

Sadakathullah Appa College

(Autonomous)

(Reaccredited by NAAC at an 'A' Grade and ISO 9001:2015 Certified Institution)

Rahmath Nagar, Tirunelveli – 627 011, Tamil Nadu.

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE



CBCS SYLLABUS

For

M.Sc. Computer Science

(Applicable for students admitted in June 2019 and onwards)

**(As per the Resolutions of the Academic Council Meetings
held on 03-03-2018, 17-10-2018 and 02-03-2019).**

CONTENTS

Sl. No.	Subject Title	Subject Code	Page No.
1	Design and Analysis of Algorithm	18PCCS11	3
2	Linux Programming	18PCCS12	4
3	Python Programming	18PCCS13	5
4	A) Cloud Computing	18PECS1A	6
5	B) Ad-Hoc and Sensor Networks	18PECS1B	7
6	Linux Programming Lab	18PCCS1P1	9
7	Python Programming Lab	18PCCS1P2	10
8	Open Source Technology	18PCCS21	11
9	Advanced Database Management System	18PCCS22	12
10	Internet of Things	18PCCS23	13
11	A) Security Practices	18PECS2A	14
12	B) Cyber Security	18PECS2B	15
13	Open Source Technology Lab	18PCCS2P1	16
14	Advanced Database Management System Lab	18PCCS2P2	16
15	Data Mining Concepts and Techniques	18PCCS31	17
16	Software Testing	18PCCS32	18
17	Digital Image Processing	18PCCS33	20
18	A) Mobile Computing	18PECS3A	21
19	B) Social Computing	18PECS3B	22
20	Data Mining Lab	18PCCS3P1	23
21	Image Processing Lab	18PCCS3P2	23
22	Big Data Analytics	18PCCS41	24
23	Soft Computing	18PCCS42	25
24	Project	18PCCS43	26
25	A) Artificial Intelligence	18PECS4A	27
26	B) Human Computer Interface	18PECS4B	28
27	Web Programming Lab	18PCCS4P1	29
28	Big Data Analytics Lab	18PCCS4P2	30
29	Internet Concepts and Web Design	18PICS21	31
30	Desktop Publishing	18PICS31	32

**POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE
CBCS SYLLABUS M.Sc. COMPUTER SCIENCE (2018 - 2021)
COURSE STRUCTURE (CBCS)**

(Applicable for students admitted in June 2019 and onwards)

I SEMESTER			II SEMESTER		
COURSE	H/W	C	COURSE	H/W	C
DSC 1	6	4	DSC 4	5	4
DSC 2	6	4	DSC 5	5	4
DSC 3	6	4	DSC 6	5	4
DSE 1	4	4	DSE 2	4	4
P-I	4	2	P-III	4	2
P-II	4	2	P-IV	4	2
			IDC-I	3	3
TOTAL	30	20	TOTAL	30	23
III SEMESTER			IV SEMESTER		
DSC 7	5	4	DSC 10	5	4
DSC 8	5	4	DSC 11	5	4
DSC 9	5	4	DSC 12- Project	8	8
DSE 3	4	4	DSE 4	4	4
P-V	4	2	P-VII	4	2
P-VI	4	2	P-VIII	4	2
IDC 2	3	3			
TOTAL	30	23	TOTAL	30	24
I - IV SEMESTER					
MOOC*		2#			

DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS, & MARKS				
SUBJECT	HOURS	CREDITS	NO. OF PAPERS	MARKS
DSC THEORY + PROJECT	66	52	12	1200
DSC PRACTICALS	32	16	8	400
DSE	16	16	4	400
IDC	6	6	2	200
MOOC*		2#	1	
TOTAL	120	90+2#	27	2200

**COURSE STRUCTURE - POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE
CBCS Syllabus – M.Sc., Computer Science (2019-2020 onwards)**

SEM	P	Title of the paper	S. Code	H/W	C	Marks		
						I	E	T
I	DSC1	Design and Analysis of Algorithm	18PCCS11	6	4	25	75	100
	DSC2	Linux Programming	18PCCS12	6	4	25	75	100
	DSC3	Python Programming	18PCCS13	6	4	25	75	100
	DSE-1	A) Cloud Computing	18PECS1A	4	4	25	75	100
		B) Ad-Hoc and Sensor Networks	18PECS1B					
	P-I	Linux Programming Practicals	18PCCS1P1	4	2	40	60	100/2
P-II	Python Programming Practicals	18PCCS1P2	4	2	40	60	100/2	
II	DSC4	Open Source Technology	18PCCS21	5	4	25	75	100
	DSC5	Advanced Database Management System	18PCCS22	5	4	25	75	100
	DSC6	Internet of Things	18PCCS23	5	4	25	75	100
	DSE-2	A) Security Practices	18PECS2A	4	4	25	75	100
		B) Cyber Security	18PECS2B					
	P-III	Open Source Technology Practicals	18PCCS2P1	4	2	40	60	100/2
	P-IV	Advanced Database Management System Practicals	18PCCS2P2	4	2	40	60	100/2
IDC-1	Internet Concepts and Web Design	18PICS21	3	3	25	75	100	
III	DSC7	Data Mining Concepts and Techniques	18PCCS31	5	4	25	75	100
	DSC8	Software Testing	18PCCS32	5	4	25	75	100
	DSC9	Digital Image Processing	18PCCS33	5	4	25	75	100
	DSE-3	A) Mobile Computing	18PECS3A	4	4	25	75	100
		B) Social Computing	18PECS3B					
	P-V	Data Mining Practicals	18PCCS3P1	4	2	40	60	100/2
	P-VI	Image Processing Practicals	18PCCS3P2	4	2	40	60	100/2
IDC-2	Desktop Publishing	18PICS31	3	3	25	75	100	
IV	DSC10	Big Data Analytics	18PCCS41	5	4	25	75	100
	DSC11	Soft Computing	18PCCS42	5	4	25	75	100
	DSC12	Project	18PCCS43	8	8			100
	DSE-4	A) Artificial Intelligence	18PECS4A	4	4	25	75	100
		B) Human Computer Interface	18PECS4B					
	P-VII	Web Programming Practicals	18PCCS4P1	4	2	40	60	100/2
P-VIII	Big Data Analytics Practicals	18PCCS4P2	4	2	40	60	100/2	
I-IV		Massive Open Online Course *		-	2 [#]			
			Total	120	90+2[#]			2200

* As per the guidelines of the UGC all the UG and the PG students shall enrol for one Massive Open Online Course offered through SWAYAM, NPTEL, etc.

Two extra credits will be given on completion of the course.

I SEMESTER			
DSC 1	DESIGN AND ANALYSIS OF ALGORITHM	18PCCS11	
Hrs / Week: 6	Hrs / Sem: 90	Hrs / Unit: 18	Credits: 4

OBJECTIVES

- To analyze the asymptotic performance of algorithms, and demonstrate a familiarity with major algorithms and data structures.
- To apply important algorithmic design paradigms and methods of analysis

UNIT I INTRODUCTION

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search -Travelling Salesman Problem - Knapsack Problem – Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE

Computing a Binomial Coefficient – Warshall’s and Floyd’ algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim’s algorithm- Kruskal's Algorithm-Huffman-Trees.

UNIT IV ITERATIVE IMPROVEMENT

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees- Coping with the Limitations - Backtracking – n-Queens problem – Hamiltonian Circuit Problem –Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem.

TEXT BOOK(S):

Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.

REFERENCE(S):

1. 1.Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
3. 3.Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.
4. <http://nptel.ac.in/>

I SEMESTER			
DSC 2	LINUX PROGRAMMING	18PCCS12	
Hrs / Week: 6	Hrs / Sem: 90	Hrs / Unit: 18	Credits: 4

OBJECTIVES

- To control the resources with various commands and to understand File systems and File structures.
- To understand the client, server programming

UNIT-I: LINUX INTRODUCTION

Linux history –Features –Types – Installing Linux: Installation – System Configuring for Installation –Upgradation –Setting up disk partition –Adding new partition –Editing a Partition –Deleting a Partition –Linux hard disk layouts –Boot sector –Boot process

UNIT-II: LINUX COMMANDS AND TEXT EDITORS

Basic Linux Commands:ls, dircommands, date, cut, paste, sort, join – Using the File System –File & Directory Permissions –Text Editors: vi and Emacs

UNIT-III: GUI BASED LINUX

GNOME Architecture-GNOME Desktop-Programming in GNOME using GTK-Applications in GNOME

UNIT-IV: LINUX SHELL PROGRAMMING

Shell Scripting –Variables –Basic Control structures –Loops – Command Line Arguments

UNIT-V: SYSTEM ADMINISTRATION COMMANDS

Gawk –System Administration Basics: User and group administration –Starting and stopping the system - password recovery-user management

TEXT BOOK(S):

1. Vijay shekar, Red Hat Linux- Study Guide, First Edition: 2006, Firewall Media. Print ISBN: 81-7008-862-3
2. Mark G.Sobell, *A Practical Guide to Linux (R) Commands editors and shell programming*, 1st Edition: Prentice Hall PTR, July 2005.Print
3. Neil Mathew, Richard Stones, *Beginning Linux Programming*, 4th Edition: WTECH, 2008.Print ISBN: 8126515716.
4. Richard Peterson, *Linux: The complete Reference*, 6th Edition: McGraw-Hill Osborne Media, November 2007.Print

REFERENCE BOOK(S):

1. Bill Ball, Hoyt Dulf, *Linux Unleashed*, 1st Edition, Indiana, SAMS Publishing, 2000.Print
2. Peter Norton, *Linux Complete Reference*, 7th Edition, USA, BPB Publications, SYBEX Inc, 1999.Print

WEBSITE(S):

1. nptel.iitkac.in/courses/webcourse-contents/IISc-BANG/
2. <https://www.mooc-list.com/tags/linux>
3. <http://www.kegel.com/linux/traing.html>
4. <http://www.lancom-tech.com/hello-lnux-inst-supp-matls.html>
5. <http://www.isd.mel.nist.gov/projects/rtlinux/rtutorial/doc/basics.html>
6. <http://www.gtk.org/tutorial/>

I SEMESTER			
DSC 3	PYTHON PROGRAMMING		18PCCS13
Hrs / Week: 6	Hrs / Sem: 90	Hrs / Unit: 18	Credits: 4

OBJECTIVES

- To understand the concepts of list and tuple.
- To know the concepts of network programming.

