



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(SEM V & VI)

VISION:

To make the Department of Computer Science and Engineering the unique of its kind in the field of Research and Development activities in this part of world.

MISSION:

To impart highly innovative and technical knowledge to the urban and unreachable rural student folks in Computer Science and Engineering through "Total Quality Education".

PROGRAM EDUCATIONAL OBJECTIVES:

PEO 1: Apply the basic engineering skills and domain knowledge for developing effective computing solutions to address various social issues.

PEO 2: Able to have successful career in technical / managerial roles in multi-disciplinary environment.

PEO 3: To confront the evolving technical challenges and problems in the areas of computing.

PROGRAM OUTCOMES:

After going through the four years of study, the Artificial Intelligence and Data Science will have the ability to

S.NO	GRADUATE ATTRIBUTE	PROGRAMME OUTCOME
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal

		and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: Professional Skills: To apply learned skills to build optimized solutions pertaining to Data Processing, Artificial Intelligence and Machine Learning.

PSO 2: Problem - Solving Skills: To analyze data using domain knowledge to get insights and develop appropriate solutions.

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
Regulation - 2020 Syllabus
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER V

SL. NO	COURSE CODE	COURSE NAME	CATEGORY	CREDITS				
				L	T	P	CONTACT PERIODS	C
THEORY								
1	AD1501	Big Data Analytics	PC	3	0	0	3	3
2	AD1502	Networks and Security	PC	3	0	0	3	3
3	AD1503	Object Oriented Programming using Java	PC	2	0	2	4	3
4	PE1	Professional Elective – I	PE	3	0	0	3	3
5	PE2	Professional Elective - II	PE	3	0	0	3	3
6	OE1	Open Elective – I	OE	3	0	0	3	3
		Online Course*						
PRATICALS								
7	AD1511	Big Data Analytics Laboratory	PC	0	0	4	4	2
8	AD1512	Networks and Security Laboratory	PC	0	0	4	4	2
TOTAL				17	0	10	27	22

SEMESTER VI

SL. NO	COURSE CODE	COURSE NAME	CATEGORY	CREDITS				
				L	T	P	CONTACT PERIODS	C
THEORY								
1	AD1601	Computer Vision	PC	3	0	0	3	3
2	AD1602	Deep Learning	PC	3	0	0	3	3
3	GE1671	Total Quality Management	HS	3	0	0	3	3
4	OL1	Online Course – I*	OL	0	0	0	0	3
5	PE3	Professional Elective - III	PE	3	0	0	3	3
6	PE4	Professional Elective - IV	PE	3	0	0	3	3
PRATICALS								
7	CS1681	Mobile Application Development Laboratory	PC	0	0	4	4	2
8	AD1611	Computer Vision Laboratory	PC	0	0	4	4	2
9	AD1612	Deep Learning Laboratory	PC	0	0	4	4	2
10	HS1521	Professional Communication	EEC	0	0	2	2	1
TOTAL				15	0	14	29	25

*Students shall complete online course in this semester. Credits earned will be added in consolidated mark statement

**Professional Elective Courses
(Elective – I) Semester V**

SL. NO.	COURSE CODE	COURSE NAME	CREDITS				
			L	T	P	CONTACT PERIODS	C
1.	CS1531	Computer Graphics	3	0	0	3	3
2.	AD1531	Information Retrieval	3	0	0	3	3
3.	AD1532	Modern Application Development	2	0	2	4	3
4.	AD1533	Soft Computing	3	0	0	3	3
5.	CS1402	Software Engineering with UML Design	3	0	0	3	3

**Professional Elective Courses
(Elective – II) Semester V**

SL. NO.	COURSE CODE	COURSE NAME	CREDITS				
			L	T	P	CONTACT PERIODS	C
1.	CS1537	C# and .Net Fundamentals	2	0	2	4	3
2.	CS1538	Data Science using R	2	0	2	4	3
3.	CS1532	Data Warehousing and Data Mining	3	0	0	3	3
4.	AD1534	Ethical Hacking	3	0	0	3	3
5.	AD1535	Human Computer Interaction	3	0	0	3	3

**SEMESTER V
OPEN ELECTIVE – I**

SL. NO	COURSE CODE	COURSE NAME	CATEGORY	L	T	P	C
1.	OAD151	Foundations of Data Science using Excel	OE	3	0	0	3

**Professional Elective Courses
(Elective – III) – Semester VI**

SL. NO.	COURSE CODE	COURSE NAME	CREDITS				
			L	T	P	CONTACT PERIODS	C
1.	IT1631	Blockchain Technologies	3	0	0	3	3
2.	AD1631	Cognitive Science	3	0	0	3	3
3.	EC1633	Digital Image Processing	3	0	0	3	3
4.	AD1632	MATLAB Programming for Numerical Computations	2	0	2	4	3
5.	CS1535	Software Testing and Quality Assurance	3	0	0	3	3

**Professional Elective Courses
(Elective – IV) – Semester VI**

SL. NO.	COURSE CODE	COURSE NAME	CREDITS				
			L	T	P	CONTACT PERIODS	C
1.	CS1536	Agile Development	3	0	0	3	3
2.	CS1539	Multimedia Systems	3	0	0	3	3
3.	AD1633	Robotics and Intelligent Systems	3	0	0	3	3
4.	CS1637	Mobile Adhoc Networks	3	0	0	3	3
5.	CS1638	Social Media Analytics	3	0	0	3	3
6.	AD1634	Reinforcement Learning	3	0	0	3	3

L	T	P	C
3	0	0	3

OBJECTIVES

To enable the students to

- Describe the fundamental concepts of big data and analytics
- Explain about various tools and techniques used for Big Data analytics
- Demonstrate the basic concepts of NOSQL
- Use fundamental aspects on writing scripts through Pig Latin
- Formulate queries to extract and correlate information using Hive data model

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data: Types of Digital Data - Characteristics of Big Data - 3Vs of Big Data – Evolution of Big Data – Architecture of Big Data systems – Advantages of Big Data - Challenges with Big Data - Big Data Use Cases -Applications

UNIT II DATA ANALYTICS USING HADOOP AND MAPREDUCE FRAMEWORK 9

Introducing Hadoop – RDBMS versus Hadoop – Hadoop Overview – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Introduction to Map Reduce – Features of Map Reduce – Algorithms Using Map-Reduce: Matrix-Vector Multiplication, Relational Algebra Operations, Grouping and Aggregation – Extensions to Map Reduce.

UNIT III NOSQL- DATA MANAGEMENT FOR BIG DATA 9

NoSQL Databases : CAP Theorem - BASE Concept – NoSQL data Models: Increasing Flexibility for Data Manipulation- Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases- Hive - Sharding – Hbase

UNIT IV DATA ANALYTICS USING PIG 9

Introduction – installation and execution – Pig Data Model – Pig Latin – Input, Output- Relational Operators – User Defined Functions – Join Implementations –

Integrating Pig with Legacy Code and Map Reduce –Developing and Testing Pig Latin Scripts

UNIT V DATA ANALYTICS USING HIVE

9

Introduction – Data Types and File Formats – Databases in Hive – HiveQL: Data Definition – Data Manipulation – Queries – Views – Indexes – Schema

THEORY : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Explain the fundamental concepts of Big Data and its tools and techniques

CO2: Apply the concepts of MapReduce framework

CO3: Infer appropriate NoSQL database techniques for storing and processing large volumes of structure and unstructured data

CO4: Write script using Pig latin

CO5: Build various HiveQL queries

TEXT BOOKS:

1. Hurwitz JS, Nugent A, Halper F, Kaufman M, 2013, *Big data for dummies*, John Wiley & Sons.
2. Alan Gates & Daniel Dai, 2016, *Pig : Data flow Scripting with Hadoop*, O'Reilly Media.
3. Jason Rutherglen, Dean Wampler & Edward Capriolo, 2012, *Programming Hive*, 1st ed, O'Reilly Media.

REFERENCE BOOKS:

1. Judith Hurwitz, Alan Nugent, Fern Halper & Marcia Kaufman, 2014, *Big Data*, Wiley Publications.
2. Mark Van Rijmenam, 2014, *Think Bigger: Developing a Successful Big Data Strategy for Your Business*, 1st ed, Amazon.
3. Hurwitz JS, Nugent A, Halper F, Kaufman M, 2013, *Big data for dummies*, John Wiley & Sons.
4. Tom White, 2011, *Hadoop: The Definitive Guide*, O'Reilly Publications.

5. Dayong Du, 2015, *Apache Hive Essentials*, Packet Publishing.
6. Hanish Bansal, Saurabh Chauhan, 2016, *Apache Hive Cookbook*, Packt publishing.

AD1502

NETWORKS AND SECURITY

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Gain the knowledge of basic networking concepts and layered approaches in OSI & TCP/IP model
- Learn the functions and protocols of Network layer and Transport layer.
- Familiarize the functions of Application layer protocols.
- Understand the fundamentals of Network Security
- Acquire the knowledge on various Cryptographic Algorithms

UNIT I PHYSICAL & DATA LINK LAYER 12

ISO/OSI architecture – Functionalities of OSI Layers - TCP/IP architecture – Types of Networks (LAN, WAN, VPN, VLAN) – Network Components (NIC, Bridges, Switches, Routers, Hubs, Gateways) Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP – Media Access Control – Wired LANs: Ethernet – Wireless LANs – Introduction – IEEE 802.11, Bluetooth.

UNIT II NETWORK LAYER & TRANSPORT LAYER 9

IP V4/6 addressing, Sub netting, Circuit & Packet switching, routing protocols, Transport Layer Services: Flow Control – Protocols – Port Addressing, TCP(segment format, connection establishment & Termination), and UDP, Congestion control.

UNIT III APPLICATION LAYER 6

HTTP, DNS, SMTP, POP, FTP, TELNET

UNIT IV INTRODUCTION TO SECURITY 8

Introduction to Computer Security - Services, Mechanisms and attacks - Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).

