ATMIYA UNIVERSITY

सुहृदं सर्वभूतानाम्

Department of Computer Application

Master of Computer Applications

Semester – 3

S#	Course Code	Course Name	Theory Credits	Practical Credits	Theory Hours	Practical Hours
1	20MCACC301	Core 1: Software Engineering	04+01	--	05	--
2	20MCACC302	Core 2: Mobile Application Development using Android	03	02	03	04
3	20MCACC303	Core 3: Design and Analysis of Algorithm	04	01	04	02
	Elective – 1					
4	20MCADC301	Advance Java Programming	03	02	03	04
5	20MCADC302	Programming using ASP .Net	03	02	03	04
6	20MCADC303	Cyber Security	03	02	03	04
7	20MCADC304	Data Analytics & Visualization	03	02	03	04
8	20MCADC305	Web Development using AngularJS	03	02	03	04
	Elective – 2					
09	20MCADC306	Machine learning with Python	03	02	03	04
10	20MCADC307	Big Data Tools	03	02	03	04
11	20MCADC308	Programming with ReactJS	03	02	03	04
12	20MCADC309	Internet of Things	03	02	03	04
13	20MCADC310	Cloud Computing using AWS	03	02	03	04
14	20MCADC311	Statistical Methods-II	03	02	03	04
			45	25	45	50

Course Code	Course Name	Credits
20MCACC301	Software Engineering	05

❖ Aim of the Course:

1	Software engineering aims to develop a broad understanding of each stage of software engineering life cycle, viz. communication, planning, analysis, design, construction, and deployment. It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems. The aim is to set these techniques in an appropriate engineering and management context.

❖ Course Overview and Context:

1	The course is divided into five units. Each unit is the step by step progress towards the development of the real time project. We start with the very basic introduction of traditional software development model and Agile Software development model. Then we move forward with step by step deep understanding of each phase in Software Development Life Cycle. We will also cover UML diagrams. This course will become the base of the real time development of any type of software, whether it may be an mobile application, website, or a desktop application.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	**Recall** the working and types of traditional and Agile software development model and **Instantiate** which development model should be applied in the given situation.	Remember, Understand
2	**Categorize** types of requirements, and the method of requirement gathering. Prepare SRS (Software Requirement Specification) document by **determining** user requirement.	Understand, Apply
3	**Determine** the good User Interface design by **illustrating** three Golden Rules of user interface design.	Understand, Apply
4	To **understand** various coding conventions and **apply** it while developing a software. To **understand** various testing techniques and **apply** them on software projects.	Understand, Apply
5	To **understand** the requirement of client and **draw** various UML diagram.	Understand, Apply

❖ Content of the Course:

Unit-1 Software Engineering, Process models-An Introduction

- Introduction
- Software process;
- Traditional software process models.
- Characteristics of Agile projects;
- Agile software process models;
- Differentiating characteristics of Agile software process model with traditional.

Unit-2 Requirement Engineering Principle, Design and Architectural Engineering

- Introduction
- What requirement engineering is?
- Importance and types of requirements
- Steps involved in requirement engineering process.
- Design process and concept
- Basic issues in software design
- Characteristics of good design
- Function-oriented system vs object-oriented system
- Modularity, cohesion, coupling, layering.

Unit-3 User Interface Design (UI)

- Introduction
- Concept of user interface
- Elements of the user interface
- Designing the user interface
- User interface design evaluations
- Golden rules of user interface design.

Unit-4 Software Coding, and testing

- Software Coding-An Introduction
- Programming principles
- Programming guidelines
- Coding conventions
- Key concepts in software coding.
- Software testing-An Introduction
- Psychology of testing
- Software testing Scope
- Software testing objective
- Strategic approach to software testing
- Types of software testing.

Unit-5 UML Modelling

- Introduction;
- Class diagram, Object diagram;
- Use case diagram;
- Activity diagram and sequence diagram.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Chandramouli Subramanian, SaikatDutt, Chandramouli Seetharaman, B G Geetha, Software Engineering, Pearson
2	Object-Oriented Modeling and Design with UML by Michael Blaha, James Rumbaugh, Pearson Education Publication, 2nd Edition, 2007 Reprint
3	The Unified Modeling Language - User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson,

Sr #	Textbook | References | Internet Links
	Pearson Education Publication, 2009 Reprint
4	Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 7th Edition, McGraw Hill Publications
5	Sommerville, "Software Engineering", 8th Edition, Pearson Education
6	An Introduction to Object-Oriented Analysis – Objects and UML in Plain English by David William Brown, John Wiley & Sons Publication, 2nd Edition

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit-1 and Unit-2	After 3 Weeks	Within 10 Days
2	Unit-3 and Unit-4	After 6 Weeks	Within 10 Days

Course Code	Course Name	Credits
20MCACC302	Mobile App Development using Android	03

❖ Aim of the Course:

1	The aim of this course is to introduce to the students able to understand the process of developing software for the mobile and able to create the mobile applications on android platform which useful to the people in real life.