UNIT I WELCOME TO PYTHON

Welcome to Python - What is Python – History of Python – Features of Python – Installing Python – Running Python - Comments - Operators - Variables and Assignment - Python Objects - Standard Types - Other Built-in Types - Internal Types - Standard Type Operators - Standard Type Built-in Functions - Categorizing the Standard Types - Unsupported Types

UNIT II INTRODUCTION TO NUMBERS

Introduction to Numbers – Integers - Floating Point Real Numbers - Complex Numbers – Operators - Built-in Functions - Sequences – Strings - Strings and Operators - String-only Operators - Built-in Functions - String Built-in Methods - Special Features of Strings

UNIT III LISTS, TUPLES, LOOPS

Lists – Operators - Built-in Functions - List Type Built-in Methods - Special Features of Lists - Tuples - Tuple Operators and Built-in Functions - Special Features of Tuples - Conditionals and Loops - if statement - else statement - else if statement - while statement - for statement - break statement - continue statement - pass statement - else statement

UNIT IV EXPRESSIONS

Regular Expressions – Introduction – Special symbols and characters for Regular Expressions – Regular Expressions and Python – Network Programming – Introduction – Network programming in Python – Sockets : Communication end points

UNIT V GUI PROGRAMMING

GUI Programming with TKinter – Introduction TKinter and Python Programming – Tkinter examples – Related modules and other GUIs – Web programming – Web surfing with Python – Advanced web clients.

TEXT BOOK(S):

Chun, J Wesley, CORE Python Programming, 2 nd Edition, Pearson, 2007 Reprint 2010.

UNIT I: Chapter 1, 2, 4 UNIT II: Chapter 5, 6 UNIT III: Chapter 6, 8

UNIT IV: Chapter 15, 16 UNIT V: Chapter 18, 19

REFERENCE(S):

Jeffrey Elkner, Chris Meyers Allen Downey, Learning with Python, Dreamtech Press, 2015

I SEMESTER			
DSE-1A	CLOUD COMPUTING		18PECS1A
Hrs / Week:4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To study the basics of cloud computing and different Cloud Computing services
- To understand the key concepts of virtualization, Cloud Implementation, Programming and Mobile cloud computing

UNIT-I: UNDERSTANDING CLOUD COMPUTING

Cloud computing-cloud types-the cloud cube model-deployment models – servicemodels - characteristics of cloud computing:Benefits of Cloud Computing- Disadvantages of Cloud Computing-assessing the role of open standards.

UNIT-II: CLOUD ARCHITECTURE

The cloud computing stack – composability – infrastructure – platforms – virtual appliances – communication protocols –Connecting to the cloud: The Jolicloud net book OS – Chromium OS the browser as an operating system.

UNIT-III: DEVELOPING CLOUD SERVICES

Infrastructure as a service (IaaS) – IaaS workloads- Platform as a service (PaaS) – Software as a service (SaaS)– Identity as a service (IDaaS) – Compliance as a service(CaaS).

UNIT-IV: VIRTUALIZATION AND CLOUD APPLICATIONS

Virtualization technologies – load balancing and virtualization – advanced load balancing – the Google cloud – Google Analytics – Google translate- Google Toolkit –Google APIs-Windows Azure service – Windows Azure App fabric.

UNIT-V: CLOUD STORAGE

Cloud storage – unmanaged cloud storage – managed cloud storage – creating cloud storage systems – working with Amazon storage systems: Amazon Elastic compute cloud(EC2)- Amazon simple storage system(S3) – Amazon Elastic block store(EBS)- cloud front-security issues

TEXT BOOK(S)

Barrie Sosinsky, *Cloud Computing Bible*, New Delhi: Wiley India Pvt. Ltd, 2012.Print Chapters: 1,3,4,5 (pgs:94-99), 8(pgs:162-173), 10(pgs:201-216), 15(pgs:316-321), 9(pgs:185-199).

REFERENCE BOOK(S)

1. Haley Beard,,*Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*, Emereo Pvt. Limited, July 2008.Print
2. Michael Miller, *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Second Edition, Que Publishing, August 2008.Print

WEBSITE(S) :

1. www.infoworld.com/d/cloud-computing/
2. <http://cecs.wright.edu/~pmateti/Courses/2350/Labs/Cloud/CloudComputing.html>
3. <https://www.windowsazure.com/en-us/>

I SEMESTER			
DSE-1B	AD-HOC AND SENSOR NETWORKS		18PECS1B
Hrs / Week:4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To study the protocols and functionalities of ad-hoc networks.
- To understand various application development based on ad hoc networking and learn about the security issues in ad-hoc and sensors networks.

UNIT I ADHOC NETWORKS & COMMUNICATION PROTOCOLS

Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration and Auto Configuration-issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols.

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches – Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR,AODV, Hybrid Routing Approach ZRP, CBRP.

UNIT III SENSOR NETWORK COMMUNICATION PROTOCOLS

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN" s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee – Link Layer and Error Control Issues.

UNIT IV SENSOR NETWORK MANAGEMENT AND PROGRAMMING

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators.

UNIT V ADHOC AND SENSOR NETWORK SECURITY

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols.

TEXT BOOK(S):

1. Amiya Nayak, Ivan Stojmenovic, : Wireless Sensor and Actuator Networks : Algorithm and Protocols for Scalable Coordination and Data communication John Wiley & Sons 2010
2. C.Siva Ram Murthy and B.S.Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2011.

REFERENCE(S):

1. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.

2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications", Second Edition, World Scientific Publishing, 2011.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2007
4. ErdalÇayırıcı ,Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009
5. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004. 8. Feng Zhao, Leonidas Guibas, " Wireless Sensor Networks : An information processing Approach " , Elsevier 2004.
6. Holger Karl, Andreas willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc .2007.
7. Kazem Sohraby, Daniel Minoli, TaiebZnati , Wireless Sensor Networks: Technology, Protocols and Applications, Wiley Interscience A John Wiley & sons, Inc., Publication 2007.
8. WaltenequsDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010

I SEMESTER		
P-1	LINUX PROGRAMMING LAB	18PCCS1P1
Hrs / Week:4	Hrs / Sem: 60	Credits: 2

OBJECTIVES

- To learn shell script and sed concepts.
 - To learn file management and permission advance commands.
 - To learn awk, grap, perl scripts.
- 1) Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line.
 - 2) Write a shell script that delete all lines containing a specified word .
 - 3) Write ashell script that displays a list of all the files in the current directory.
 - 4) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and report.
 - 5) Write a shell script that accept a list of file names as arguments count and report the occurrence of each word.
 - 6) Write a shell script to find the factorial of given integer.
 - 7) Write a shell script that list the all files in a directory.
 - 8) Write aawk script to find the number of characters, words and lines in a file? linked list respectively.
 - 9) Write a C Program that makes a copy of a file using standard I/O and system calls?
 - 10)Implement in C the following Unix commands using system calls
A) cat B)mv

I SEMESTER		
P-2	PYTHON PROGRAMMING LAB	18PCCS1P2
Hrs / Week:4	Hrs / Sem: 60	Credits: 2

OBJECTIVES

- To study the basics of Python programming.
- To study about decision making, Functions and Files Handling in Python.

1. Program to demonstrate arithmetic operations.
2. Program using numbers and operators.
3. Program to demonstrate string manipulation.
4. Program using user defined functions.
5. Program using lists.
6. Program using tuples.
7. Program using conditional statement.
8. Program using looping statement.
9. Program using continue, pass and else statement.
10. Program to demonstrate the use of regular expressions.
11. Program to demonstrate exception handling.
12. Program to demonstrate network programming.
13. Program to demonstrate GUI programming with Tkinter.
14. Program using web programming.
15. Program using advanced web clients.

II SEMESTER			
DSC 4	OPEN SOURCE TECHNOLOGY		18PCCS21
Hrs / Week:5	Hrs / Sem:75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To provide knowledge about FOSS.
- To study programming languages like PHP, Ruby and Rails.
- To learn the Open Source database like MongoDB.

UNIT I INTRODUCTION

Introduction to Open Sources – Free Software Vs Open Source Software – Public Domain Software – Open Source Vs Closed Source - Need of Open Sources – Advantages of Open Sources – Application of Open Sources – Open Source Ethics – Social and Financial Impacts of Open source Technology – Open Source Development model Licenses and Patent, Important FOSS Licenses (Apache, BSD, GPL, LGPL), Copyrights – Copyleft.

UNIT II OPEN SOURCE PROGRAMMING LANGUAGES

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

UNIT III OPEN SOURCE DATABASE

Documents Database- MongoDB- Installation – crud operations- insert, modify, remove & query documents- 2-phase commits- Data models- Administration-security – aggregation- Indexes- Mongo shell – operators- couch DB over MongoDB.

UNIT IV RAILS

Introduction - DRY - COC - MVC - REST - Migrations - Active Record Validations - Active Record Associations - Active Record Query Interface - Layouts and Rendering - Action Controller - Rails Routing.

UNIT V RUBY

History and Design of Ruby – Classes, Objects and Variables – Containers, Blocks and Iterators – Standard Types – Methods – Expressions – Exceptions – Modules – Input and Output – Threads and Processes – Ruby and Web – Reflection – ObjectSpace – Distributing Ruby. Open source tools and technologies web server: Apache Web server – Working with Web Server – Configuring and Using apache web services.