UNIT V CRYPTOGRAPHIC ALGORITHMS

10

Block Ciphers – DES/AES, Stream Cipher - RC4/IDEA – Public Key Cryptography : RSA, Diffie-Hellman, Message Authentication – MAC, MD5, SHA, Digital Signature/certificate Physical & Data Link Layer – Ethernet (Port security), Wireless (WEP), Networks Layer – IPsec , Transport Layer -TLS, Application Layer - Email Security(S/MIME), Firewall.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Explain the basic networking concepts highlighting the layered approaches in OSI and TCP/IP models

CO2: Choose an appropriate addressing scheme and routing protocol for communication in a network

CO3: Summarize the functionalities of various application layer protocols and their real time usage

CO4: Outline the fundamental of network security

CO5: Explore the knowledge on various cryptographic algorithms

TEXT BOOKS:

1. Behrouz A Forouzan, 2013, *Data Communications and Networking*, 5th ed, TMH, 2013.
2. Behrouz A Ferouzan, 2007, *Cryptography & Network Security*, Tata Mc Graw Hill.

REFERENCE BOOKS:

1. Larry L Peterson & Bruce S Davie, 2012, *Computer Networks: A Systems Approach*, 5th ed, Morgan Kaufmann Publishers Inc.
2. William Stallings, 2013, *Data and Computer Communications*, 10th ed, Pearson Education.
3. Bruce Schneier & Neils Ferguson, 2003, *Practical Cryptography*, 1st ed, Wiley Dreamtech India Pvt Ltd.
4. Charles Pfleeger, 2006, *Security in Computing*, 4th ed, Prentice Hall of India.
5. William Stallings, 2013, *Cryptography and Network Security*, 6th ed, Pearson Education.

AD1503 OBJECT ORIENTED PROGRAMMING USING JAVA

L	T	P	C
2	0	2	3

PREREQUISITES:

- CS1201 – Object Oriented Programming using Python
- CS1211 - Object Oriented Programming laboratory using Python

OBJECTIVES:

To enable the students to

- Understand the basic Object Oriented Programming concepts and Java fundamentals
- Explore the principles of inheritance and interfaces
- Learn the concepts of exception handling and use I/O streams
- Develop a java application using Threads and generics classes
- Familiarize simple Graphical User Interface applications

UNIT I INTRODUCTION TO OOPS AND JAVA FUNDAMENTALS 6

Object Oriented Programming Concepts –. Fundamental Programming Structures in Java – Data Types, Variables, Operators, Control Flow, Arrays, Defining classes in Java – constructors, methods and Fields - Packages.

UNIT II INHERITANCE AND INTERFACES 6

Inheritance – Super classes & Sub classes, types of Inheritance, Abstract classes and methods – Final Classes and methods – Interfaces – Inner classes – String.

UNIT III EXCEPTION HANDLING AND I/O 6

Exceptions – Exception hierarchy, Throwing & Catching exceptions, Built-in Exceptions and Creating own exceptions, Input / Output Streams Basics – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 6

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, Generic Programming – Generic classes – generic methods, Type inference with var and datetime and Curriculum and Syllabi | B.Tech. Artificial Intelligence and Data Science | R2020

Collection API.

UNIT V EVENT DRIVEN PROGRAMMING

6

Introduction to Swing – layout management, Swing Components, Working with 2D shapes – Using color, fonts, and images – Basics of event handling – AWT event hierarchy, adapter classes & mouse events –Solid pattern in Java and JDBC

THEORY : 30 PERIODS

LIST OF EXPERIMENTS:

1. Develop a Java application to generate Electricity bill.
2. Develop a java application to implement the User Defined Packages.
3. Write a program to perform string operations using ArrayList.
4. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary
5. Design a Java interface for ADT Stack/Queue. Implement this interface using array. Provide necessary exception handling in both the implementations
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java program that reads the file information and display it in console by Byte/Character Stream Classes.
8. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a java program to find the maximum value from the given type of elements using a generic function
10. Design a calculator using event-driven programming paradigm of Java
11. Write a java program to connect MySQL/Oracle using JDBC
12. Mini project

PRACTICAL : 30 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: Java (JDK Latest Version), NetBeans IDE / Eclipse IDE or equivalent	Open source

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Explain the basic Object Oriented Programming concepts and Java Fundamentals
- CO2: Demonstrate Java applications with Inheritance and Interfaces
- CO3: Infer the use of Exceptions and I/O Streams in Java applications
- CO4: Build applications using Threads and Generic Classes
- CO5: Construct interactive Java applications using swings

TEXT BOOKS:

1. Herbert Schildt, 2019, *Java - The complete reference*, 11th ed, McGraw Hill Education.
2. Cay, S, Horstmann & Gary cornell, 2013, *Core Java Volume – I Fundamentals*, 9th ed, Prentice Hall.

REFERENCE BOOKS:

1. Paul Deitel & Harvey Deitel, 2015, *Java SE 8 for programmers*, 3rd ed, Pearson.
2. Steven Holzner, 2011, *Java 2 Black book*, Dreamtech press.
3. Timothy Budd, 2000, *Understanding Object-oriented programming with Java*, Updated Edition, Pearson Education.

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to:

- Set up single and multi-node Hadoop Clusters.
- Solve Big Data problems using Map Reduce Technique.
- Design algorithms that use Map Reduce Technique to apply on Unstructured and structured data.
- Understand the Pig Data model and Pig scripts
- Learn ways of Querying Big Data using Hive

LIST OF EXPERIMENTS:

1. (i) Setting up and Installing Hadoop in its two operating modes:
 - Pseudo distributed,
 - Fully distributed.(ii) Web based tools to monitor the Hadoop setup.
2. (i) Implementing the following file management tasks in Hadoop:
 - Adding files and directories
 - Retrieving files
 - Deleting filesii) Benchmark and stress test on Apache Hadoop cluster
3. Basic Word Count Map Reduce program to understand Map Reduce Paradigm.
 - Finding the number of occurrences of each word appearing in the input file(s)
 - Performing a MapReduce Job for word search count (look for specific keywords in a file)
4. Stop word elimination problem:

Input:

 - A large textual file containing one sentence per line
 - A small file containing a set of stop words (One stop word per line)

Output:

 - A textual file containing the same sentences of the large input file without the words appearing in the small file.

5. Writing a Map Reduce program that mines weather data. Weather sensors collect data every hour at many locations across the globe and gather large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Data available at: <https://github.com/tomwhite/hadoop-book/tree/master/input/ncdc/all>.

- To find average, max and min temperature for each year in NCDC data set?
- To filter the readings of a set based on value of the measurement. Output the line of input files associated with a temperature value greater than 30.0 and stores it in a separate file.

6. Purchases.txt Dataset

Instead of breaking the sales down by store, give us a sales breakdown by product category across all of our stores

1. What is the value of total sales for the following categories?
 - Toys
 - Consumer Electronics

Finding the monetary value for the highest individual sale for each separate store

2. What are the values for the following stores?
 - Reno
 - Toledo
 - Chandler

Find the total sales value across all the stores and the total number of sales.

7. Installation and Run Pig then writing Pig Latin scripts to sort, group, join, project, and filter the data.
8. Writing Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooks available at: Project Gutenberg)
9. Installation and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO 1: Construct applications to Process big data using Hadoop framework

CO 2: Apply Map Reduce Technique for Unstructured and structured data.

Curriculum and Syllabi | B.Tech. Artificial Intelligence and Data Science | R2020

CO 3: Write Pig scripts

CO 4: Use Hive for Querying Big Data

CO 5: Build applications using Big Data analytics tools

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SL. NO.	DESCRIPTION OF EQUIPMENT (Minimum Hardware and Software requirements)	QUANTITY REQUIRED
1.	Hadoop Framework	30
2.	Map Reduce Frame work	30
3.	Big data tools(Pig Latin, Hive..)	30
4.	PCs with minimum (8 GB RAM)	30

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Learn TCP/UDP socket programming.
- Implement and analyze various network protocols.
- Learn and use simulation tools.
- Implement various classical symmetric cryptosystem
- Familiarize with different modern symmetric and asymmetric cryptosystems

LIST OF EXPERIMENTS:

1. Applications using TCP sockets like:
 - Echo client and echo server
 - Chat
 - File Transfer
2. Simulation of DNS using UDP sockets
3. Write a code simulating ARP /RARP protocols.
4. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
5. Simulation of Distance Vector/ Link State Routing algorithm.
6. Implementation of Classical Substitution Crypto Algorithms to provide Confidentiality
 - Implementation of Caesar Cipher and Shift Cipher
 - Implementation of Playfair Cipher
 - Implementation of Vigenere Cipher
 - Implementation of Hill Cipher
7. Implementation of Classical Transposition Crypto Algorithms to provide Confidentiality
 - Implementation of Row - Columnar Transformation
 - Implementation of Rail fence
8. Implementation of Modern Private Key Cryptosystem Algorithms to provide Confidentiality
 - Apply DES algorithm for practical applications
 - Apply AES algorithm for practical applications

9. Implementation of Public Key Cryptosystem to provide Confidentiality and Authentication
 - Implement RSA Algorithm
10. Implement the Diffie-Hellman Key Exchange algorithm
11. Implementation of Cryptographic Algorithms to provide Data Integrity and Authentication
 - Calculate the message digest of a text using the SHA algorithm.
 - Implement the Signature Scheme - Digital Signature Standard
12. Mini project in network domain

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Apply the concepts of TCP/UDP Socket Programming

CO2: Analyse the functions and performance of various network protocols

CO3: Select appropriate simulation tools (NS) for visualizing the behaviour of working model network.

CO4: Choose appropriate classical symmetric cryptosystem to provide data security.