❖ Course Overview and Context:

1	The course is divided into five units. The first units deal with basic introduction of the Kotlin Programming. Unit-2 designed to learn concepts of User Interface in Android and basics of android. Unit-3 is designed to learn the concept of storage like content provider, database and file handling. Unit-4 is designed to enhance the user experience, maps and location-based services. Unit-5 is designed to learn the concepts of audio, video, camera and telephony and how to publish app on google play.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **illustrate** and **explain** basic concepts of KOTLIN programming	Understand
2	To **understand** the architecture of android and user interface.	Understand
3	To **translate** the real-life situations in android programming form and **solve** them by storing data on database.	Understand, Apply
4	To **translate** the real-life situations in android programming form and **solve** them by providing concepts of Maps, Location, UI-UX and test and detect that it is optimized applications.	Understand, Apply Analyse Evaluate
5	To **understand** the real-life situation in android programming and **solve** it using concepts of Audio, Video, Camera, Telephony and make it live for the other people.	Understand, Apply

❖ Content of the Course:

Unit-1 Introduction to KOTLIN Programming

- Basics of Kotlin, Operations and Priorities, Decision Making
- Loop Control, Data Structures(Collections), Functions
- Object Oriented Programming: Inheritance, abstract, interface, super and this, visibility modifiers.

Unit-2 Introduction to Android and User Interface

- ANDROID SDK Features, Introduction to Development Features
- Developing for ANDROID, developing for mobile and embedded devices, ANDROID development tools
- Basics of an ANDROID application, introduction to manifest, externalizing resources, application lifecycle, ANDROID activities
- Widgets: Button, TextView, ImageView, ProgressBar, ListView, EditText, Calendar, DateTimeetc
- Working with Intent

Unit-3 File, Preferences, Database and Content Provider

- Creating, saving and retrieving shares preferences
- Including static files as resources, working with the file system
- Introducing ANDROID databases
- Content values and cursors
- Working with SQLite databases
- Creating content providers
- Using content providers
- Native ANDROID Content providers

Unit-4 Enhancing User Experience, Maps and Location Based Services

- Introduction and addition of action bar
- Menus and dialogs, drawable and gradients
- Using location-based services
- Selecting a location provider,
- Finding your current location, and
- Creating map-based activities.
- Introduction of recycle view and card view.

Unit-5 Audio, Video, Camera, Telephony & SMS, and Monetizing the applications

- Playing audio and video, manipulating raw audio, using camera to take pictures, recording video, adding media to media store
- Hardware support for telephony, using telephony, introducing SMS and MMS
- Signing and publishing applications, introduction to monetizing applications

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Learn Android Studio 3 with Kotlin – Teg Hagos – Apress – 2019
2	Headfirst Kotlin, A Brain Friendly Guide – Dawn Griffiths, David Griffiths – Orilly – 2019
3	Learn Kotlin for Android Development – Peter Spath – Apress – 2019
4	Android Developer Fundamental Course – Practical Book – 2018

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Introduction to Kotlin and Basics of Android	After 3 Weeks	Within 10 Days
2	Database, Storage and Enhancing user experience in Android	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCACC303	Design and Analysis of Algorithms	04

❖ Aim of the Course:

1	The aim of this course is to teach techniques for effective problem solving in computing. The use of different techniques of problem solving will be used to explain clever and efficient ways to solve a given problem. In every case stress would be given on proving correctness of the algorithm. The analysis of the algorithm will be used to demonstrate the efficiency of the algorithm over the naive techniques.