REFERENCE(S):

1. Fadi. P. Deek and James A. M. McHugh, Open Source Technology and Policy, Cambridge University Press.
2. Kristina Chodorow and Michael Dirolf, “MongoDB: The Definitive Guide”, O’Reilly, 2010.
3. Rasmus Lerdorf and Kevin Tatroe, “Programming PHP”, O’Reilly, 2013.
4. Bruce A Tate and Curt Hibbs, “Ruby on Rails: Up and Running”, O’Reilly Media, 2008.
5. Carlson and Leonard Richardson, “Ruby Cookbook”, O’Reilly Media, 2008.
6. Peter Wainwright, “Professional Apache”, Wrox Press, 2002. 15MXDI HUMAN COMPUTER

II SEMESTER			
DSC-5	ADVANCED DATABASE MANAGEMENT SYSTEM		18PCCS22
Hrs / Week:5	Hrs / Sem:75	Hrs / Unit :15	Credits: 4

OBJECTIVES

- To present an introduction to database management systems.
- To understand how to organize, maintain and retrieve the information from a DBMS efficiently.

UNIT I RELATIONAL MODEL

Introduction - Structure of Relational Data Base - Relational Algebra. ER Model - Basic Concepts - Conversion of ER Model into Relations - ER Diagram Symbols. EER Model - Subclasses - Entity Types and Superclasses.

UNIT II DATA BASE DESIGN

Functional Dependency and Decomposition - Functional Dependency - Decomposition. Normalization - Introduction - Normalization - Normal Forms - BCNF - 4 NF - 5 NF.

UNIT III QUERY PROCESSING AND OPTIMIZATION

Introduction - Query Processing - Syntax Analyzer - Query Decomposition - Query Optimization. Transaction Processing and Concurrency Control: Transaction Concepts - Concurrency Control.

UNIT IV DATA BASE RECOVERY AND SECURITY

Introduction - Database Recovery Concepts - Types of Database Failures - Types of Database Recovery - Recovery Techniques - Buffer Management. Goals of Database Security - Discretionary Access Control - Mandatory Access Control - Firewalls - Statistical Database Security - Data Encryption.

UNIT V DATA BASE TECHNOLOGIES

Introduction - Parallel Databases - Architecture of Parallel Databases - Key Elements of Parallel Database Processing - Distributed Data Bases - Architecture of Distributed Data Bases - Distributed Data Base System Design - Recovery Control in Distributed Databases. Internet Databases - Digital Libraries - Multimedia Databases - Mobile Databases - Spatial Databases.

TEXT BOOK(S):

1. S.K. Singh, "Database Systems Concepts, Design and Applications", Pearson Education Pte. Ltd., New Delhi: 2006.
2. C.J. Date and others, "An Introduction to Database Systems", Eighth Edition, Pearson Education Pte. Ltd., New Delhi: 2006.
3. Abraham Silberschatz, "Database Systems", McGraw Hill International, 1997.

REFERENCE(S):

1. Paneerselvam R, "Database management systems", PHI, 2005.
2. Narang Rajesh, "Database management systems", PHI, 2005.
3. ISRD Group, "Introduction to database management systems", TMG, 2006.
4. Ramakrishnan, Gehrke, "Database management systems", 3/E, TMG, 2003.

II SEMESTER			
DSC 6	INTERNET OF THINGS		18PCCS23
Hrs / Week:5	Hrs / Sem: 75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To understand the fundamentals of Internet of Things, learn about the basic of IOT protocols, a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I THE INTERNET OF THINGS

An Overview –The Internet of Things – The Technology of the Internet of Things - Enchanted objects. Design Principles for Connected Devices: Calm and Ambient Technology – metaphor – Privacy – Web thinking for connected Devices.

UNIT II INTERNET PRINCIPLES

Internet Communications overview – IP – TCP – TCP/I P – UDP. IPAddresses: DNS – Static and Dynamic IP Address Assignment – MAC Addresses – TCP and UDP Ports – Application Layer Protocols. Prototyping: Sketching – Familiarity – Prototypes and Production – Open Source versus Closed Source.

UNIT III PROTOTYPING EMBEDDED DEVICES

Electronics - Embedded Computing Basics – Arduino -Raspberry Pi - Beagle Bone Black - Electric Imp. Prototyping the Physical Design: Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.

UNIT IV PROTOTYPING ONLINE COMPONENTS

API - Writing a New API - Real-Time Reactions - OtherProtocols. Techniques for Writing Embedded Code: Memory Management - Performance and Battery Life – Libraries - Debugging.

UNIT V BUSINESS MODELS

History of Business Models – Model – Internet of Starting up – LeanStartups. Moving to Manufacture: Designing Kits - Designing Printed circuit boards – Certification – Costs - Scaling Up Software. Ethics: Privacy – Control – Environment – Solutions.

TEXT BOOK(S)

Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014.

REFERENCE(S)

1. OvidiuVermesan and Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers, 2014.
2. Peter Waher, “Learning Internet of Things” ,Packt Publishing, 2015.
3. Donald Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack”, McGraw Hill, 2015.

II SEMESTER			
DSE-2A	SECURITY PRACTICES		18PECS2A
Hrs / Week:4	Hrs / Sem:60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To be exposed to the concepts of Cyber Security and Encryption concepts.
- To perform a detailed study of privacy and storage security and related issues.

UNIT I SYSTEM SECURITY

Building a secure organization- A Cryptography primer- detecting system Intrusion- Preventing system Intrusion- Fault tolerance and Resilience in cloud computing environments- Security web applications, services and servers.

UNIT II NETWORK SECURITY

Internet Security - Botnet Problem- Intranet security- Local Area Network Security - Wireless Network Security - Wireless Sensor Network Security- Cellular Network Security- Optical Network Security- Optical wireless Security.

UNIT III SECURITY MANAGEMENT

Information security essentials for IT Managers- Security Management System - Policy Driven System Management- IT Security - Online Identity and User Management System - Intrusion and Detection and Prevention System.

UNIT IV CYBER SECURITY AND CRYPTOGRAPHY

Cyber Forensics- Cyber Forensics and Incidence Response - Security e-Discovery - Network Forensics - Data Encryption- Satellite Encryption - Password based authenticated Key establishment Protocols.

UNIT V PRIVACY AND STORAGE SECURITY

Privacy on the Internet - Privacy Enhancing Technologies - Personal privacy Policies - Detection of Conflicts in security policies- privacy and security in environment monitoring systems. Storage Area Network Security - Storage Area Network Security Devices - Risk management - Physical Security Essentials.

REFERENCE(S):

1. John R.Vacca, Computer and Information Security Handbook, Second Edition, Elsevier 2013.
2. Michael E. Whitman, Herbert J. Mattord, Principal of Information Security, Fourth Edition, Cengage Learning, 2012.
3. Richard E.Smith, Elementary Information Security, Second Edition, Jones and Bartlett Learning, 2016

II SEMESTER			
DSE-2B	CYBER SECURITY		18PECS2B
Hrs / Week:4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To understand the difference between threat, risk, attack and vulnerability.
- To identify how threats materialize into attacks and the motivation behind them.

UNIT I INTRODUCTION TO CYBER SECURITY

Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

UNIT II SECURITY IN OPERATING SYSTEM & NETWORKS

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

UNIT III DEFENCES: SECURITY COUNTER MEASURES

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

UNIT IV PRIVACY IN CYBERSPACE

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

UNIT V MANAGEMENT AND INCIDENTS

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare-Cyberspace and the Law - International Laws - Cyber crime - Cyber Warfare and Home Land Security.

TEXT BOOK(S):

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
2. George K.Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.

REFERENCE(S):

1. Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics,Technology and Automation edited, Springer International Publishing Switzerland 2015
2. Nelson Phillips and Enfinger Stuart, Computer Forensics and Investigations, Cengage Learning, New Delhi, 2009.

II SEMESTER		
P-III	OPEN SOURCE TECHNOLOGY LAB	18PCCS2P1
Hrs / Week: 4	Hrs / Sem: 60	Credits: 2

OBJECTIVE

- To provide practical experience in software development using open source tools like PHP and Ruby.
1. Write a program to Addition of two numbers using php.
 2. Write a program to show data types in php.
 3. Write a program to using class in php.
 4. Write a php program to connect to database.
 5. Write a program using function in ruby
 6. Write a program using arguments in ruby
 7. Write a program to remove funny character from a file using ruby
 8. Write a program to find a URL and print the web page to the screen using ruby

REFERENCES

<https://www.fincher.org/tips/Languages/Ruby/>

II SEMESTER		
P-IV	ADVANCED DATABASE MANAGEMENT SYSTEM LAB	18PCCS2P2
Hrs / Week: 4	Hrs / Sem: 60	Credits: 2

OBJECTIVES

- To understand the basic concepts and applications of Object Oriented database.
 - To understand and work on areas like Storage, Retrieval, Multi valued attributes, Triggers and other complex objects.
1. Creation of a database and writing SQL queries to retrieve information from database.
 2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
 3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
 4. Creating an Employee database to set various constraints.
 5. Creating relationship between the databases.
 6. Write a PL/SQL block that handles all types of exceptions.
 7. Creation of Procedures.
 8. Creation of database triggers and functions

III SEMESTER			
DSC 7	DATA MINING CONCEPTS AND TECHNIQUES		18PCCS31
Hrs / Week:5	Hrs / Sem: 75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To Understand the value of data mining in solving real world.
- To Understand the algorithms commonly used in data mining tools and ability to apply data mining tools to real world problems.

UNIT I INTRODUCTION

Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse –A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining.

UNIT II DATA PROCESSING

Data preprocessing – Data cleaning – Data Integration and Transformation – Data Reduction –Discretization and concept hierarchy generation – Data mining primitives – Data mining Task

UNIT III ASSOCIATION RULES

Association Rule Mining – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification Classification by Back propagation – classification based on concepts from association rule mining

UNIT IV DATA MINING TECHNIQUES

Cluster Analysis-A categorization of Major clustering methods-Partitioning methods Hierarchical methods -Grid based methods - Model based clustering methods Density - based methods.