CO5: Make use of modern symmetric and asymmetric cryptosystem to enhance data security.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: i. C / C++ / Java / Python or equivalent compiler ii. Network simulator like NS2 /Glomosim /OPNET/ Packet Tracer/ Equivalent iii. GnuPG, Snort, KFSensor, N-Stalker or Equivalent, GMER	Open source

L	T	P	C
3	0	0	3

PREREQUISITE: AD1371 – Data Structures and Algorithms

OBJECTIVES:

To enable the students to

- Describe the basic concepts of graphics systems.
- Familiarize with various 2D Modelling techniques.
- Understand the different 3D Modelling techniques
- Gain knowledge about Illumination and different color models
- Explore the various Animation and Graphics techniques

UNIT I INTRODUCTION

9

Historical Evolution - Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II TWO-DIMENSIONAL GRAPHICS

10

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two-dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, two-dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms

UNIT III THREE-DIMENSIONAL GRAPHICS

10

Three dimensional concepts; Three-dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modelling transformations – Translation, Rotation, Scaling, composite transformations; Three-dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV ILLUMINATION AND COLOUR MODELS

7

Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model -

UNIT V ANIMATIONS AND REALISM

9

ANIMATION GRAPHICS: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – COMPUTER GRAPHICS REALISM: Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Explain the basic concepts of display devices and primitives of Computer Graphics.
- CO2: Apply two dimensional transformations and different types of clipping algorithms on 2D graphical objects.
- CO3: Explain about different 3D Transformation techniques and visible surface detection methods.
- CO4: Interpret the idea of illumination and color models.
- CO5: Illustrate the animation sequences and fractal concepts.

TEXT BOOKS:

1. John, F, Hughes, Andries Van Dam, Morgan Mc Guire, David, F, Sklar, James, D, Foley, Steven, K, Feiner, & Kurt Akeley, 2013, *Computer Graphics: Principles and Practice*, 3rd ed, Addison Wesley Professional.
2. Donald Hearn & Pauline Baker, M, 2007, *Computer Graphics*, Prentice Hall, New Delhi

REFERENCE BOOKS:

1. Donald Hearn, Pauline Baker, M & Warren Carithers, 2010, *Computer Graphics With Open GL*, 4th ed, Pearson Education.
2. Jeffrey McConnell, 2006, *Computer Graphics: Theory into Practice*, Jones and Bartlett Publishers.
3. Hill, FS, Jr., 1990, *Computer Graphics*, Maxwell Macmillan.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung & Peters, AK, 2010, *Fundamental of Computer Graphics*, CRC Press,.
5. William M Newman & Robert F Sproull, 1978, *Principles of Interactive Computer Graphics*, Mc Graw Hill.

AD1531

INFORMATION RETRIEVAL

L	T	P	C
3	0	0	3

PREREQUISITE: AD1371 - Data Structures and Algorithms

OBJECTIVES:

To enable the students to

- Learn the basics of information retrieval and components of search engine
- Understand various information retrieval models and information retrieval techniques
- Model various web search engines and its mechanism
- Apply Hadoop and MapReduce concepts in the Web search context
- Make use of text mining techniques in the document retrieval model

UNIT I INTRODUCTION 9

Introduction -History of IR- Components of IR - Issues –Open source Search Engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

UNIT II INFORMATION RETRIEVAL 9

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - Evaluation in information Retrieval – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion.

UNIT III WEB SEARCH ENGINE–INTRODUCTION AND CRAWLING 9

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes – Near-duplicate detection - Index Compression - XML retrieval.

UNIT IV WEB SEARCH–LINK ANALYSIS AND SPECIALIZED SEARCH 9

Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation -Personalized search - Collaborative filtering and content-based

AD1532 MODERN APPLICATION DEVELOPMENT

L	T	P	C
2	0	2	3

PREREQUISITE: GE1171-Fundamentals of Computing and Programming

OBJECTIVES

To enable the students to

- Develop simple web pages using HTML and CSS
- Build dynamic web applications using Java Script
- Familiarize with server side programming using JSP
- Develop simple web applications in PHP
- Familiarize with AJAX and web service architectures

UNIT I WEB ESSENTIALS: HTML 5, CSS 3, WEB 2.0 7

Web Essentials: Clients, Servers and Communication – The Internet – World wide web –HTTP Message Structure- HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls – CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows

UNIT II CLIENT SIDE SCRIPTING 5

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript

UNIT III SERVER SIDE SCRIPTING 6

JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example

UNIT IV PHP PROGRAMMING 6

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation- Regular Expressions – File handling – sending email – Cookies – Connecting to Database.

UNIT V INTRODUCTION TO AJAX AND WEB SERVICES**6**

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods;
 Web Services: Introduction- Java web services Basics – Creating, Publishing,
 Testing and Describing a Web services (WSDL)-Consuming a web service –SOAP.

THEORY : 30 PERIODS**LIST OF EXPERIMENTS**

1. Create a web page with the following using HTML and CSS (use 3 types of CSS)
 - a. To embed a map in a web page
 - b. To fix the hot spots in that map
 - c. Show all the related information when the hot spots are clicked.
2. Implement the following programs using JavaScript
 - a. Validate the Registration, user login pages
 - b. Scientific Calculator
3. Develop simple dynamic web application along with database connectivity using JSP.
4. Implement the following programs using PHP
 - a. Validate the form using PHP regular expression.
 - b. Store a form data into database.
5. Write a web service to design a calculator application

PRACTICAL: 30 PERIODS**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 500 GB, 8 GB RAM)	30
2.	Printer	1
3.	Software: Netbeans IDE 8.2, WAMP/XAMPP, Apache Tomcat server.	30

TOTAL : 60 PERIODS**OUTCOMES:**

Upon successful completion of the course, students will be able to

CO1: Construct simple web applications using HTML and CSS

CO2: Develop dynamic web pages by embedding Java Script in HTML

CO3: Build server side applications using JSP

CO4: Construct interoperable web applications using PHP

CO5: Make use of AJAX and web services to develop interactive web applications

TEXT BOOK:

1. Deitel & Nieto, 2011, *Internet and World Wide Web - How to Program*, Prentice Hall, 5th ed.

REFERENCE BOOKS:

1. Stephen Wynkoop & John Burke, 1999, *Running a Perfect Website*, 2nd ed, QUE.
2. Chris Bates, 2009, *Web Programming – Building Intranet Applications*, 3rd ed, Wiley Publications.
3. Jeffrey, C, and Jackson, 2011, *Web Technologies A Computer Science Perspective*, Pearson Education.
4. Gopalan, NP & Akilandeswari, J, 2011, *Web Technology*, Prentice Hall of India.
5. Uttam K Roy, 2011, *Web Technologies*, Oxford University Press.

AD1533

SOFT COMPUTING

L	T	P	C
3	0	0	3

PREREQUISITE: AD1471 – Machine Learning

OBJECTIVES:

To enable the students to

- Classify the soft computing frame works
- Be familiar with the design of neural networks,
- Be exposed to fuzzy logic and fuzzy systems
- Learn mathematical background for optimized genetic programming
- Be exposed to neuro-fuzzy hybrid systems and its applications

UNIT I INTRODUCTION

9

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.

UNIT II NEURAL NETWORKS

9

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative autoassociative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.

UNIT III FUZZY LOGIC

9

Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of

fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT IV GENETIC ALGORITHM 9

Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multilevel optimization – real life problem- advances in GA

UNIT V HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS 9

Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Outline soft computing concepts for practical applications

CO2: Construct suitable neural networks for real time problems

CO3: Use fuzzy rules and reasoning to develop decision making and expert systems

CO4: Explain the importance of optimization techniques and genetic programming

CO5: Summarize the hybrid soft computing techniques and apply in real time problems

TEXT BOOKS:

1. Sivanandam, SN & Deepa, SN, 2011, *Principles of Soft Computing*, Wiley India Pvt Ltd.
2. Jang, JSR, Sun, CT & Mizutani, E, 2004, *Neuro-Fuzzy and Soft Computing*, PHI / Pearson Education.

REFERENCE BOOKS:

1. Rajasekaran, S & Vijayalakshmi Pai, GA, 2006, *Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications*, Prentice-Hall of India Pvt. Ltd.
2. George, J, Klir, Ute St, Clair, & Bo Yuan, 1997, *Fuzzy Set Theory: Foundations and Applications*, Prentice Hall.
3. David, E & Goldberg, 2013, *Genetic Algorithm in Search Optimization and Machine Learning*, Pearson Education India.
4. James, A, Freeman, David, M & Skapura, 1991, *Neural Networks Algorithms, Applications, and Programming Techniques*, Pearson Education India.
5. Simon Haykin, 2005, *Neural Networks Comprehensive Foundation*, 2nd ed, Pearson Education.

CS1402 SOFTWARE ENGINEERING WITH UML DESIGN

L	T	P	C
3	0	0	3

PREREQUISITE: CS1402- Software Engineering with UML Design

OBJECTIVES:

To enable the students to

- Learn the fundamental concepts of software process and requirements engineering
- Explore UML static modeling
- Explore UML dynamic modeling
- Learn the various management concepts
- Understand the different testing strategies

UNIT I SOFTWARE PROCESS AND REQUIRMENTS ENGINEERING 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process - Extreme programming-XP Process-Requirements Engineering- Functional and non-functional requirements- The software requirements document - Requirements specification- Requirements engineering processes- Requirements elicitation and analysis- Requirements validation- Requirements management

UNIT II STATIC MODELING 9

Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies - Aggregation and Composition - UML activity diagrams and modeling

UNIT III DYNAMIC MODELING AND IMPLEMENTATION 9

System sequence diagrams – Communication diagrams - Relationship between sequence diagrams and use cases - Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams – relationship – inheritance – Abstract classes –Operation contracts - Mapping design to code – Test driven development – Refactoring – UML tools and UML as blueprint - UML state machine

CS1537

C# AND .NET FUNDAMENTALS

L	T	P	C
2	0	2	3

PREREQUISITE: GE1171-Fundamentals of Computing and Programming

OBJECTIVES:

To enable the students to

- Understand the .NET architecture and basic features of C#.
- Be familiar with the object oriented programming concepts of C#.
- Gain knowledge about advanced features in C#.
- Build simple application using database connectivity with C#.
- Develop web application using ASP.NET.