❖ Course Overview and Context:

1	The course is divided into five units. In the first unit we would focus on fundamentals of algorithms and its time complexity. In the second unit we would learn Divide and Conquer strategy. Various Greedy methods and Dynamic programming techniques will be the focus of third unit. The backtracking technique will be covered in the fourth unit. In the fifth unit Branch and Bound techniques will be covered.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	**Recall** the factors affecting the efficiency of algorithms.	Remember
2	**Recognize** limitations of Divide and Conquer paradigm. **Distinguish** between Divide and Conquer & Decrease and Conquer.	Remember, Understand
3	**Recall** and **distinguish** the working of Greedy methods and Dynamic programming. **Illustrate** the working of Greedy methods and Dynamic programming.	Remember, Understand
4	**Recall** and **Illustrate** the working of various Backtracking techniques.	Remember, Understand
5	**Recall** Polynomial-Time and Non-Polynomial-Time. **Recall and Illustrate** the working of various Branch and Bound techniques.	Remember, Understand

❖ Content of the Course:

Unit-1 Basics of Design and Analysis of Algorithms

- Introduction; basic steps to solve a problem using computer; examples;
- An overview of Top-down design and Recursion; Correct use of Loops in programs;
- Factors affecting efficiency of algorithms; Estimating and specifying execution times;
- Order notation: Big-oh, Omega, Theta, small omega, small-oh
- Design using Recursion

Unit-2 Divide and Conquer Strategy

- Analysis of Multiplication algorithm and its limitations using examples;
- Limitations of Divide and Conquer strategy
- Decrease-and-Conquer approach with examples.

Unit-3 Greedy Methods, Dynamic Programming

- Greedy methods- an introduction
- Knapsack problem; Job sequencing with deadlines;
- Minimum spanning trees: Prim's algorithm, Kruskal's algorithm;
- Optimal merge pattern;
- Shortest path: Dijkstra's shortest path algorithm.

Unit-4 Backtracking

- Combinatorial search;
- Search and traversal: BFS, DFS;
- Backtracking strategy: 8-Queen problem; Backtracking framework, Efficiency of backtracking and examples;
- Some typical state spaces: Constructing all subsets, Constructing all permutations.

Unit-5 Branch and Bound Algorithms

- Shortest path, 16-Puzzle and 8-Puzzle, Scale balancing, 0/1 Knapsack problem, Traveling salesman problem.
- Polynomial-Time (P) and Non-Polynomial-Time (NPT) Algorithms, Worst and Average Case Behavior.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	"Parag H Dave", "Himanshu B Dave", "Design and Analysis of Algorithms", Pearson Second Edition (2014)
2	"Thomas H. Cormen", "Charles E. Leiserson", "Ronald L Rivest", "Clifford Stein", "Introduction to Algorithms", PHI, 2nd Edition.
3	S. Baase, "Computer Algorithms: Introduction to Design and Analysis", Pearson (2002).

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit-1 and Unit-2	After 3 Weeks	Within 10 Days
2	Unit-3 and Unit-4	After 6 Weeks	Within 10 Days

Course Code	Course Name	Credits
20MCADC301	Advance Java Programming	05

❖ Aim of the Course:

1	Advance Java Programming course provides extensive experience with Java and its object-oriented features. Build robust applications using Java's object-oriented features.Java is known for reliability, maintainability, and ease of development. Its unique architecture enables programmers to develop a single application that can seamlessly run across multiple platforms. Attend this course and learn to leverage these key features.

❖ Course Overview and Context:

1	The course is divided into five units. Unit-1 contains topiocs which briefs to an introduction of java Unit-2 deals with package and multi threading programming. In Unit-3 we will discuss about Applets and it's features, how it is useful to developers of java. Unit -4 introduction of JDBC, students lern here how to connect with database and operate with database operations and it's features. Unit-5 Here student learn Spring framework for easy and best possible ways while developing application.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **remember** basic concepts of Java	Remember
2	To **understand** Multithreading	Understand
3	To **understand** Applets	Understand, Apply
4	To **understand** JDBC	Understand, Apply
5	To **understand** Spring.	Understand, Apply

❖ Content of the Course:

Unit-1 Basic Concepts in JAVA

- Features of Java
- Data types, variables and arrays, operators, control statements
- Classes and Methods – Inheritance
- Introduction to object oriented programming

Unit-2 Packages and Multithreading Programming

- Packages and Interfaces
- Exception Handling
- Multithreaded Programming
- Input/Output Files, Utility Classes, String Handling.
- Generics, Generic Class, Generic methods

Unit-3 Applets in JAVA

- Applet life cycle
- Add Image / Sound to Applet
- Perameter pass to Applet
- Working with Windows, Graphics and Text
- Event Handling. Introducing AWT
- Using AWT Controls, Layout Managers and Menus.