UNIT V APPLICATIONS

Applications and Trends in Data Mining – Data mining system Products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining Mining Spatial Databases – Mining Timeseries and sequence data – Mining the World wide web.

TEXT BOOK(S):

1. Jiwei Han, Michelen Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an Imprint Of Elsevier, 2001.(Chapters 1,2,3,4.1, 6.1 ,6.2, 7,8, 9.2, 9.4, 9.6, 10)

REFERENCE(S):

1. Arun K.Pujari, Data Mining Techniques, Universities Press(India) Limited, 2001.
2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, First Edition, 2002.
3. PangNing Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson,2008.
4. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Prentice Hall, 2008.

III SEMESTER			
DSC 8	SOFTWARE TESTING		18PCCS32
Hrs / Week:5	Hrs / Sem: 75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To learn about White box testing and Black Box testing methods and techniques.
- To study about quality Assurance models.

UNIT I: PRINCIPLES OF TESTING AND SOFTWARE LIFE CYCLE MODELS

Principles of Testing – Software Testing Standards - Phases of Software Project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation- Process model to represent different phases- Life Cycle Models

UNIT II: WHITE BOX, BLACK BOX AND INTEGRATION TESTING

Overview of White Box Testing– Classification - Static Testing methods – Structural Testing Classification - Challenges in White Box Testing – Overview of Black Box Testing -- Need for Black Box Testing – Scope of Black Box Testing -- Implementation Techniques

UNIT III: INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Overview of Integration Testing – Integration Testing Methodologies – Testing as a Phase of Testing – Scenario Testing – Defect Bash – System Testing Overview – Need for System Testing – Functional versus Non-Functional Testing – Techniques for Functional System Testing – Non-Functional Testing –Acceptance Testing – Summary of Testing Phases

UNIT IV: PERFORMANCE AND REGRESSION TESTING

Introduction -- Factors Governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Challenges – Overview of Regression Testing – Types of Regression Testing – Scope of Regression Testing – Methodology for Regression Testing

UNIT V: TEST MANAGEMENT AND AUTOMATION

Introduction – Test Planning – Test Management – Test Process – Test Reporting –Best Practices – Test Automation Overview – Terms used in Automation – Skills needed for Automation – Scope of Automation –Design and Architecture for Automation – Generic requirements for test

Tool/Framework- Process Model for Automation – Selecting a Test Tool –
Automation for Extreme Programming Model – Challenges

TEXTBOOK(S):

1. Srinivasan Desikan&Gopalaswamy Ramesh, (2007). *Software Testing Principles and Practices*, (5th Impression), Delhi: Pearson Education. Print.(Chapters: 1 to 8,15,16)

REFERENCE(S):

1. Dinesh Maidasani, (2007). *Software Testing*, (1st ed.), New Delhi: Firewall Media. Print.
2. Ilene Burnstein, (2007). *Practical Software Testing*, (3rd reprint), New Delhi: Springer (India) Private Limited. Print.
3. V. K. Jain, (2010). *Introduction to Software Testing and Analysis*, (Vol. I), New Delhi: Atlantic publishers & distributors (P) Ltd. Print.

WEBSITE(S):

1. <http://softwaretestingfundamentals.com/>
2. www.softwaretestingstandard.org/
3. https://www.tutorialspoint.com/software_testing/software_testing_iso_standards.htm (Software Testing Standards)
4. <https://www.guru99.com/junit-tutorial.html>
5. https://www.tutorialspoint.com/junit/junit_execution_procedure.htm
6. <http://nunit.org/docs/2.5.4/quickStart.html>

III SEMESTER			
DSC 9	DIGITAL IMAGE PROCESSING		18PCCS33
Hrs / Week:5	Hrs / Sem:75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To learn and understand the fundamentals of digital image processing, and various image Transforms.
- To learn Image Enhancement Techniques, Image restoration Techniques, image compression and Segmentation used in digital image processing.

UNIT I INTRODUCTION TO IMAGE PROCESSING

Digital Image Processing – Mat Lab Working Environment – Image Representation – reading images – Displaying images – Writing images – Data classes – Image types – Converting between data classes and image types – Array indexing – M-Function Programming

UNIT II SPATIAL DOMAIN AND FREQUENCY DOMAIN PROCESSING

Intensity Transformation functions – Histogram processing and function plotting – spatial filtering – 2-D Discrete Fourier transformation – filtering in the frequency domain – generating and sharpening frequency domain filters

UNIT III IMAGE RESTORATION AND COLOR IMAGE PROCESSING

Model of the image degradation / restoration process – Noise models – Periodic Noise Reduction using frequency domain filtering – direct inverse filtering – wiener filtering – constrained least square filtering – Lucy – Richardson algorithm – color image representation

UNIT IV IMAGE COMPRESSION AND MORPHOLOGICAL IMAGE PROCESSING

Coding redundancy - Spatial redundancy – psycho visual redundancy – JPEG compression - Morphological image processing – dilation and erosion – morphological reconstruction

UNIT V IMAGE SEGMENTATION AND REPRESENTATION

Point , Line, Edge Detection – Hough Transform – Thresholding – Region based Segmentation – Watershed Transform – Representation – Boundary Descriptors – Regional Descriptors.

TEXT BOOK(S):

1. Rafael C.Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing using MATLAB, Pearson Education Inc, New Delhi, 2007.

REFERENCE(S):

1. Chanda. B. Dutta Majumder, D. Digigal Image Processing and Analysis, Prentice Hall of India, New Delhi, 2007.
2. Gonzalez, R.C., Wintz P Digital Image Processing, Addison-wesley Longman Publishing Co, New Delhi – 1987
3. Scott E. Umbaug, Computer Vision and Image Processing, Prentice Hall International, New Delhi, 1998.

III SEMESTER			
DSE-3A	MOBILE COMPUTING		18PECS3A
Hrs / Week: 4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications

UNIT I: INTRODUCTION TO MOBILE COMPUTING

Mobility of bits and bytes – Wireless the beginning – Developing mobile Computing application – Mobile computing architecture – GSM – Architecture-Entities – Call Routing in GSM – PLMN Interfaces.

UNIT II: INTRODUCTION TO DIGITAL TRANSMISSION

Digital to Digital Conversion – Line Coding – line coding schemes – Block coding – Scrambling – Analog-to – Digital Conversion - Pulse code modulation –delta modulation – Transmission modes – Parallel Transmission – Serial Transmission.

UNIT III WAP & 3G

Introduction to WAP – MMS, GPRS Application; CDMA and 3G: Spread Spectrum technology CDMA Vs GSM – wireless data – third generation networks – application on 3G

UNIT IV: WIRELESS LAN, INTERNET NETWORKS AND INTERNET WORKING

Introduction – Wireless LAN advantages IEEE802.11 standards wireless LAN architecture – mobility in wireless LAN - Wireless LAN security – Fundamentals of call processing – Intelligence in the networks – SS#7 – INCM – softswitch – programmable networks – Technologies and interfaces for IN.

UNIT V: PROTOCOLS SUPPORTING MOBILITY

Mobile network layer protocols such as mobile IP –Dynamic Host Configuration Protocol (DHCP)-Mobile transport layer protocols such mobile TCP, indirect –TCP – Wireless Application Protocol (WAP).

TEXTBOOK(S):

1. Asoke K Talukder & Roopa R Yavagal, Mobile Computing, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters 4,5 ,Chapters 1,2,8,9,10,11
2. J.Schiller, Mobile Communications, ISBN:0-321-12381-6, Addison-Wesley, 2003,
3. Behrouz AForouzan, Data Communications and Networking, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters 4.

REFERENCE(S):

1. T.S. Rappaport, Wireless communications, Principle and Practice, Pearson, 2002.
2. A.S.Tanenbaum, Computer Networks, 4th edition, Publisher: Prentice Hall PTR; ISBN: 0130661023; August, 2002.

REFERENCE SITES:

1. www.dcg.ethz.ch
2. www.informatik.uni-goettingen.de
3. www.ebookee.net

III SEMESTER			
DSE-3B	SOCIAL COMPUTING		18PECS3B
Hrs / Week: 4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To create original social application, critically applying appropriate theories and effective practices in a reflexive and creative manner.
- To critically analysis social software in term of its technical, social, legal , ethical and functional feature.

Unit I BASIC CONCEPTS

Networks and Relations: Relations and Attributes, Analysis of Network Data, Interpretation of network data -New Social Learning – Four Changes that Shift Work - Development of Social Network Analysis: Sociometric analysis and graphtheory, Interpersonal Configurations and Cliques – Analysing Relational Data.

Unit II SOCIAL LINK

Individual Actors, Social Exchange Theory, Social Forces, Graph Structure, Agent Optimization Strategies in Networks – Hierarchy of Social Link Motivation- Social Context.

Unit III SOCIAL MEDIA

Trends in Computing – Motivations for Social Computing – Social Media: Social relationships, Mobility and Social context – Human Computation – Computational Models- Business use of social Media.

Unit IV SOCIAL INFORMATION FILTERING

Mobile Location Sharing – Location based social media analysis – Social Sharing and Social Filtering – Automated recommender Systems – Traditional and Social Recommender Systems.

Unit V SOCIAL NETWORK STRATEGY

Application of Topic Models – Opinions and Sentiments – Recommendation Systems – Language Dynamics and influence in online communities–Psychometric analysis – Case Study: Social Network Strategies for surviving the zombie apocalypse.