UNIT I INTRODUCTION TO .NET AND C# FUNDAMENTALS 6

Introduction to .NET Architecture - CLS, CTS, BCL, Overview of C# - Data types, Literals and Variables, Boxing and Un Boxing – Operators – Control statements - Enumerations -Parameter passing mechanisms - Arrays, Strings, StringBuilder.

UNIT II OBJECT ORIENTED CONCEPTS IN C# 6

Classes and Objects, Inheritance: Virtual methods and Overriding–Abstract Class, Sealed Class. Interfaces – Generic classes and methods - Collection

UNIT III ADVANCED C# FEATURES 6

Exception handling - Delegates and Events - lambda expressions, Multithreading
Introduction to assemblies – Properties - Reflection, and Attributes

UNIT IV ADO.NET AND DATABASE CONNECTIVITY 6

Connected Model: Data provider classes, SqlConnection, SqlCommand and SqlDataReader. Disconnected Model: DataAdapter, DataSet, DataTable. Parameters and Stored procedures.

UNIT V WEB APPLICATIONS**6**

ASP.NET based web application –Web Forms Code behind model –Autopostback – concept of state - validating controls - master and content pages – Web services, Introduction to ASP.NET MVC.

THEORY : 30 PERIODS**LIST OF EXPERIMENTS:**

1. Implement a simple C# program using jagged array concept
2. Develop programs with the usage of C# specific keywords (ref, in, out)
3. Implement object oriented concepts using class, objects and constructors
4. Implement multiple inheritance using C#
5. Implement a C# program for the following concepts.
 - a. Generic class
 - b. Exception handling
6. Implement a C# program for the following concepts.
 - a. Delegates
 - b. Event handling
7. Develop a simple database application using ADO.NET connected Model
8. Develop a simple database application using ADO.NET disconnected Model
9. Develop a web application using ASP.NET
10. Create a web service to implement the basic calculator services

PRACTICAL : 30 PERIODS**LABORATORY REQUIREMENTS FOR A BATCH OF 30 STUDENTS**

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4GB RAM)	30
2.	Printer	1
3.	Software: Microsoft Visual Studio 2019, SQL Server or equivalent	

TOTAL: 60 PERIODS**OUTCOMES:**

Upon successful completion of the course, students will be able to

CO1: Explain the basic concepts of C# and .NET framework.

CO2: Develop C# programs with object oriented programming concepts.

CO3: Build simple applications with exception handling and threading concepts.

CO4: Construct three tier applications using ADO.NET.

CO5: Build simple web application using ASP.NET.

TEXT BOOKS:

1. Herbert Schildt, 2010, Reprint 2017, *C# 4.0: The Complete Reference*, McGraw Hill Education, Indian Edition.
2. Andrew Troelsen & Philip Japikse, 2015, *C# 6.0 and the .NET 4.6 Framework*, Apress, 7th ed.

REFERENCE BOOKS:

1. Mark Michaelis & Eric Lippert, 2015, *Essential C# 6.0*, Pearson.
2. Daniel Solis, *Illustrated C# 2012*, 2nd ed, Apress.
3. Joseph Albahari & Ben Albahari, 2010, *C# 4.0 in a Nutshell: The Definitive Reference*, O'Reilly.
4. Ian Gariffiths, 2012, *Programming C# 5.0*, O'Reilly, 4th ed.
5. John Sharp, 2013, *Microsoft Visual C# 2013 Step by Step Developer*, Pearson Education.
6. Thamarai Selvi, S & Murugesan, R, 2012, *A textbook on C#*, Pearson.

L	T	P	C
2	0	2	3

PREREQUISITE: MA1473 - Probability and Statistics & AD1201 - Foundations for Data Science

OBJECTIVES:

To enable the students to

- Learn programming using R Software
- Understand the data structures in R
- Familiarize with programming constructs in R
- Be able to manipulate data using R Packages
- Learn how to communicate results using R

UNIT I INTRODUCTION 6

Introduction: Overview of R: Essentials of the R Language, Installing R, Running R, Introduction to functions and Important R Data structures, Declarations, Recycling, Common vector operations, Vectorized Operations, NA and NULL Values, Filtering, Testing Vector Equality, Matrices and Arrays: Creating Matrices, General Matrix Operations, Applying functions to Matrix Rows and Columns, Adding and Deleting Matrix Rows and Columns, Avoiding Unintended Dimensional Reduction, Higher Dimensional Arrays

UNIT II PROGRAMMING BASICS 6

Data Structures: Lists, Data Frames, Factors and Tables, Programming Structures: Control Statements, Arithmetic and Boolean Operators and Values, Default values for Arguments, Return Values, Functions are objects, Environment and Scope issues, Recursion, Replacement Functions, Tools for composing Function Code, Writing own binary operations, Anonymous Functions, Input/Output: Accessing the Keyboard and Monitor, Reading and Writing Files, Accessing the internet.

UNIT III DATA MANIPULATION - I

6

R Packages - Data Visualization with ggplot2, Data transformation with dplyr, Exploratory Data Analysis: Introduction, Variation, Missing values, Covariation, Patterns and models, ggplot2 calls, Tibbles with tibble: Creating tibbles, Tibbles Versus Data Frame, Interacting with Older Code, Data Import with readr: Parsing a Vector, Parsing a file, Writing to a File, Types of Data, Tidy data with tidyr: Tidy Data, Spreading and Gathering, Separating and Pull, Missing Values, Case Study, Nontidy Data, .Relational Data with dplyr: Keys, Mutating Joins, Filtering Joins, Join Problems, Set Operations, , Strings: Basics, Matching patterns with Regular Expressions, Tools, Types of Pattern, Uses of Regular Expressions, Stringi, Factors with forcats, Dates and Times with lubridate

UNIT IV DATA MANIPULATION - II

6

Pipes with magrittr, Iteration with purr: Model basics with modelr: Simple model, Visualizing models, Formulas and Model Families, Missing values, Model Building, Many models with purr and broom: Introduction, gapminder, List-Columns, Creating List-Columns, Simplifying List-Columns. Making Tidy Data with broom

UNIT V COMMUNICATING RESULTS

6

R Markdown: Basics, Text Formatting with Markdown, Code Chunks, Troubleshooting, YAML Header, Graphics for Communication with ggplot2: Label, Annotations, Scales, Zooming, Themes, Saving Plots R Markdown Formats: Output Options, Documents, Notebooks, Presentations, Dashboards, Interactivity, Websites, R Markdown Workflow

THEORY : 30 PERIODS

LIST OF EXPERIMENTS:

1. R Program to add two vectors
2. R program to find sum, mean and product of a vector
3. R program to find the factorial of a number
4. R program to print Fibonacci series
5. R program to make a simple calculator
6. R program to find sum of natural numbers using recursion
7. Data visualization with R Packages

8. Data manipulation with R packages
9. Preparing Documents with R Mark Down

PRACTICAL : 30 PERIODS

LABORATORY REQUIREMENTS FOR A BATCH OF 30 STUDENTS

S. NO	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1	Personal Computers (Intel Core i3, 250 GB, 1 GB RAM) or Higher configuration	30
2	Printer	1
3	Software R-4.0.5 or latest version (free, open source)	

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Solve simple problems with R programs.
- CO2: Apply appropriate data structure and control structure to solve the given problem
- CO3: Apply R for data visualization.
- CO4: Make use of Packages in R for Data Manipulation.
- CO5: Make use of R Markdown to communicate results

TEXT BOOKS:

1. Hadley Wickham & Garrett Golemund, 2017, *R for Data Science*, O'Reilly Medi Inc.
2. Roger D Peng, 2015, *R Programming for Data Science*, Lean Publishing.

REFERENCE BOOKS:

1. Norman Matloff, 2011, *The Art of R Programming: A tour of Statistical Software Design*, no starch press.
2. Garrett Golemund, 2014, *Hands-On Programming with R*, O'Reilly.
3. Nina Zumel & John Mount, 2014, *Practical Data Science with R*, Manning Publications.

CS1532 DATA WAREHOUSING AND DATA MINING

L	T	P	C
3	0	0	3

PREREQUISITE: CS1371 - Database Management Systems**OBJECTIVES:**

To enable the students to

- Understand data warehouse concepts, architecture, business analysis and OLAP tools
- Understand data pre-processing and data visualization techniques
- Learn algorithms for finding hidden and interesting patterns in data
- Understand and apply various classification and clustering techniques
- Use Weka tool to experiment various data mining algorithms for various datasets.

UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP) 9

Basic Concepts -Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies - Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II DATA MINING – INTRODUCTION 9

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Pre-processing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III DATA MINING - FREQUENT PATTERN ANALYSIS 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi-Dimensional

Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection- Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis - Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering –Clustering high dimensional data-Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V WEKA TOOL 9

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association– Rule learners.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Develop a Data warehouse system for a given application.
- CO2: Identify suitable pre-processing and visualization techniques for different types of datasets.
- CO3: Apply frequent pattern and association rule mining techniques for data analysis.
- CO4: Apply appropriate classification and clustering techniques for data analysis.
- CO5: Experiment with Weka tool, various data mining algorithms.

TEXT BOOKS:

1. Alex Berson & Stephen J Smith, 2016, *Data Warehousing, Data Mining & OLAP*, Tata McGraw Hill Edition, 35th Reprint.
2. Jiawei Han & Micheline Kamber, 2012, *Data Mining Concepts and Techniques*, 3rd ed, Elsevier.

REFERENCE BOOKS:

1. Soman, KP, Shyam Diwakar & Ajay, V, 2006, *Insight into Data Mining Theory and Practice*, Eastern Economy Edition, Prentice Hall of India.
2. Ian H Witten & Eibe Frank et al., 2016, *Data Mining: Practical Machine Learning Tools and Techniques*, Morgan Kaufmann.