Unit-4 JDBC

- Introduction of JDBC
- JDBC Connection model
- Statements
  - Statement interface
  - Prepared statement
  - Callable statement
  - Resultset interface
- Catching Database Results
- handling database SQL Queries.

Unit-5 JAVA Frameworks: SPRING

- Overview of Spring
- Spring Architecture
- Bean life cycle
- XML Configuration on Spring
- Aspect – oriented Spring
- Managing Database
- Managing Transaction

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	JAVA The complete reference
2	Java Programming – A Practical Approach – C Xavier,Tata McGraw-Hill Edition
3	Complete Reference J2EE by James Keogh mcgraw publication
4	Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit 1 and Unit 2	After 3 Weeks	Within 10 Days
2	Unit 3, 4 and 5	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC302	Programming using ASP.Net	03

❖ Aim of the Course:

This course provides a comprehensive and practical hands-on introduction to developing Web applications using MVC ASP.NET and C#.

❖ Course Overview and Context:

This course includes an introduction to MVC ASP.NET and AJAX to build rich client applications. With Razor MVC ASP.NET is introduced as a Web programming platform that overcomes a number of limitations of ASP and Asp.net. Web Forms are introduced, including server controls, viewstate, life cycle, and the event model. Request/Response HTTP programming using MVC ASP.NET is covered.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **Clarify** class structure and necessary fields, methods and parameters to meet real-life situation.	Remember, Understand
2	To distinguish properties and fields, delegates and events	Understand, Apply, Evaluate
3	To **acquire** a working knowledge of Web application development using Web Forms and Visual Studio	Understand, Apply, Evaluate
4	To **construct a model** to optimize an ASP.NET Web application using configuration, security, and caching	Understand, Apply
5	To be able to **determine** access databases using ADO.NET and More recent ASP .NET features	Understand, Apply

❖ Content of the Course:

Unit-1 Introduction to C#

- Identifier, keywords, statements, comments, text input and output, type – predefined type, user defined type, value type, reference type, variable, static and dynamic keyword.
- **Class:** Declaring class, class members, accessing member from inside and outside class, instance constructor, static constructor, object initializer, destructor, readonly modifier, this keyword
- **Field & Method:** static field, lifetime of static members, constant and static members, structure, local variable and constant, method invocation, return value, formal and actual parameter, value parameter, reference parameter, output parameter, parameter arrays, ref local, ref return, method overloading, named parameter, optional parameter, recursion
- Array: rectangular array, jagged array, foreach statement with array

Unit-2 Properties, Indexers, Delegates, Events

- Properties: property declaration, read-only and write-only property, auto property, static property.
- Indexers: declaring indexer, set and get accessors, using indexer, indexer overloading

- Delegates: overview of delegate, declaring delegate type, creating delegate object, assigning delegates, combining delegates, adding and removing methods to delegate, invoking delegate, delegate with parameter and return value
- Events: declaring an event, subscribing to an event, raising an event, removing event handler, event accessors.

Unit-3 Overview of ASP.Net and MVC

- Introduction of different Web Technology
- What is ASP.NET MVC
- Role of Model, View, and Controller
- How ASP.NET MVC Works
- Benefits of using ASP.NET MVC
- Setting up and Installing ASP.NET MVC
  - Installing Internet Information Server
  - Installation of ASP.NET MVC
  - Application Setting in IIS.
- ASP.NET MVC project templates
- Understanding the structure of an ASP.NET MVC project
- Naming conventions
- Creating views
- Defining controllers
- Defining a data model
- Overview of coding standards follows during programming
- Creating an application in MVC
  - Creating strongly-typed views
  - Understanding URLs and action methods
  - Using HTML helpers
  - Handling form post-backs
  - Data validation
- Razor View Engine
  - Razor Basics
  - Razor design goals
  - Implementation of Razor view
  - Razor syntax
  - Accessing Model Data in Razor views

Unit-4Strengthening of ASP.NET MVC Applications

- ASP.NET application architecture best practices
- Implementing a Repository and Entity Framework Data Model
- Using Dependency Injection
- Implementing a custom controller factory
- View Techniques
  - Defining and using custom HTML Helpers
  - Defining a layout / MVC Master Page
  - Using Styles
  - Defining and using partial views
  - Razor Helper Method syntax

Unit-5 Implementing Navigation in MVC web apps and State Management

- Defining view-model classes
- Implementing Data Filtering in a Controller
- Understanding the Routing mechanism
- Adding custom entries to a route table
- Defining defaults, parameters, and validation
- Generating URLs and Hyperlinks
- Custom Route constraints
- Using hidden fields
- Session and Application State