REFERENCE(S):

1. Tony Bingham, Marcia Conner, “The New Social Learning, Connect. Collaborate. Work”, 2nd Edition, ATD Press, ISBN-10:1-56286-996-5, 2015.
2. Nick Crossley, Elisa Bellotti, Gemma Edwards, Martin G Everett, Johan Koskinen, Mark Tranmer, “Social Network Analysis for Ego-Nets”, SAGE Publication, 2015.
3. Zafarani, Abbasi and Liu, Social Media Mining: An Introduction, Cambridge University Press, 2014.
4. John Scott, “Social Network Analysis”, Third Edition, SAGE Publication, 2013
5. Jennifer Golbeck, “Analyzing the Social Web”, Elsevier Publication, 2013.
6. Huan Liu, John Salerno, Michael J. Young, “Social computing and Behavioral Modeling”, Springer Publication, 2009.
7. Christina Prell, “Social Network Analysis: History, Theory and Methodology”, 1st Edition, SAGE Publications Ltd, 2012

III SEMESTER		
P-V	DATA MINING LAB	18PCCS3P1
Hrs / Week:4	Hrs / Sem: 60	Credits: 2

OBJECTIVES

- To introduce data mining techniques including predictive, descriptive and visualization modeling.
- To focus on the main process of data mining such as data preparation, classification, clustering, association analysis and pattern evaluation.

1. Build Data Warehouse and Explore WEKA
2. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
3. Demonstrate performing classification on data sets
4. Demonstrate performing clustering on data sets
5. Demonstrate performing Regression on data sets
6. Sample Programs using Hospital Management System

III SEMESTER		
P-VI	IMAGE PROCESSING LAB	18PCCS3P2
Hrs / Week:4	Hrs / Sem: 60	Credits: 2

OBJECTIVE

- To implement the methods and algorithm for image processing in MatLab.

1. Point processing in spatial domain
 - a. Negation of an image
 - b. Thresholding of an image
 - c. Contrast Stretching of an image
2. Bit Plane Slicing
3. Histogram Equalization
4. Histogram Specification
5. Zooming by interpolation and replication
6. Filtering in spatial domain
 - a. Low Pass Filtering
 - b. High Pass Filtering
 - c. Median filtering
7. Edge Detection using derivative filter mask
 - a. Prewitt
 - b. Sobel
 - c. Laplacian
8. Data compression using Huffman coding
9. Filtering in frequency domain
 - a. Low pass filter
 - b. High pass filter
10. Hadamard transform

IV SEMESTER			
DSC-10	BIG DATA ANALYTICS		18PCCS41
Hrs / Week:5	Hrs / Sem:75	Hrs / Unit: 15	Credits: 4

OBJECTIVES

- To understand the Big Data Platform and its Use cases.
- To provide an overview of Apache Hadoop, MongoDB.

UNIT I INTRODUCTION TO BIG DATA

Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

UNIT II BIG DATA ANALYTICS

Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

UNIT III BIG DATA TECHNOLOGIES AND DATABASES

Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

UNIT IV HADOOP FOUNDATION FOR ANALYTICS

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures.

UNIT V HADOOP MAPREDUCE AND YARN FRAMEWORK

Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

TEXT BOOK(S):

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016

REFERENCE(S):

1. "Big Data" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. "Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics" by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. "Mining of Massive Datasets", Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. "Hadoop: The definitive Guide", Tom White, O'Reilly Media, 2010.

IV SEMESTER			
DSC 11	SOFT COMPUTING		18PCCS42
Hrs / Week:5	Hrs / Sem:75	Hrs / Unit: 15	Credits: 4

OBJECTIVES:

- To introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real world problems.
- To insight into the tools that make up the soft computing techniques fuzzy logic, artificial neural networks and hybrid systems Techniques.

UNIT I ARTIFICIAL NEURAL NETWORK

Introduction – Neural Networks – Application Scope of Neural Networks – Fundamental Concept – Basic Models of Artificial Neural Network – Important Terminologies of ANNs – Hebb Network – Perceptron Networks – Adaptive Linear Neuron (Adaline) – Multiple Adaptive Linear Neurons – Back-Propagation Network

UNIT II ASSOCIATIVE MEMORY NETWORKS

Introduction – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory (BAM) – Hopfield Networks – Unsupervised Learning Networks :Kohonen Self-Organizing Feature Maps – Learning Vector Quantization – Counter Propagation Networks – Adaptive Resonance Theory Network.

UNIT III GENETIC ALGORITHM

Introduction – Biological Background – Basic Terminologies in Genetic Algorithm – Operators in Genetic Algorithm: Encoding – Selection – Crossover (Recombination) – Mutation – Stopping Condition for Genetic Algorithm Flow – Constraints in Genetic Algorithm – Problem Solving Using Genetic Algorithm – Classification of Genetic Algorithm : Messy Genetic Algorithms – Hybrid Genetic Algorithms.

UNIT IV FUZZY LOGIC

Introduction to Fuzzy logic – Classical Sets (Crisp Sets) - Fuzzy Sets – Classical Relations and Fuzzy Relations : Introduction – Cartesian Product of Relation – Classical Relation – Fuzzy Relations – Features of the Membership Functions – Fuzzification – Methods of Membership Value Assignments

UNIT V DEFUZZIFICATION AND DECISION MAKING

Defuzzification : Introduction – Lambda-Cuts for Fuzzy Sets(Alpha-Cuts) - – Lambda-Cuts for Fuzzy Relations – Defuzzification Methods – Fuzzy Decision Making : Introduction – Individual Decision Making – Multiperson Decision Making – Multiobjective Decision Making – Multiattribute Decision Making – Fuzzy Bayesian Decision Making

TEXT BOOK(S):

1. S.N Sivanandam S.N Deepa “Principles of Soft Computing”, Wiley –India, 2007.
2. Timothy J.Ross, “Fuzzy Logic with Engineering Application “, McGraw Hill, 2000.

REFERENCE(S):

1. S.Rajasekaran G.A.Vijayalakshmi Pai “Neural networks, Fuzzy logic, and Genetic algorithm” , synthesis and Applications
2. James A. Freeman, David M. Skapura, Neural Networks, Algorithms, Applications, and Programming Techniques.

IV SEMESTER		
DSC-12	PROJECT	18PCCS43
Hrs/Week:8	Hrs/Sem: 120	Credits:8

OBJECTIVE:

Every PG student is required to prepare the project subject related – based on the guidelines of his/her project guide.

The following are the guidelines to be adhered to

- The project should be an individual one
- The language for the project is **English**
- The Minimum number of pages should be **60**
- Project observations, suggestions and conclusion shall be formed aspart of the project.
- The Projectwill be evaluated both by the Internal as well as External Examiner each for 100 marks. The distribution of mark should be **60 marks for the Project Report and 40 marks for the Viva-voce Examination**.The Division of marks for the Project Report is as mentioned below:

Particulars	Internal Examiner	External Examiner
Wording of Title	5	5
Objectives/ Formulation including Hypothesis	5	5
Review of Literature	10	10
Relevance of Project to Social Needs	5	5
Methodology/ Technique/ Procedure Adopted	20	20
Summary/ Findings/ Conclusion	5	5
Bibliography/ Annexure/ Foot notes	10	10
Total	60	60

The average mark of Internal and External Examiner is considered as marks of Dissertation report.

IV SEMESTER			
DSE-4A	ARTIFICIAL INTELLIGENCE		18PECS4A
Hrs / Week:4	Hrs / Sem:60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To study the concept of Artificial Intelligence.
- To learn the methods of solving problems using Artificial Intelligence and Introduce the concepts of expert system and Machine Learning.

UNIT I ARTIFICIAL INTELLIGENCE

What is Artificial Intelligence? The AI Problems – The Underlying Assumptions – What is an AI Technique? Problem spaces and search – Defining the Problems as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programmes.

UNIT II KNOWLEDGE REPRESENTATION

Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means End Analysis-Knowledge Representation issues: Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem

UNIT III PREDICATE LOGIC

Using predicate logic – Representing Simple facts in Logic – Representing Instance and Is a relationships – Computable functions and Predicates – Resolutions – Natural Deductions – Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Forward versus Backward Reasoning – Matching – Control Knowledge

UNIT IV REASONING

Symbolic Reasoning under uncertainty – Introduction to Non Monotonic Reasoning – Logics for Non Monotonic Reasoning – Implementation issues – Implementation : Breadth – First Search – Statistical reasoning – Bayesian Networks – Fuzzy Logic- Learning: What is learning? – Rote Learning – Learning by taking advice

UNIT V EXPERT SYSTEM

Connectionist Models – Introduction – Hopfield Networks – Learning in Neural Networks – Applications of Neural Networks – Expert Systems – Representing and Using Domain Knowledge – Expert System Shells – Explanation – Knowledge acquisition

TEXT BOOK(S):

11. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivas Shankar B Nair, TataMcGraw Hill Publishing Ltd., - New Delhi, Third Edition, 2009.

REFERENCE(S):

1. Introduction to Artificial Intelligence and Expert Systems, Dan W.Patterson, Prentice Hall of India, New Delhi, 1992
2. Artificial Intelligence, A Modern Approach, Stuart J. Russell and Peter Norvig, Pearson Education, reprint 2003.
3. Introduction to Expert Systems, 3/e, Peter Jackson, Pearson Education, Reprint 2003
4. Artificial Intelligence, A New Synthesis, Nils J. Nilsson Harcourt Asia Pvt. Ltd., 1998

IV SEMESTER			
DSE-4B	HUMAN COMPUTER INTERFACE		18PECS4B
Hrs / Week:4	Hrs / Sem: 60	Hrs / Unit: 12	Credits: 4

OBJECTIVES

- To learn the Foundations Of Human Computer Interface.
- To understand the awareness of Mobile HCI and guidelines for User Interface.

Unit I FOUNDATIONS

Human: Human memory – Emotion – Individual differences – Psychology and the design of interactive systems – Computer: Devices used for Text entry, display, virtual reality and 3D interactions – Positioning & pointing – physical controls, sensors and special devices – memory – processing and networks. Interactions: Models of interactions - Framework – interaction styles – context of interactions -elements of WIMP interface.