AD1534

ETHICAL HACKING

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the information security threats and counter measures
- Gain the knowledge to perform security auditing and testing
- Explain the various issues related to ethical hacking
- Familiarize with various ethical hacking techniques in web applications
- Experiment with the predominant Security Management tools

UNIT I ETHICAL HACKING OVERVIEW 9

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.

UNIT II SCANNING AND ENUMERATION 9

Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools

UNIT III SYSTEM HACKING 9

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges – Executing Applications – Keyloggers and Spyware.

UNIT IV ETHICAL HACKING IN WEB 9

Social Engineering, Session Hijacking, Hacking Web servers, Hacking Web Applications SQL Injection, Hacking Wireless Networks, Hacking Mobile Platforms.

UNIT V SECURITY MANAGEMENT TOOLS

9

Manage security assessments with Metasploit, Honey pots, IDS- SolarWinds, Security Event Manager (SEM) Sagan, Kismet

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Outline the information security threats and countermeasures.

CO2: Illustrate the security auditing and testing process.

CO3: Interpret various issues related to ethical hacking.

CO4: Demonstrate real-world hacking techniques in web applications.

CO5: Make use of Security Management Tools.

TEXT BOOKS:

1. EC-Council, 2016, *Ethical Hacking and Countermeasures: Attack Phases*, 2ND edition Delmar Cengage Learning.
2. Kimberly Graves, 2016, *CEH V9 Certified Ethical Hacker Version 9 Study Guide*, Wiley India Pvt Ltd.

REFERENCE BOOKS:

1. Rajat Khare, 2006, *Network Security and Ethical Hacking*, Luniver Press.
2. Ramachandran, V, 2011, *BackTrack, Wireless Penetration Testing Beginner's Guide* (3rd ed.) Packt Publishing.
3. Thomas Mathew, 2003, *Ethical Hacking*, OSB publishers.
4. Michael, T & Simpson, 2010, *Hands-on Ethical Hacking & Network Defense*, Course Technology.

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the foundations of Human Computer Interaction.
- Become familiar with the design technologies for individuals and persons with disabilities.
- Understand the user models, social organizational issues and stakeholder requirements of HCI
- Understand the concepts of mobile HCI.
- Learn the guidelines for designing simple user interfaces.

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity

UNIT II DESIGN AND SOFTWARE PROCESS 9

Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III MODELS AND THEORIES 9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements –Communication and collaboration models

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT V WEB INTERFACE DESIGN

9

Designing Web Interfaces – Drag and Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Outline the fundamental design and evaluation methodologies of HCI.

CO2: Demonstrate the guidelines, principles, and software process influencing HCI.

CO3: Identify the stakeholder requirements and choose the appropriate models.

CO4: Explain the HCI implications for designing Mobile application.

CO5: Develop user interface for a given application.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd & Russell Beale, 2004 (UNIT I, II & III), *Human Computer Interaction*, 3rd ed, Pearson Education.
2. Brian Fling, 2009 (UNIT – IV), *Mobile Design and Development*, 1st ed, O'Reilly Media Inc.
3. Bill Scott & Theresa Neil, 2009 (UNIT-V), *Designing Web Interfaces*, 1st ed, O'Reilly.

OAD151 FOUNDATIONS OF DATA SCIENCE USING EXCEL

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Know the basics of Excel
- Formatting and editing in Excel
- Handle the data in Excel
- Use tables and sharing concepts
- Visualize the data and analyzing

UNIT I INTRODUCTION 9

Introduction to Basics of excel Foundations - Workbooks and Worksheets, Fundamentals, How to enter data, Autofit, Keyboard navigation, Autocomplete, Entering numbers, Navigating edges, Navigating first and last used cells; selecting cells - introduction, shift arrow, selecting cells - ctrl shift arrow, selecting cells - mouse click and drag, selecting cells - mouse click and shift click; All cells and used cells, Selecting cells - Rows and columns, Selecting cells – Non-contiguous cells, Selecting cells; Number formatting - Introduction, General and text, Number and fraction, Currency, Accounting, Percentage, Date, Time; Inserting and deleting rows, columns and cells.

UNIT II FORMATTING, EDITING 9

Number formatting – Introduction General and text, Number and fraction, Currency, Accounting, Percentage, Date, Time, Inserting and deleting rows, columns and cells, Formatting - Introduction, Bold, italics and underline, Border, Fill and Font, Alignment, Format painter and clear format, Editing the cell content, Multiple lines of text, ctrl enter, auto fill, copy and paste, cut and paste, auto fill series, sort, filter, find and replace

UNIT III HANDLING DATA IN EXCEL 9

Handling Data overview - freeze panes, Calculations - introduction to formula, Editing formula, Introduction to functions, Entering functions, Types of functions, MIN MAX and AVERAGE functions, Copying formula, Cell References, Paste formula,

2. Wayne Winston, 2019, *Microsoft Excel 2019 Data Analysis and Business Modeling*, 6th ed, Microsoft Press.

REFERENCE BOOKS:

1. Walkenbach, J, *Microsoft Excel 2016 Bible: The Comprehensive Tutorial Resource*, Wiley.
2. Fischer, W, *Excel: Quick Start Guide from Beginner to Expert (Excel, Microsoft Office)*, Create Space Independent Publishing Platform.
3. Harvey, G, *Excel 2016 for Dummies (Excel for Dummies)*, John Wiley & Sons.
4. Kalmstrom, P, *Excel 2016 from Scratch: Excel course with demos and exercises*, Create Space Independent Publishing Platform.
5. Alexandar, M, *Excel Macros For Dummies*, Wiley.
6. Walkenbach, J, *Excel Charts*, John Wiley & Sons.

AD1601

COMPUTER VISION

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Review image processing techniques for computer vision.
- Understand histograms and binary vision.
- Understand geometric transformations and edge detection.
- Understand features and recognition techniques.
- Study about video tracking and panoramas.

UNIT I OPENCV AND BASIC OPERATIONS ON IMAGES 9

History of OpenCV - Built-in Modules - Setting up OpenCV on Your Computer - Stereo Matching – Homography Estimation in Video - Circle and Line Detection - Image Segmentation - Bounding Box and Circle - Image Inpainting - Displaying Images from Disk in a Window - The cv::Mat Structure - Converting Between Color-spaces - GUI Track- Bars and Callback Functions - ROIs: Cropping a Rectangular Portion out of an Image - Accessing Individual Pixels of an Image – Videos

UNIT II IMAGES, HISTOGRAMS, BINARY VISION 9

Simple pinhole camera model – Sampling – Quantisation – Colour images – Noise – Smoothing – 1D and 3D histograms - Histogram/Image Equalisation - Histogram Comparison - Back-projection - k-means Clustering – Thresholding - Threshold Detection Methods - Variations on Thresholding - Mathematical Morphology – Connectivity

UNIT III EDGES AND GEOMETRIC TRANSFORMATIONS 9

Problem Specification and Algorithm - Affine Transformations - Perspective Transformations - Specification of More Complex Transformations – Interpolation - Modelling and Removing Distortion from Cameras - Edge Detection - Contour Segmentation - Hough Transform

UNIT IV FEATURES AND RECOGNITION

9

Moravec Corner Detection - Harris Corner Detection - FAST Corner Detection – SIFT - Other Detectors – Template Matching - Chamfer Matching - Statistical Pattern Recognition - Cascade of Haar Classifiers - Other Recognition Techniques – Performance

UNIT V VIDEO AND PANORAMAS

9

Moving Object Detection – Tracking - Video Datasets and Formats - Metrics for Assessing Video Tracking Performance – Affine Transformations - Perspective Transformations - Image panorama

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Implement fundamental image processing techniques required for computer vision.
- CO2: Apply thresholding and find histograms.
- CO3: Apply geometric transformations and edge detection to images.
- CO4: Apply various feature extraction techniques.
- CO5: Implement image panorama and video tracking.

TEXT BOOKS:

1. Kenneth Dawson-Howe, 2014, *A Practical Introduction to Computer Vision with OpenCV*, Wiley.
2. Samarth Brahmhatt, 2013, *Practical OpenCV*, Apress.

REFERENCE BOOKS:

1. Adrian Kaehler, Gary Bradski, 2017, *Learning OpenCV 3: Computer Vision in C++ with the OpenCV Library*, 1st ed, O'Reilly Media;.
2. Prateek Joshi, David Millán Escrivá, Vinicius Godoy, 2016, *OpenCV by Example*, Packt Publishing.
3. Adrian Rosebrock, 2016, *Practical Python and OpenCV*, 2nd ed, Py Image Search.

UNIT V **ADVANCED DEEP LEARNING TECHNIQUES**

9

Deep Belief Networks – Deep Boltzman Machine – Deep Associative Memory networks – Generative Neural Networks – Deep fake Technology –Case Study on designing deep learning solutions for identifying fake finger prints, fake images and videos

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Explain the basic concepts of neural networks

CO2: Implement various ANN models

CO3: Experiment with Convolutional Neural Network

CO4: Apply Convolutional Neural Network for multimedia analytics

CO5: Demonstrate various deep learning techniques

TEXT BOOK:

1. Ian Goodfellow, Yoshua Bengio & Aaron Courville, 2016, *Deep Learning*, MIT Press.

REFERENCE BOOKS:

1. Cosma, Rohilla & Shalizi, 2015, *Advanced Data Analysis from an Elementary Point of View*.
2. Deng & Yu, 2013, *Deep Learning: Methods and Applications*, Now Publishers.
3. Michael Nielsen, 2015, *Neural Networks and Deep Learning*, Determination Press.

GE1671 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the concepts of quality and quality management, TQM framework, Barriers and Benefits of TQM.
- Apply the Principles and techniques of Quality Management for real time
- Understanding the need and importance of quality assurance and certification

UNIT I INTRODUCTION 9

Concept of Quality and Quality Management- Determinants of quality of product & service-Quality vs. Reliability-- Definition of TQM-- Basic concepts of TQM -- TQM Framework- Barriers to TQM –Benefits of TQM.–Gurus of TQM (Brief introduction)- Quality statements – vision, mission, Policy.