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Pro ASP.NET Core MVC 2 Book by Adam Freeman
2	Introduction to ASP.NET Web Programming Using the Razor Syntax (C#) by Tom FitzMacken

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	C# topics	After 3 Weeks	Within 10 Days
2	ASP.Net Web Application topics	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC303	Cyber Security	05

❖ Aim of the Course:

1	Cyber security is to understand how network users can identify network risk, online frauds, and cyber-crimes. Also, they learn tricks to protect them self on network. Cyber security is also helpful to Understand OSI security architecture, threats, vulnerabilities and various types of attacks and apply the various symmetric and asymmetric key algorithms.

❖ Course Overview and Context:

1	The course is divided into five units. Unit-1 and Unit-2 deals with basic introduction of what is cyber security and when we need of cyber security to protect against cyber crime. In Unit-3 we will discuss about Network security, OSI layers and Cryptography methods. Unit -4 introduction of HTTPS and Wireless Network Security. In Unit-5 we will discuss about Email security and IP security.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **understand**about cybercrime	Understand
2	To **understand**about cybersecurity	Understand
3	To **remember and understand** cryptography	Understand, Remember
4	To **understand** HTTPS & Wireless network	Understand
5	To **understand** Email & IP	Understand

❖ Content of the Course:

Unit-1 Introduction to Cybercrime

- Classifications of Cybercrimes (E-Mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Hacking, Online Frauds, Offenses , Software Piracy, E-Mail Bombing/Mail Bombs, Computer Network Intrusions, Password Sniffing, Credit Card Frauds)
- Categories of Cybercrime
- Criminals Plan to the Attacks: (Reconnaissance, Passive Attack, Active Attacks, Social Engineering)
- Cyber security roles

Unit-2 Introduction to Cybersecurity

- Cyber security objectives
- Cyber security roles
- Differences between Information Security & Cyber security
- Principles of Cyber security(Confidentiality, integrity, & availability)
- Authentication & non-repudiation
- E-commerce Security.
- Computer Forensics
- OS Security Vulnerabilities, updates and patches
- Steganography

Unit-3 Introduction to Network Security and Cryptography

- Computer Security Concepts
- The OSI Security Architecture
- Symmetric Encryption Principles
- Approaches to Message Authentication
- Cryptography
- Secure Hash Functions (Public-Key Cryptography Principles, Public-Key Cryptography Algorithms)

Unit-4 Wireless Network Security and HTTPS

- Web Security Considerations
- Secure Socket Layer and Transport Layer Security
- Transport Layer Security
- HTTPS, Secure Shell (SSH).
- Overview of IEEE 802.11 WLAN, IEEE 802.11i Wireless LAN Security

Unit-5 Email, IP and System Security

- PreetyGoog Privacy, MIME
- IP Security Overview and Security Policy
- Intruders and Intrusion Detection
- Types of Malicious Software and Viruses
- Distributed Denial of Service Attacks
- The Needs and Types of Firewalls

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	"William Stallings", "Network Security Essentials"
2	"Charlie Kaufman", "Radia Perlman" and "Mike Speciner", "Network Security"
3	"Behrouz A. Ferouzan", "Cryptography & Network Security", Tata Mc Graw Hill

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit 1 & Unit 2	After 3 Weeks	Within 10 Days
2	Unit 3,4 and 5	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC304	Data Analytics and Visualization	03

❖ Aim of the Course:

1	The main goal of this course is to help students learn, understand, practice and to introduce various data analytics techniques and presenting result graphically by means of various types of appropriate chart.

❖ Course Overview and Context:

1	The course provides various hands-on techniques and examples to pursue career in data analytics and visualization area. Learners will be able to derive meaningful insight by learning fundamentals of python data structure, numpy and pandas library, data cleaning and organizing operations and plotting them visually using various library functions of matplotlib library.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **recognize** need of data analytics and visualization, and able to **distinguish** basic data structure of python and	Remember, Understand
2	To **solve** real-life examples using numpy and pandas library.	Understand, Apply
3	To **determine** and **select** appropriate data cleaning and organizing strategy.	Understand, Apply, Analyze
4	To **recognize** and **distinguish** importance of each chart, to **judge** real-life situation and present result as appropriate chart.	Remember, Understand, Apply, Analyze, Evaluate
5	To **outline** various subplots in one plot.	Analyze

❖ Content of the Course:

Unit-1 Introduction to Data Analysis and basic python data structure

- **Introduction to Data Analysis**: Data Analysis, Knowledge domain of data analysis, nature and types of data, data analysis process.
- **List**: Creating list, accessing values in list, adding, updating and deleting values from list, indexing and slicing from list, basic list operations, list sorting and traversing, aliasing, parsing lines.
- **Tuple**:Creating tuple, concatenating tuples, accessing values in tuple, basic tuple operations.
- **Dictionary**:Creating dictionary, updating and accessing values in dictionary, deleting dictionary elements, built-in dictionary methods and functions.