Unit II INTERACTION DESIGN BASICS

Paradigms of interactions – process of design – HCI in software process – software life cycle – usability engineering – interactive design and prototyping – design rules: principles to support usability – standards – guidelines and rules for heuristics – HCI patterns – implementation support – evaluation technique – user support.

Unit III IMPLEMENTATION AND EVALUATION

Elements of windowing systems – Toolkits – User interface systems – Goals of evaluation – evaluation through expert system, user participation – choosing evaluation method – universal design principles – multi-modal interaction – design focus – user support.

Unit IV MODELS AND THEORIES-1

Cognitive models : Goals and task hierarchies – linguistic models – challenge of display based systems- physical and device models – cognitive architecture – socio organizational issues and stakeholder requirements: organizational issues – capturing requirements.

Unit V MODELS AND THEORIES-2

Communication and collaboration models: face to face communication – conversion – text based communication – group working – task analysis: task decomposition – knowledge based analysis – dialog notations and design – models of systems – models of rich interactions.

REFERENCE(S):

1. Julie A. Jacko, “Human Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications”, 3rd edition, CRC Press, ISBN 9781439829431, 2012.
2. Yvonne Rogers, Helen Sharp, Jenny Preece, “Interaction Design: Beyond Human computer Interaction”, 3rd edition, Wiley, ISBN-10: 0470665769, 2011.
3. Dix A, Human – Computer Interaction. Harlow, England: Prentice Hall, ISBN- 10:0130461091, 2004.

IV SEMESTER		
P-VII	WEB PROGRAMMING LAB	18PCCS4P1
Hrs / Week:4	Hrs / Sem:60	Credits: 2

OBJECTIVES:

- To understand the technologies used in Web Programming.
 - To know the importance of object-oriented aspects of Scripting.
1. Develop and demonstrate a XHTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color, and the tag.
 2. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:
 - a) Input : A number n obtained using prompt Output : The first n Fibonacci numbers
 - b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert
 3. Develop and demonstrate a XHTML file that includes Javascript script that uses functions for the following problems:
 - a) Parameter: A string
Output: The position in the string of the left-most vowel
 - b) Parameter: A number
Output: The number with its digits in the reverse order
 4. Design an XML document to store information about a student in an arts and science college affiliated to MSU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
 5. Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.
 6. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

IV SEMESTER		
P-VIII	BIG DATA ANALYTICS LAB	18PCCS4P2
Hrs / Week:4	Hrs / Sem:60	Credits: 2

OBJECTIVES:

- To introduce the tools required to manage and analyze big data like Hadoop, NoSql.
- To impart knowledge of MapReduce paradigm to solve complex problems Map-Reduce.

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

4. Implement Linear and logistic Regression
5. Implement SVM / Decision tree classification techniques
6. Implement clustering techniques
7. Visualize data using any plotting framework
8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

**IDC SUBJECTS OFFERED BY DEPARTMENT OF COMPUTER SCIENCE
TO OTHER MAJOR STUDENTS**

II SEMESTER			
IDC-1	INTERNET CONCEPTS AND WEB DESIGN	18PICS21	
Hrs/Week: 3	Hrs/Sem: 45	Hrs/Unit: 9	Credits:3

OBJECTIVES

- To understand about Internet Tools and E-Mail structure.
- To develop web pages using HTML.

UNIT-I: THE INTERNET

Introduction – Evolution of Internet – Basic Internet Terms – Website – Browser- URL – ISP – Webserver – Download and Upload – Online and Offline - Getting Connected to Internet – Internet Applications.

UNIT-II: INTERNET TOOLS

Introduction – Web Browser – Browsing Internet Using IE – E-mail – E-mail Address Structure – Checking E-mails – Sending E-mails – E-mail Attachments – How E-mail Works - Netiquette - Search Engines Instant Messaging.

UNIT-III :HISTORY OF HTML

History of HTML-HTML document-HEAD and BODY sections-Title, Prologue,Links-Comment line-Designing the BODY section-Aligning the headings-HR tag-Paragraphs-Tab settings-Images and Pictures-Embedding PNG format images.

UNIT-IV :ORDERED AND UN ORDERED LISTS

Ordered and Un Ordered lists-Nested Lists-Headings in a list-Table Handling-Table Creation in HTML-Width of the table and Cells-Cell spanning-Coloring cells-column specification.

UNIT-V :FRAMES

Frames - Frameset definitions-Frame definitions- Nested Framesets-Forms-Action attribute-Method attribute-Enctype attribute-Check Boxes-Radio Buttons - Text Fields - Text Areas – Password-Submit and Reset buttons-Drop down list-sample forms.

TEXT BOOK(S):

1. Introduction to Information Technology,ITL Education Solutions Limited Pearson Education
Unit I – Chapter 15
Unit II – Chapter 16
2. World Wide Web with HTML, Dr. C.Xavier., Tata McGraw – Hill Publishing Company.

III SEMESTER			
IDC-2	DESKTOP PUBLISHING		18PICS31
Hrs / Week:3	Hrs / Sem : 45	Hrs / Unit: 9	Credits: 3

OBJECTIVE

- To provide DTP Operators include Publishing, Graphic Design, Advertising, Printing and Advertising medium.

UNIT I- Introduction

Introduction to PageMaker - Layout window - Document setup - Basic page Maker function: Open, new, close, print, save and save as - Working with text: text tool, Text block - Editing Text - Formatting a Text: Character formatting, paragraph formatting

UNIT II - Drawing Tools

Lines - Boxes- Ellipses- Polygons- Selecting- Deleting- Moving- Resizing elements- Selecting Multiple Elements- Grouping and Ungrouping- Manipulating Elements using Control Palettes - Cut ,Copy and Paste

UNIT III - Working With Graphics

Graphics Tool, Masking, Rotation, Flipping, Cropping, positioning and scaling, Fill option. Arrange the object, Grouping, locking, Frame concept polygon setting and Text wrap properties Master Pages: Header and Footer and Template files - Story Editor: Find & Replace. Spell checker - Book Creation - TOC creation

UNIT IV- Introduction to photo Shop

Layout -basic functions: New, Open, close, save, save as and setup - painting tools: Air brush, paint brush, line pen, eraser, eye dropper, and gradient and paint bucket tools-Background eraser tool.

UNIT V - Photoshop Text Tools

Text Tools-Entering text-Selecting text-Checking for spelling errors - Zoom tool, Hand tool, selection tools: Move and sponge tools- Vignettes and edge effects. Manipulating Images: Changing the canvas size- Rotating and Flipping images - Blurring and Sharpening images - Color Replacement Tool.

TEXT BOOK(S):

1. Mastering Page Maker6 for windows 95 - by Rebecca Bridges Altman & Rick Altman Chapters: 1 - 7,8(Text Blocks)10 - 11, 13 - 15.
2. Pagemaker in easy steps - by Scott Basham Chapter 3
3. Photoshop 4 Studio skills by steven Moniz Chapters 1 - 6,10,12,13.

SADAKATHULLAH APPA COLLEGE
(AUTONOMOUS)
(Reaccredited by NAAC withan 'A' Grade with a CGPA of
3.40 out of 4.00 in the III cycle An ISO 9001:2015 Certified
Institution)
RAHMATH NAGAR, TIRUNELVELI- 11,
Tamilnadu

PG AND RESEARCH DEPARTMENT OF
COMPUTER SCIENCE
(Unaided)



CBCS SYLLABUS
For
M.Phil. COMPUTER SCIENCE

(Applicable for students admitted in June 2018 and
onwards)

(As per the Resolutions of the Academic Council
Meeting held on 17.10.2018)

SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE
M.Phil. Computer Science Syllabus
(Applicable for students admitted in June 2018 and onwards)
COURSE STRUCTURE

I SEMESTER			II SEMESTER		
COURSE	H/W	C	COURSE	H/W	C
Core 1	4	4	Project and Viva - Voce	12	12
Core 2	4	4			
Project Oriented Elective Course (Theory)	4	4			
TOTAL	12	12	TOTAL	12	12

DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS, & MARKS				
SUBJECT	HOURS	CREDITS	NO. OF PAPERS	MARKS
Core	8	8	2	200
Project Oriented Elective Course (Theory)	4	4	1	100
Project and Viva-Voce	12	12	1	100
TOTAL	24	24	4	400

TITLE OF THE PAPERS

M. PHIL. COMPUTER SCIENCE (2018 - 2021)

(The candidate should select any one of the Area Papers in the first semester related to their proposed topics of research)

SEM	P	TITLE OF THE PAPER	SUB. CODE	H/W	C	MARKS		
						I	E	T
I	DSC1	Research and Teaching Methodology	18MCCS11	4	4	25	75	100
	DSC2	Machine Learning Techniques	18MCCS12	4	4	25	75	100
	DSE	A) Virtual Reality	18MECS1A	4	4	25	75	100
		B) Digital Image Processing	18MECS1B					
		C) Deep Learning	18MECS1C					
D) Big Data Analytics		18MECS1D						
II	D	Project and Viva-Voce	18MDCS21	-	12	--	100	100
TOTAL				12	24	75	325	400

M. PHIL. COMPUTER SCIENCE SYLLABUS

(Applicable for students admitted in June 2018 and onwards)

I SEMESTER			
DSC1	RESEARCH AND TEACHING METHODOLOGY		18MCCS11
Hrs/Week:4	Hrs/ Sem:60	Hrs/Unit:12	Credits: 4

OBJECTIVES:

- To develop understanding of the basic framework of research process.
- To develop an understanding of various research designs and techniques.
- To identify various sources of information for literature review and data collection.
- To develop an understanding of the ethical dimensions of conducting applied research.
- Appreciate the components of scholarly writing and evaluate its quality.