UNIT II PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT 9

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

UNIT III TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT 9

Quality functions development (QFD) – Benefits, Voice of customer, information Organisation, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation-Taguchi techniques

UNIT IV STATISTICAL QUALITY CONTROL 9

Juran’s concept of quality cost-components of Quality Cost- Statistical Quality Control – Inspection, Sampling, Sample Size, Sampling Plan, AQL, OC curve, Producer Risk, Consumer Risk, AOQ, AOQL, Control Charts & Control Limits – X, R & S charts and their application- causes of variations – Assignable & Random; Runs-Test, Chart-Sensitivity Test and Run-Sum Test; Normal-Distribution curve and concept of Six Sigma

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001-Benefits of EMS

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Apply TQM concepts in a selected enterprise.

CO2: Apply TQM principles in a selected enterprise.

CO3: Understand Taguchi's techniques, Performance Measures, QFD, HOQ.

CO4: Understand Six Sigma and apply Traditional tools, new tools, Benchmarking.

CO5: Confirm quality standards and implementing QMS in business organization

TEXT BOOKS:

1. Suganthi, L & Anand Samuel, 2004, *Total Quality Management*, Prentice Hall, Publications.
2. Dale H Besterfield, Carol B Michna, Glen H Besterfield, Mary B Sacre, Hemant Urdhwareshe & Rashmi Urdhwareshe, 2013, *Total Quality Management*, Revised 3rd ed, Pearson Education Asia, Indian Reprint, Sixth Impression.

REFERENCE BOOKS:

1. Rose JE, 1997, *Total Quality Management*, S. Chand & Co.
2. Kiran, DR, 2016, *Total Quality Management: Key concepts and case studies*, Butterworth Heinemann Ltd.
3. Shridhara Bhat, K, 2016, *Total Quality Management: Text and Cases*, 2nd ed, Himalaya Publishing House India.

CS1681 MOBILE APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Understand the components and structure of mobile application development frameworks.
- Develop mobile applications using Graphical Primitives and Event Driven Concepts
- Familiarize with the file concepts and inbuilt/SQLite database for developing mobile applications
- Construct real time mobile applications to integrate cloud database and IoT

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Styles
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an application to draw basic graphical primitives on the screen.
4. Create an Animation using Multithreading
5. Develop an application that makes use of databases. (SQLite)
6. Implement an application that writes data to the SD card.
7. Develop an application that makes use of Notification Manager
8. Develop a native application that uses GPS location information
9. Implement an application that creates an alert upon receiving a message
10. Develop a mobile application to send an email.
11. Develop a mobile application with regional language support
12. Develop a mobile application to record audio
13. Develop a mobile application for sensing temperature using IOT
14. Develop a mobile application to retrieve and process data from cloud storage
15. Develop a Mini Project

PRACTICAL : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (8 core Apple M1 chip,8 GB)	30
2.	Printer	1
3.	Server (Intel Core i3, 4 GB RAM) (High Speed Processor)	1
4.	Software: Android Studio 4.2	30
5.	Android Emulator	30

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Build simple mobile applications using GUI components.

CO2: Develop mobile applications using Graphical Primitives and Event Driven Concepts.

CO3: Make use of file concepts and inbuilt/SQLite database for developing mobile applications.

CO4: Utilize notification and location tracking concepts in mobile application development.

CO5: Construct real time mobile applications to integrate cloud database and IoT.

TEXT BOOK:

1. John Horton, 2018, *Android Programming for Beginners*, 2nd ed, Packt Publishing.

REFERENCE BOOK:

1. Pradeep Kothari, Kogent Learning Solutions Inc., 2014, *Android Application Development (With Kitkat Support)*, Black Book, 1st ed, Kindle Edition.

AD1611 COMPUTER VISION LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Review various image processing techniques.
- Understand histograms and binary vision.
- Understand geometric transformations and edge detection.
- Understand feature extraction techniques.
- Study about moving object detection and panoramas.

LIST OF EXPERIMENTS:

Implement the following using OpenCV

1. Conversion of 24 bit color image to 8 bit , 4 bit, 1 bit image
2. Converting Between Color-spaces
3. Histogram mapping & equalisation, stretching
4. Image smoothing, sharpening
5. Geometric transformations
6. Morphological operations on binary images
7. Edge detection
8. Feature extraction
9. Moving object detection
10. Image Panorama

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Implement fundamental image processing techniques.

CO2: Apply thresholding and find histograms.

CO3: Apply geometric transformations, morphological operations and edge detection to images.

CO4: Apply various feature extraction techniques.

CO5: Implement image panorama and video tracking.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: Python - OpenCV	30

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Explore various tools such as tensorflow, keras and pytorch library.
- Understand the basic concepts of neural networks.
- Build various neural network architectures.
- Build convolutional neural networks for solving various applications.

LIST OF EXPERIMENTS:**Implement the following using Python and TensorFlow**

1. Implementation of Perceptrons
2. Feed Forward neural Network using Backpropagation
3. Restricted Boltzman machine using Python with TensorFlow
4. Self Organising Map
5. Radial Basis Neural Network
6. LSTM
7. Construct CNN model to perform Image Analysis
8. Construct CNN model to perform Audio Analysis
9. Construct CNN model to perform Video Analysis
10. Deep belief Network
11. Generative Neural Networks
12. Team Project –Deep Learning Based Applications

TOTAL: 60 PERIODS**OUTCOMES:**

Upon successful completion of the course, students will be able to

- CO1: Implement basic artificial neural network architectures
- CO2: Build real time applications using artificial neural network architectures
- CO3: Experiment with Convolutional Neural Network for image analytics
- CO4: Apply Convolutional Neural Network for audio and video analytics
- CO5: Demonstrate various advanced deep learning techniques

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: Python packages for vision experiment – numpy, matplotlib, Sklearn, scipy, keras, tensorflow, NLP, pytorch, and pyspark packages	30

HS1521

PROFESSIONAL COMMUNICATION

L	T	P	C
0	0	2	1

OBJECTIVES:

This course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates.
- Develop their confidence and help them attend interviews successfully

UNIT I

Introduction to Soft Skills – Hard skills & soft skills – employability and career Skills - Grooming as a professional with values - Time Management - General awareness of Current Affairs.

UNIT II

Self-Introduction-organizing the material – Introducing oneself to the audience – introducing the topic – answering questions with clarity and appropriate phrases – individual presentation practice - presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion - Participating in group discussions – understanding group dynamics – brainstorming the topic - questioning and clarifying – GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview - one to one interview & panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams - managing time-managing stress - networking professionally - respecting social protocols-understanding career

management -developing a long-term career plan-making career changes - Error spotting.

TOTAL: 30 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

CO1: Make effective presentations

CO2: Participate confidently in Group Discussions.

CO3: Attend job interviews and be successful in them.

CO4: Develop adequate Soft Skills required for the workplace

REFERENCE BOOKS:

1. Butterfield, 2015, *Jeff Soft Skills for Everyone*, Cengage Learning: New Delhi.
2. Suresh Kumar, E, et al., 2015, *Communication for Professional Success*. Orient Blackswan: Hyderabad.
3. *Interact English Lab Manual for Undergraduate Students*, 2016, OrientBalckSwan: Hyderabad.
4. Raman, Meenakshi & Sangeeta Sharma, 2014, *Professional Communication*. Oxford University Press, Oxford.
5. Hariharanet, S, et. al., 2010, *Soft Skills*. MJP Publishers: Chennai.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 250 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: Orell Techno Systems Digital Language Lab Software	30 (Licenses)

IT1631

BLOCKCHAIN TECHNOLOGIES

L	T	P	C
3	0	0	3

PREREQUISITE: CS1532 - Data Warehousing and Data Mining

OBJECTIVES:

To enable the students to

- Understand the needs of cryptographic algorithms in blockchain technologies
- Describe the operational and functional aspects of trading and mining
- Know about the bitcoin consensus
- Explain various algorithms that supports distributed consensus
- Realize the usage of Hyper ledger fabric and ethereum in various fields

UNIT I INTRODUCTION TO BLOCKCHAIN 7

Blockchain- Public Ledgers, Blockchain as Public Ledgers -Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain - Cryptocurrency to Blockchain 2.0 - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree..

UNIT II BITCOIN AND CRYPTOCURRENCY 9

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments - Consensus in a Bitcoin network.

UNIT III BITCOIN CONSENSUS 10

Bitcoin Consensus, Proof of Work (PoW)- HashcashPoW , BitcoinPoW, Attacks on PoW, monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned blockchain-Distributed consensus in closed environment-Paxos

REFERENCE BOOKS:

1. Arshdeep Bahga & Vijay Madiseti, 2017, *Blockchain Applications : A Hands-on Approach*.
2. Andreas Antonopoulos & Satoshi Nakamoto, 2014, *Mastering Bitcoin*, O'Reilly Publishing.
3. Roger Wattenhofer, 2017, *The Science of the Blockchain*, Create Space Independent Publishing Platform.
4. Alex Leverington, *Ethereum Programming*, Packt Publishing Limited.

