformation - Simple problems. Sensors in robot – Touch sensors - Tactile sensor – Proximity and range sensors – Robotic vision sensor - Force sensor - Light sensors, Pressure sensors.

UNIT IV ROBOT CELLDESIGNANDAPPLICATIONS 12

Robot work cell design and control - Sequence control, Operator interface, Safety monitoring devices in Robot - Mobile robot working principle, actuation using MATLAB, NXT Software Introductions - Robot applications - Material handling - Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.

UNIT V MICRO/NANO ROBOTICS SYSTEM 12

Micro/Nanorobotics system overview - Scaling effect - Top down and bottom up approach - Actuators of Micro / Nano robotics system - Nano robot communication techniques - Fabrication of micro / nano grippers - Wall climbing, micro robot working principles - Biomimetic robot - Swarm robot - Nano robot in targeted drug delivery system.

Total Hours: 60 hours

Text Books:

1. S.R. Deb, “Robotics Technology and flexible automation”, Tata McGraw-Hill Education, 2009.
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, “Industrial Robotics, Technology programming and Applications”, McGraw Hill, 2012.

Reference Books:

1. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, “Robotics Engineering an Integrated Approach”, PHI Learning, 2009.
2. Francis N. Nagy, Andras Siegler, “Engineering foundation of Robotics”, Prentice Hall Inc., 1987.
3. P.A. Janaki Raman, “Robotics and Image Processing an Introduction”, Tata McGraw Hill Publishing company Ltd.,1995.