UNIT I INTRODUCTION TO RESEARCH

Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Method – Importance of knowing how research is done – Research Process – Criteria of Good Research – Defining the Research Problem – Selecting the Problem – Necessity – Techniques involved in defining a problem – Research Design – Meaning – #Need# – Features of Good Design.

UnitII Data Collection and analysis:

Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages - Hypothesis-testing - Generalization and Interpretation. RESEARCH TOOLS Introduction – SPSS – MATLAB – LaTeX – #Weka# # # self-study portion

Unit III Reporting and thesis writing

Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication –. Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals.

Unit IV Application of results and ethics –

Environmental impacts - Ethical issues - ethical committees - Commercialisation – Copy right – royalty - Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published

material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

UNIT V Methodology of Teaching

Teaching –Objective of Teaching-Phases of Teaching-Teaching Methods: Lecture Methods-Discussion Methods-Discovery Learning-Inquiry, Problem Solving Methods-Project Method-Seminar-Integrating ICT in Teaching-Individualised Instruction, Ways for Effective Presentation with Power Point-Documentation-Evaluation: Formative-Summative-Continuous and Comprehensive Evaluation-Later Adolescents Psychology: Meaning Physical, Cognitive, Emotional, Social and Moral Development-Teaching Later Adolescents.

COURSE OUTCOMES:

- Understand some basic concepts of research and its methodology
- Identify appropriate research topics
- Select and define appropriate research problem parameter
- Overview & concepts of research
- The need for research and types of research
- Steps in conducting research, prepare a project proposal
- Organize and conduct research in a more appropriate manner
- Write a research report, thesis and research proposal

REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Additional Reading

1. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
2. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.
3. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.
4. Day, R.A., 1992.How to Write and Publish a Scientific Paper, Cambridge University Press.
5. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
6. Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.
7. Satarkar, S.V., 2000. Intellectual property rights and Copy right. EssEss Publications.

I SEMESTER			
DSC2	MACHINE LEARNING TECHNIQUES	18MCCS12	
Hrs/Week: 4	Hrs/ Sem: 60	Hrs/Unit: 12	Credits: 4

OBJECTIVES:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough out understanding of the Supervised and Unsupervised learning
- To study the various probability based learning techniques

UNIT I FOUNDATION OF LEARNING

Probability Theory - Linear Algebra - Convex Optimization - Statistical Decision Theory - Regression - Classification - Bias Variance - Linear Regression - Multivariate Regression - Subset Selection - Shrinkage Methods - Principal Component Regression - Partial Least squares.

UNIT II LINEAR MODELS

Linear Classification - Logistic Regression - Linear Discriminant Analysis - Perceptron - Support Vector Machines - Neural Networks - Early Models - Perceptron Learning - Backpropagation - Initialization - Training & Validation - Parameter Estimation - Bayesian Estimation

UNIT III TREE AND RULE MODEL

Decision Trees - Regression Trees - Stopping Criterion & Pruning - Loss functions - Categorical Attributes - Multiway Splits - Missing Values - Decision Trees – Instability - Evaluation Measures - Bootstrapping & Cross Validation - Class Evaluation Measures - ROC curve - Ensemble Methods - Bagging - Boosting - Multi-class Classification - Naive Bayes - Bayesian Networks

UNIT IV CLUSTERING

Undirected Graphical Models - HMM - Variable Elimination - Belief Propagation - Partitional Clustering - Hierarchical Clustering - Birch Algorithm - CURE Algorithm - Density-based Clustering

UNIT V REINFORCEMENT LEARNING

Gaussian Mixture Models - Expectation Maximization - Learning Theory - Introduction to Reinforcement Learning - Optional videos (RL framework - TD learning - Solution Methods - Applications)

COURSE OUTCOMES

- To implement neural network for an application of your choice using an available tool.
- To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results.

- To use a tool to implement typical clustering algorithm for different types of application.
- To design and implement an HMM for a sequence model type of application.
- To identify applications suitable for different types of machine learning with suitable justification

TEXT BOOKS:

1. The Elements of Statistical Learning - by Trevor Hastie - Robert Tibshirani - Jerome H. Friedman (freely available online)
2. Pattern Recognition and Machine Learning - by Christopher Bishop (optional)

REFERENCE(S):

1. K. P. Murphy - "Machine Learning: A probabilistic perspective" - MIT Press - 2012.
2. C. M. Bishop - "Pattern Recognition and Machine Learning" - Springer - 2007.
5. D. Barber - "Bayesian Reasoning and Machine Learning" - Cambridge University Press - 2012.

I SEMESTER			
DSE(A)	VIRTUAL REALITY		18MECS1A
Hrs/Week:4	Hrs/ Sem: 60	Hrs/Unit:12	Credits: 4

OBJECTIVES:

- To impart the fundamental aspects, principles of virtual reality technology
- To gain knowledge about hardware tools of virtual reality

UNIT I VIRTUAL REALITY AND VIRTUAL ENVIRONMENTS

Introduction – Computer Graphics – Real-time computer Graphics – Flight Simulation – Virtual Environment – Benefits of Virtual Reality – Historical Development of VR: Scientific Landmarks.

UNIT II 3D COMPUTER GRAPHICS

Virtual world Space – Positioning the Virtual Observer – The Perspective Projection – Human Vision – Stereo Perspective Projection – 3D Clipping – Color Theory – Simple 3D Modeling – illumination, reflection Models- Shading Algorithms – Radiosity – Hidden surface removal – realism- stereographic Images Geometric Modeling: 3D Space Curves – 3D boundary representation – other modeling strategies – Geometrical Transformations: Frames of reference – Modeling – Instances – Picking, Flying, scaling – Collision detection.

UNIT III GENERIC VR SYSTEM

Virtual Environment – computer Environment – VR technology – Models of Interaction – VR Systems – Animating the Virtual Environment: The Dynamics of numbers – animation of objects – Shape and object i n between – Free-form deformation – Particle Systems

UNIT IV PHYSICAL SIMULATION

Objects Falling in a gravitational field – Rotating wheels – Elastic Collisions – Projectiles – Simple Pendulums – Springs – Flight dynamics of an aircraft. Human Factors: The eye – the ear – The Somatic senses – Equilibrium.

UNIT V VR HARDWARE

Sensor Hardware – Head-Coupled display s – Acoustic Hardware – Integrated VR Systems – VR Software: Modeling Virtual World – Physical Simulation – VR Tool Kits – VR Applications: Engineering – Entertainment – Science – training – The Future: Virtual Environments – Modes of Interaction.

COURSE OUTCOMES

- To discuss the basic concepts of Virtual Reality
- Develop the Virtual Reality application in different areas
- Design of various Modeling concepts
- To expose the concept of Virtual Reality Programming with Toolkits

TEXT BOOK(S):

John Vince, "Virtual Reality Systems", Pearson Education Asia, 2001

REFERENCE BOOK(S):

1. The VRML 2.0 Handbook by Jed Hartman - Josie Wernecke - and Silicon Graphics (Paperback - Oct 10 - 1996)
2. Building VrmL Worlds by Claire Sanders - Charlie Scott - Paul Wolfe - and SebastianHassinger (Paperback - Dec 1996)
3. The Annotated VRML 2.0 Reference Manual by Rikk Carey and Gavin Bell (Paperback - Jun 6 - 1997)
4. Reality Architecture: Building 3D Worlds In Java and VRML by Mccarthy and Carty (Paperback - Feb 5 - 1998)
5. The VrmL Sourcebook by Andrea L. Ames - David R. Nadeau - and John L. Moreland (Paperback - Jan 1996)
6. VrmL: Browsing and Building Cyberspace by Mark Pesce (Paperback - Sep 1995)

I SEMESTER			
DSE(B)	DIGITAL IMAGE PROCESSING	18MECS1B	
Hrs/Week:4	Hrs/ Sem: 60	Hrs/Unit:12	Credits: 4

OBJECTIVES:

- Learn Digital Image introduction and filtering concepts.
- Be Exposed To Simple Image Processing Techniques.
- Be Familiar With Image Compression And Segmentation Techniques.
- Learn To Represent Image In Form Of Features.

UNIT I Introduction and Filtering

Light - Brightness adaption and discrimination - Pixels - coordinate conventions - Imaging Geometry - Perspective Projection - sampling and quantization. **Spatial Domain Filtering:** Intensity transformations - contrast stretching - histogram equalization - Correlation and convolution - Smoothing filters - sharpening filters - gradient and Laplacian. **Filtering in the Frequency domain:** Fourier Transforms and properties - FFT - Convolution - Correlation - 2-D sampling - Discrete Cosine Transform.

UNIT II Image Restoration

Basic Framework - Interactive Restoration - Image deformation and geometric transformations - image morphing - Restoration techniques - Noise characterization - Noise restoration filters - Adaptive filters - Linear - Position invariant degradations - Estimation of Degradation functions - Restoration from projections.

UNIT III Image Compression

Encoder-Decoder model - Types of redundancies - Lossy and Lossless compression - Entropy of an information source - Shannon's 1st Theorem - Huffman Coding - Arithmetic Coding - Golomb Coding - LZW coding - Transform Coding - Run length coding - Bit-plane encoding - Discrete Wavelet Transform (DWT) - Continuous Wavelet Transform - Fast Wavelet Transform - 2-D wavelet Transform - JPEG-2000 encoding - Digital Image Watermarking.

UNIT IV Morphological Image Processing

Basics - SE - Erosion - Dilation - Opening - Closing - Hit-or-Miss Transform - Boundary Detection - Hole filling - Connected components - convex hull - thinning - thickening - skeletons - pruning - Geodesic Dilation - Erosion - Reconstruction by dilation and erosion.