AD1631

COGNITIVE SCIENCE

L	T	P	C
3	0	0	3

PREREQUISITE: AD1372 - Introduction to Artificial Intelligence

OBJECTIVES:

To enable the students to

- Learn the basics of Cognitive Science with focus on acquisition, representation and use of knowledge by individual minds, brains, and machines
- Study the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics.
- Understand the role of neuro-science in the cognitive field.
- Learn about computational models for semantic processing.
- Appreciate the role of reasoning in cognitive processing

UNIT I INTRODUCTION TO COGNITIVE SCIENCE 9

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 9

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 SkillThe Connectionist Approach to Cognitive Architecture

UNIT III COGNITIVE NEUROSCIENCE 9

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

REFERENCE BOOKS:

1. Friedenbergr, J, & Silverman, G, 2011, *Cognitive Science: An Introduction to the Study of Mind*.
2. Steven Pinker, 2009, *How the Mind Works*, W. W. Norton & Company; Reissue edition.
3. Carolyn Panzer Sobel & Paul Li, 2013, *Cognitive Science: An Interdisciplinary Approach*.
4. Paul Thagard, 2005, *Mind: Introduction to Cognitive Science*, 2nd ed, MIT Press.

processing- erosion and dilation, Segmentation by morphological watersheds - basic concepts - Dam construction - Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION

9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors - Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Explain the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms. .
- CO2: Make use of different image enhancement techniques in spatial and frequency domain for enhancing the quality of image.
- CO3: Identify the causes for image degradation and restore the image using different image restoration techniques. .
- CO4: Apply image segmentation techniques for image analysis.
- CO5: Summarize different feature extraction techniques that are used for image analysis, image recognition.

TEXT BOOK:

1. Rafael, C, Gonzalez, Richard, E & Woods, 2018, *Digital Image Processing*, 4th ed, Pearson.

REFERENCE BOOKS:

1. Anil, K & Jain, 2002, *Fundamentals of Digital Image Processing*, Pearson.
2. Kenneth, R & Castleman, 2006, *Digital Image Processing*, Pearson.
3. Dudgeon, DE & Mersereau, RM, 2006, *Multidimensional Digital Signal Processing*, Prentice Hall Professional Technical Reference.
4. William, K & Pratt, 2002, *Digital Image Processing*, John Wiley, New York.

Simulink and its Relation to MATLAB- library: sink, source, maths operation, logic & bit operations, discrete - Modelling an Electric Circuit - Applications: Moving Ladder, Conical Water Reservoir, Feedback Control Systems

THEORY: 30 PERIODS

LIST OF EXPERIMENTS:

1. Learn to use MATLAB Commands for working with the system
2. Implement the following MATLAB programs using Arrays
 - a. Magic square
 - b. Multidimensional arrays
 - c. Sorting arrays
 - d. Accessing data in cell
3. Develop MATLAB programs using Functions
 - a. Anonymous Functions
 - b. Primary and Sub Functions
 - c. Nested Functions
 - d. Private Functions
4. Implement the following MATLAB programs using Graphics and Plotting
 - a. Adding Title, Labels, Grid Lines and Scaling on the Graph
 - b. Setting Colours on Graph
 - c. Generating Sub-Plots
 - d. Drawing Bar charts and contours
 - e. Three Dimensional plots
5. Develop the following MATLAB programs using Algebra, Differential, Integration and Simulink
 - a. Solving Basic Algebraic and Quadratic Equations in Octave
 - b. Solving higher order equations in MATLAB
 - c. Computing higher order derivatives and finding maxima and minima of a curve
 - d. Finding Definite and Indefinite integral using MATLAB Building models using Simulink

PRACTICAL: 30 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SL. NO.	DESCRIPTION OF EQUIPMENT	QUANTITY REQUIRED
1.	Personal Computers (Intel Core i3, 500 GB, 8 GB RAM)	30
2.	Printer	1
3.	Software: MATLAB - Mathworks	30

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Explain the basic concepts of MATLAB programming.

CO2: Build codes using MATLAB scripts and functions.

CO3: Demonstrate MATLAB plotting tools

CO4: Develop MATLAB programs for statistical analysis.

CO5: Apply Simulink tools for engineering applications.

TEXT BOOKS:

1. William J Palm, *Introduction to MATLAB for Engineers*, 3rd ed, 2010.
2. Moore Holly, 2009, *Matlab for Engineers*, Prentice Hall.

REFERENCE BOOKS:

1. Ferreira Ajm, 2014, *Matlab Codes for Finite Element Analysis - Solids and Structures*, Springer.
2. Amos Gilat, 2008, *MATLAB: An Introduction with Applications*, 3rd ed.
3. Steven T.Karris, 2006, *Introduction to Simulink with Engineering Applications*, Orchard Publications, 2nd ed.
4. Rudra Pratap, 2002, *Getting Started with MATLAB*, Oxford University Press.

CS1535 SOFTWARE TESTING AND QUALITY ASSURANCE

L	T	P	C
3	0	0	3

PREREQUISITE: CS1402- Software Engineering with UML Design

OBJECTIVES:

To enable the students to

- Understand the basics and goals of software testing
- Familiarize with various methods of unit and white box testing techniques.
- Understand integration, system and acceptance testing techniques.
- Gain knowledge about automation testing and the software quality standards for establishing quality environment
- Familiarize with the methods and evaluation procedures for improving the quality models

UNIT I INTRODUCTION 9

Basics Concepts of Software Testing and Quality Assurance - Quality Revolution, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black ,test Planning and design, Test Tools and Automation, . Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group ,System Test Team Hierarchy, Team Building

UNIT II UNIT AND WHITE BOX TESTING 9

Unit Testing - Control Flow Testing: Control Flow Graph - Paths in a Control Flow Graph - Path Selection Criteria - Generating Test Input - Examples of Test Data Selection - Containing Infeasible Paths Data Flow Testing: Data Flow Graph - Data Flow Testing Criteria - Comparison of Data Flow Test Selection Criteria - Feasible Paths and Test Selection Criteria - Comparison of Testing Techniques.

UNIT III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING 9

System Integration Techniques - Software and Hardware Integration - Test Plan for System Integration – Off the shelf Component Integration System Test: System Test Categories, Functional Testing: Functional Testing Concepts of Howden - Complexity of Applying Functional Testing - Pairwise Testing - Equivalence Class Partitioning - Boundary Value Analysis - Decision Tables - Random Testing - Error

Guessing - Category Partition Acceptance Testing: Types - Acceptance Criteria - Selection of Acceptance Criteria - Test Plan - Test Execution - Test Report - Acceptance Testing in eXtreme Programming.

UNIT IV SOFTWARE QUALITY MODELS 9

Software quality – People’s Quality Expectations, Frameworks and ISO-9126, McCall ‘s Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models- Test Process Improvement, Testing Maturity Model

UNIT V EMERGING AREAS IN TESTING AND QUALITY THROUGH CONTINUOUS IMPROVEMENT PROCESS 9

Software test automation, Role of Statistical Methods in Software Quality - Key to Quality management - Quality Assurance - Root Cause Analysis, modelling, technologies, standards and methodologies for defect prevention. Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees. Comparing Quality Assurance Techniques and Activities. QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement. Case Study: FSM-Based Testing of Web-Based Applications

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Identify the right type of software testing process for any given real-world problem.
- CO2: Make use of unit and white box software testing process.
- CO3: Explain the integration, system and acceptance testing techniques.
- CO4: Infer quality standards for developing quality software.
- CO5: Utilize the quality procedures through continuous improvement process.

TEXT BOOKS:

1. Kshirasagar Naik, & Priyadarsh Tripathy, 2011, *Software Testing and Quality Assurance -Theory and Practice 1ST edition*, John Wiley & Sons publication.

2. William Lewis, E, 2011, *Software Testing and Continuous Quality Improvement*, 3rd ed, Auerbach Publications.
3. Srinivasan Desikan & Gopaldaswamy Ramesh, 2008, *Software testing: Principles and Practices*, 6th ed, Pearson Education.

REFERENCE BOOKS:

1. Alan C Gillies, 2011, *Software Quality Theory and Management*, 2nd ed, Cengage Learning.
2. Ron Patton, 2007, *Software testing*, 2nd ed, Pearson Education.
3. Elfriede Dustin, Jeff Rashka, & John Paul, 1999, *Automated Software Testing: Introduction, Management and Performance 1st edition*, Addison-Wesley.
4. William E Perry, 2006, *Effective Methods for Software Testing*, 3rd ed, Wiley India.

CS1536

AGILE DEVELOPMENT

L	T	P	C
3	0	0	3

PREREQUISITE: CS1402- Software Engineering with UML Design

OBJECTIVES:

To enable the students to

- Explore the theoretical as well as practical understanding of agile software development practices
- Learn the various agile processes
- Explore agility and knowledge management.
- Understand the impact of agile processes in requirements engineering.
- Learn the various agile metrics.

UNIT I AGILE METHODOLOGY 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT II AGILE PROCESSES 9

Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT 9

Agile Information Systems – Agile Decision Making – Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV MULTIMEDIA COMMUNICATION SYSTEMS

9

Multimedia Communication Standards, Transport Protocols, streaming protocols, Internet Protocols Wireless multimedia communications, synchronization and QOS, security, Entertainment networks, Collaborative multimedia support, Real-time distributed multimedia networks, Hypertext, Hypermedia.

UNIT V SMART MULTIMEDIA APPLICATIONS

9

Blogs & Vlogs, Social Media, Visualization, Virtual, Augmented and Mixed Reality, Interactive E-learning, HCI and UX design, Games and Animation, Real-Time video conferencing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Outline the characteristics and formats of multimedia elements.

CO2: Make use of Multimedia Hardware and Software for Editing and Authoring multimedia applications.

CO3: Classify Compression algorithms for appropriate multimedia applications.

CO4: Demonstrate effective strategies to deliver Quality-of-Experience in Networked Multimedia applications.

CO5: Extend multimedia applications in prominent domains.

TEXTBOOKS:

1. Ze-Nian Li, Mark S Drew & Jiangchuan Liu, 2014, *Fundamentals of Multimedia*, 2nd ed, Springer Nature (Texts in Computer Science).
2. Prabhat K Andleigh & Kiran Thakrar, 2015, *Multimedia Systems Design*, 1st ed, Pearson Education India.
3. Ralf Steinmetz & KlaraNahrstedt, 2002, *Multimedia computing, communications, and applications*, Pearson India.