UNIT V Image Segmentation

Boundary detection based techniques - Point - line detection - Edge detection - Edge linking - local processing - regional processing - Hough transform - Thresholding - Iterative thresholding - Otsu's method - Moving averages -

Multivariable thresholding - Region-based segmentation - Watershed algorithm -
Use of motion in segmentation

COURSE OUTCOMES

- The student should be able to implement basic image processing algorithm using MATLAB tools
- Design an application that incorporates different concepts of image processing.
- Apply an explore new technologies in the areas of image enhancement restoration, segmentation, compression, wavelet processing and image morphology.
- Critically analyze the different approaches to implements mini project
- Explore the possibility of applying image processing concepts in various domains.

REFERENCE(S):

1. Digital Image Processing, 3rd Edition, by Rafael C Gonzalez and Richard E Woods. Publisher: Pearson Education.

RELATED LINKS:

<http://www.ece.arizona.edu/~dial/>

I SEMESTER			
DSE(C)	DEEP LEARNING		18MECS1C
Hrs/Week: 4	Hrs/ Sem: 60	Hrs/Unit: 12	Credits: 4

OBJECTIVES:

- To introduce students to the basic concepts and techniques of Deep Learning.
- To have a thorough understanding of the Neural Networks, Autoencoders and Regularization
- To study the various probability based Convolutional Neural Networks techniques

UNIT I INTRODUCTION

History of Deep Learning - 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

UNIT II NEURAL NETWORKS

FeedForward Neural Networks - Backpropagation - Gradient Descent (GD) - Momentum Based GD - Nesterov Accelerated GD - Stochastic GD - AdaGrad - RMSProp - Adam - Eigenvalues and eigenvectors - Eigenvalue Decomposition

UNIT III AUTOENCODERS

Principal Component Analysis and its interpretations - Singular Value Decomposition Autoencoders and relation to PCA - Regularization in autoencoders - Denoising autoencoders - Sparse autoencoders - Contractive autoencoders

UNIT IV REGULARIZATION

Regularization: Bias Variance Tradeoff - L2 regularization - Early stopping - Dataset augmentation - Parameter sharing and tying - Injecting noise at input - Ensemble methods - Dropout Greedy Layerwise Pre-training - Better activation functions - Better weight initialization methods - Batch Normalization

UNIT V CONVOLUTIONAL NEURAL NETWORKS

Learning Vectorial Representations Of Words - Convolutional Neural Networks - LeNet - AlexNet - Visualizing Convolutional Neural Networks - Guided Backpropagation - Deep Dream - Deep Art - Fooling Convolutional Neural Networks - Recurrent Neural Networks - Backpropagation through time (BPTT)

COURSE OUTCOMES

- The fundamental principles theory and approaches for learning with deep neural networks
- The main variants of deep learning and their typical application
- The key concepts issues and practices when training and modeling with deep architectures as well as have hands on experience in using deep learning framework for this purpose
- How to implement basic versions of some of the core deep network algorithms
- How deep learning fits within the context of other ML approaches and what learning tasks it considered to be suited and not well suited to perform.

REFERENCE(S):

1. Deep Learning - An MIT Press book - Ian Goodfellow and YoshuaBengio and Aaron Courville.

RELATED LINKS:

<http://www.deeplearningbook.org>

I SEMESTER			
DSE(D)	BIG DATA ANALYTICS		18MECS1D
Hrs/Week: 4	Hrs/ Sem: 60	Hrs/Unit: 12	Credits: 4

OBJECTIVES:

- To understand the competitive advantages of big data analytics
- To understand the big data frameworks
- To learn data analysis methods
- To learn stream computing
- To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

UNIT I INTRODUCTION TO BIG DATA

Big Data – Definition - Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes - Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

UNIT II HADOOP FRAMEWORK

Distributed File Systems - Large-Scale File System Organization – HDFS concepts - MapReduce Execution - Algorithms using MapReduce - Matrix-Vector Multiplication – Hadoop YARN.

UNIT III DATA ANALYSIS

Statistical Methods:Regression modelling - Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis - Types of Data in Cluster Analysis - Partitioning Methods - Hierarchical Methods - Density Based Methods - Grid Based Methods - Model Based Clustering Methods - Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

UNIT IV MINING DATA STREAMS

Streams: Concepts – Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform (RTAP) Applications - Case Studies - Real Time Sentiment Analysis - Stock Market Predictions.

UNIT V BIG DATA FRAMEWORKS

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration. Pig – Grunt – Pig Data Model – Pig Latin – developing and testing Pig Latin scripts. Hive – Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries.

COURSE OUTCOMES

- Understand how to leverage the insights from big data analytics
- Analyze data by utilizing statistical data mining approaches
- Perform analytics on real time streaming data.
- Understand the various NO SQL alternative database models

REFERENCE(S):

1. Bill Franks, —Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Wiley and SAS Business Series, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
3. Michael Berthold, David J. Hand, —Intelligent Data Analysis, Springer, Second Edition, 2007.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
6. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, , O'Reilly Media, 2013.

II SEMESTER		
D	PROJECT AND VIVA-VOCE	18MDCS21
Hrs/Week:12	Hrs/ Sem: 180	Credits: 12

The following guidelines have to be followed by every candidate while preparing his/her M.Phil. Dissertation:

- The Dissertation should be in English.
- The candidate has to follow the instructions of the SadakathullahAppa College COMPUTER SCIENCE Research Centre with regard to the format and content of the Dissertation.
- The first page, Declaration and certificate of the dissertation should be according to the model given at the end of this.
- Dissertation text should be typed in usual MS-Office font with size 12 / 13 on A4 size Executive bond quality paper with double line spacing. Each page should contain at least 20 lines.
- The Dissertation should be submitted in duplicate.
- The number of pages in M.Phil. Dissertation should be not less 100 pages inclusive of bibliography and Annexure.
- Two bound copies of the M.Phil. Dissertation duly signed by the Guide and Head of the Department should be submitted through the Research Centre along with the CD containing the softcopy of the Dissertation in PDF format.
- Candidates shall submit the dissertation to the Research Centre through the Supervisor and Head of the Department within 6 months but not earlier than 5 months from the date of start of the second semester.
- The M.Phil. scholars should attend at least one of the following:

training programmes / Workshops / Seminars / Symposiums, etc., and that they should also have a paper either published or received for acceptance in an ISSN / Reputed Journal before submitting the Dissertation. M.Phil. Scholars shall present at least one research paper in a conference or seminar as per UGC norms. Photo copy of the publication/Letter of acceptance for publication should be given as Annexure at the end of the Dissertation. **Scholars who fail to comply with the above are not eligible for the submission of their Dissertation.**
- Both the Internal as well as External Examiners award 100 marks each for the Dissertation and the average of the marks awarded by the two examiners will be given to the candidates. The distribution of marks will be **60 marks for the Dissertation and 40 marks for the Public Viva-Voce Examination.** In the Public Viva-voce Examination the M.Phil. Scholars should present their Dissertation work with PowerPoint Presentation. The Division of marks for the Dissertation is as mentioned below:

Particulars	Internal Examiner	External Examiner
Wording of Title	5	5
Objectives/ Formulation including Hypothesis	5	5
Review of Literature	10	10
Relevance of Dissertation to Social Needs	5	5
Methodology/ Technique/ Procedure Adopted	15	15
Summary/ Findings/ Conclusion	5	5
Bibliography/ Annexure/ Foot notes	10	10
Training/ Seminar/ Workshop	5	5
	60	60

(Model for the Title Page of the Dissertation)

TITLE OF THE DISSERTATION

*Dissertation Submitted to the
SadakathullahAppa College (Autonomous)
in partial fulfilment of the requirements for the award of
the degree of*

MASTER OF PHILOSOPHY (MAJOR)

Submitted by

NAME OF THE CANDIDATE

(REGISTER NO. XXXXXXXXX)

Under the guidance of

NAME OF THE GUIDE

Designation of the Guide

SadakathullahAppa College (Autonomous)

Tirunelveli – 627011



**RESEARCH DEPARTMENT OF (MAJOR)
SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)
TIRUNELVELI – 627011
MONTH, YEAR**

(Model for the Certificate of the Dissertation)

SadakathullahAppa College (Autonomous)

Rahmath Nagar, Tirunelveli – 627011

CERTIFICATE

Certified that the dissertation work with the title, **“TITLE OF THE DISSERTATION”** submitted by **NAME OF THE CANDIDATE** with the register number XXXXXXXX in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy in (Major) at the Research Department of (Major), SadakathullahAppa College (Autonomous)**, is a work done by the candidate during the period 20XX-XX, under my guidance and supervision and this dissertation or any part thereof has not been submitted elsewhere for any other Degree or Diploma.

Tirunelveli – 627011

DD-MM-YEAR

<<Signature of the HOD with date>>
<<Name of the HOD>>
<<Academic Designation of the HOD>>
<<Name of the Department>>
SadakathullahAppa College (Autonomous)
Tirunelveli - 11

<<Signature of the Supervisor with date>>
<<Name of the Supervisor>>
<<Academic Designation of the
Supervisor>>
<<Name of the Department>>
SadakathullahAppa College (Autonomous)
Tirunelveli - 11

Viva-Voce Examination for the candidate was conducted on
.....

Internal Examiner

External Examiner

(Model for the Declaration by the Candidate)

Name of the Candidate,

M.Phil. Scholar, (Register No.: XXXXXXXX)

Research Department of XXXXXXXX,

SadakathullahAppa College (Autonomous),

Rahmath Nagar, Tirunelveli – 627011

DECLARATION BY THE CANDIDATE

I hereby declare that, the dissertation with the title, **“TITLE OF THE DISSERTATION”** submitted in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy in XXXXXXXX** at **the Research Department of XXXXXXXX, SadakathullahAppa College (Autonomous)**, is my original work done under the guidance of **Name of the Guide, Designation of the Guide, SadakathullahAppa College (Autonomous), Tirunelveli – 11** and this work has not been submitted elsewhere for any other Degree or Diploma.

Tirunelveli – 627011

DD-MM-YEAR

(Signature of the Candidate)

Countersigned

1. Signature and Seal of the Guide

2. Signature and Seal of the HOD