REFERENCE BOOKS:

1. Fred Halsall, 2002, *Multimedia Communications: Applications, Networks, Protocols and Standards*, Pearson Education.
2. Khalid Sayood, 2012, *Introduction to Data Compression*, 4th ed, Morgan Kauffman.
3. Rao, KR, Zoran S Bojkovic, Bojan, M, & Bakmaz, 2017, *Wireless Multimedia Communication systems: Design, Analysis and Implementation*, CRC press.
4. Subrahmanian, VS, 2008, *Principles of Multimedia Database Systems*, Elsevier / Morgan Kauffmann.

AD1633

ROBOTICS AND INTELLIGENT SYSTEMS

PREREQUISITE : AD1372 - Introduction to Artificial Intelligence

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the concepts of Intelligent systems.
- Explain the various methods of solving problems using Intelligent systems.
- Explain the concepts of Expert Systems and machine learning.
- Learn about planning and reasoning of intelligent agent.
- Learn the risk in Robots intelligent systems.

UNIT I INTRODUCTION

10

History, state of the art, Need for AI in Robotics. **PROBLEM SOLVING:** Solving problems by searching –Informed search and exploration–Constraint satisfaction problems–Adversarial search, knowledge and reasoning– knowledge representation – first order logic.

UNIT II PLANNING

9

Planning with forward and backward State space search – Partial order planning – Planning graphs– Planning with propositional logic – Planning and acting in real world.

UNIT III REASONING

9

Uncertainty – Probabilistic reasoning–Filtering and prediction–Hidden Markov models–Kalman filters–Dynamic Bayesian Networks, Speech recognition, making decisions.

UNIT IV LEARNING

9

Forms of learning – Knowledge in learning – Statistical learning methods – reinforcement learning, Communication, perceiving and acting, Probabilistic language processing, perception.

UNIT V AI IN ROBOTICS

8

Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Explain the basic concepts of intelligent systems.
- CO2: Show appropriate by intelligent methods to solve a given problem.
- CO3: Demonstrate a given problem in the language/framework of different intelligent system methods.
- CO4: Illustrate basic intelligent algorithms.
- CO5: Identify an empirical evaluation of different algorithms on a problem

TEXT BOOKS:

1. Russell, S & Norvig, P, 2020, *Artificial Intelligence: A Modern Approach*, 4th ed, Prentice Hall.
2. Negnevitsky, M, 2011, *Artificial Intelligence: A guide to Intelligent Systems*, 3rd ed, Harlow: Addison-Wesley.

REFERENCE BOOK:

1. David Jefferis, 1992, *Artificial Intelligence: Robotics and Machine Evolution*, Crabtree Publishing Company.

CS1637

MOBILE ADHOC NETWORKS

L	T	P	C
3	0	0	3

PREREQUISITE: AD1502 - Networks and security

OBJECTIVES:

To enable the students to

- Understand the various features of ad-hoc wireless networks and their applications.
- Gain knowledge about functioning of different access protocols and standards of ad-hoc networks.
- Familiarize the issues and classification in routing protocols for ad-hoc networks.
- Learn the need for security and secure routing protocol for ad-hoc networks.
- Know the challenges and role of cross layer design in enhancing the network performance.

UNIT I INTRODUCTION TO AD-HOC NETWORKS & MANET 9

Ad-hoc networks – definition, characteristics features, applications. Ad-hoc mobility models: indoor and outdoor models. Mobile Ad-hoc Networks (MANET) – architecture & applications.

UNIT II MEDIUM ACCESS PROTOCOLS FOR MANET 9

MAC Protocols: Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III NETWORK PROTOCOLS FOR MANET 9

Routing Protocols: Design issues, goals and classification. Proactive vs Reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.

UNIT IV END – END DELIVERY AND SECURITY 9

Transport Layer: Issues in designing – Transport layer classification, ad-hoc

transport protocols. Security issues in ad-hoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT V CROSS LAYER DESIGN

9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks.

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

CO1: Interpret the characteristics and mobility model for ad-hoc networks.

CO2: Infer about the MAC protocols and different standards used in this layer.

CO3: Summarize the different types of routing protocols for mobile ad-hoc networks.

CO4: Compare ad-hoc transport protocols and security issues in ad-hoc networks.

CO5: Illustrate cross layer design and ad-hoc with mobile IP networks.

TEXT BOOK:

1. Siva Ram Murthy, C & Manoj, BS, 2007, *Ad hoc Wireless Networks Architecture and Protocols*, 2nd ed, Pearson Edition.

REFERENCE BOOKS:

1. Charles E Perkins, 2000, *Ad hoc Networking*, Addison – Wesley.

2. Stefano Basagni, Marco Conti, Silvia Giordano & Ivan stojmenovic, *Mobile ad-hoc networking*, Wiley-IEEE press.

3. Mohammad Ilyas, 2002, *The handbook of ad-hoc wireless networks*, CRC press.

4. Camp, T, Boleng, J & Davies, V, *A Survey of Mobility Models for Ad-hoc Network, Wireless Commun, and Mobile Comp, Special Issue on Mobile Ad-hoc Networking Research, Trends and Applications*, Vol. 2, no. 5, 2002, pp. 483 – 502.

CS1638 SOCIAL MEDIA ANALYTICS

L	T	P	C
3	0	0	3

PREREQUISITE: AD1531 - Information Retrieval

OBJECTIVES:

To enable the students to

- Understand the basic concepts of social media analytics and its significance.
- Gain knowledge about the tools used in web analytics.
- Familiarize with different social media analytics tools.
- Familiarize with the concepts used for studying the effectiveness of social Media for business purposes.
- Gain knowledge about different text and sentiment analytics techniques.

UNIT I INTRODUCTION TO SOCIAL MEDIA ANALYTICS 9

Introduction to Social Media Analytics (SMA) - Social media landscape - Need for SMA - SMA in Small organizations - SMA in large organizations - Application of SMA in different areas - Network fundamentals and models: The social networks perspective - nodes, ties and influencers - Social network and web data and methods - Graphs and Matrices - Basic measures for individuals and networks - Information visualization.

UNIT II WEB ANALYTICS TOOLS 8

Making connections: Link analysis - Random graphs and network evolution – Social contexts: Affiliation and identity - Web analytics tools: Clickstream analysis - A/B testing - online surveys – Web crawling and Indexing - Natural Language Processing - Techniques for Micro-text Analysis.

UNIT III SOCIAL MEDIA ANALYTICS TOOLS 10

Facebook analytics: introduction, parameters, demographics - analyzing page audience - Reach and Engagement analysis - Post-performance on FB - Social campaigns - Measuring and analyzing social campaigns - defining goals and evaluating outcomes - Network Analysis - Twitter analytics tools - Whatsapp analytics: Whatsanalyzer, Whatsapp Business Analyzer - Youtube analytics: Overview of channel analytics - Overview of video analytics - Tracking links with Bit.ly - Google analytics

UNIT IV DATA COLLECTION AND VISUALIZATION

9

Processing and Visualizing Data - Influence Maximization - Link Prediction - Collective Classification - Applications in Advertising and Game Analytics - Collecting and analyzing social media data using python - visualization and exploration of data using python

UNIT V TEXT AND SENTIMENT ANALYTICS

9

Introduction to Text Analytics - Nature of Text - Culture - Concordance - Content Analysis - Frequency Analysis: Co-Occurrence & Ngrams - Introduction to Sentiment Analysis - Learning Prior Polarity - Sentiment Prediction - Emotion Annotation and Prediction

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- CO1: Infer knowledge about basic concepts of social media analytics.
- CO2: Demonstrate the usage of web analytics tools.
- CO3: Apply different tools for studying and processing social media data.
- CO4: Illustrate how social media data is visualized.
- CO5: Explain about the usage of text and sentiment analytics in studying social media data.

TEXT BOOKS:

1. Jim Sterne, 2010, *Social Media Metrics: How to Measure and Optimize Your Marketing Investment*, Wiley publishers.
2. Marshall Sponder, 2010, *Social Media Analytics*, McGraw Hill.

REFERENCE BOOKS:

1. Matthew Ganis & Avinash Kohirkar, *Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media*, Pearson Education.
2. Oliver Blanchard, *Social Media ROI: Managing and Measuring Social Media Efforts in Your Organization*, Que Publishing.

3. Tracy L Tuten & Michael R Solomon, *Social Media Marketing*, Sage publishers.

AD1634

REINFORCEMENT LEARNING

L	T	P	C
3	0	0	3

PREREQUISITE: AD1471 – Machine Learning

OBJECTIVES:

To enable the students to

- Understand how reinforcement learning fits under the broader umbrella of machine learning.
- Explore reinforcement learning system for sequential decision making.
- Use dynamic programming in policy evaluation.
- Learn different Monte Carlo methods.
- Familiarize different RL algorithms such as Temporal- Difference learning, Sarsa, Q-learning, and Gradient methods.

UNIT I INTRODUCTION 9

Reinforcement Learning - Examples - Elements of Reinforcement Learning - Limitations and Scope - An Extended Example: Tic-Tac-Toe - Early History of Reinforcement Learning - A k-armed Bandit Problem and Incremental Implementation

UNIT II MARKOV DECISION PROCESS 9

The Agent–Environment Interface - Goals and Rewards - Returns and Episodes - Unified Notation for Episodic and Continuing Tasks - Policies and Value Functions - Optimal Policies and Optimal Value Functions - Optimality and Approximation

UNIT III DYNAMIC PROGRAMMING 9

Policy Evaluation (Prediction) - Policy Improvement - Policy Iteration - Value Iteration - Asynchronous Dynamic Programming - Generalized Policy Iteration - Efficiency of Dynamic Programming

UNIT IV MONTE CARLO METHODS 9

Monte Carlo Prediction - Monte Carlo Estimation of Action Values - Monte Carlo Control - Monte Carlo Control without Exploring Starts - Off-policy Prediction via Importance Sampling - Incremental Implementation - Off-policy Monte Carlo Control