Unit-2 Data gathering, NumPy and Pandas Library

- **Numpy library:**basic operations, indexing, slicing, iterating ndarray, shape manipulation, array manipulation, structured arrays.
- **Pandas library:** Pandas data structure – series, dataframe and index objects, reindexing, dropping, arithmetic and data alignment, operations between data structure, function application and mapping, sorting and ranking, correlation and covariance, not a number data, hierarchical indexing and levelling.

- **Reading and Writing data:** Reading and writing data in CSV/ text file, Reading and Writing HTML files, Reading and writing data from excel files, Reading data from XML, JSON data, Pickle -Python object serialization, Interacting with database.

Unit-3 Cleaning and Organizing Data

- **Cleaning data:** Data preparation – merging, Concatenating – combining, pivoting, removing, Discretization and Binning – detecting and filtering/removing outliers, data transformation - missing data, filtering inappropriate values, finding duplicate rows, removing punctuation and whitespace from column content, standardizing dates, data aggregation – group by, hierarchical grouping, Chain of transformations, Function on groups, advanced data aggregation, Permutation – random sampling.
- **Organizing data:** removing and adding columns, selecting columns, change column name, finding matching rows, filter rows based on condition, selecting rows-based condition.

Unit-4 Basic Data Visualization with Matplotlib - 1

- **Introduction to Matplotlib :**installation, matplotlib architecture, pyplot, plotting window, using kwargs, adding text, grid and legend to chart, saving code, saving chart as image,
- **Bar chart –** horizontal bar chart, multi serial bar chart, multi series stacked bar chart.
- **Pie chart –** piechart with pandas dataframe

Unit-5 Advanced Data Visualization with Matplotlib - 1

- **Line Chart, Histogram, contour plots, polar charts**
- **3-D Chart :** mplot3d toolkit
- **Multi-panel plots** – display subplot within other plot, grid of subplots.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	"Data Analysis and Visualization using Python" by Dr. OssamaEmbarak – APress – 2018.
2	"Python Data Analytics – with Pandas, numpy and matplotlib" by Fabio Nelli – APress – 2nd Edition - 2018.
3	"Learn Data Analysis With Python", A.J.Henly, Dave Wolf, Apress, 2018.
4	"Python for Data Analysis, Data Wrangling with Pandas, NumPy and IPython", Wes McKinney, 2nd Edition, O'Reilly

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Numpy, Pandas library, Data Cleaning operations	After 3 Weeks	Within 10 Days
2	Data organizing operations, Data Visualization	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC305	Web Development using AngularJS	03

❖ Aim of the Course:

1	Learning AngularJS by creating their own apps, using practical examples which can be used and adapted easily
2	Develop, maintain, and test production ready directives for any AngularJS based application.

❖ Course Overview and Context:

1	The student can explore options available for creating directives, by reviewing detailed explanations and real-world examples.
2	Dissect the life cycle of a directive and understand why they are the base of AngularJS framework.
3	The student can explore options available for creating directives, by reviewing detailed explanations and real-world examples.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	**Understanding** basic JavaScript and learn the sytax regarding it.	Understand, Remember
2		Understand
3	To **determine** the flow of the AngularJS programs and then **applying** the **knowledge** on the basis of syntax.	Understand, Remember, Apply
4	**Creating** directives, bootstrap, basic flow of various attributes	Understand, Apply
5	**Creating** services, basic programming strategies etc.	Understand, Apply

❖ Content of the Course:

Unit 1 Basic Java script and Basics of Angular JS

- **JavaScript:** Including JavaScript on a page, Statements, Functions, Parameters and Return Values, Types and Variables, Primitive Types, Undefined and Null, Javascript Operators, Equality vs Identity, Pre- vs Post-Increment, Working with Objects, Reading and Modifying an Object's Properties, Adding Methods to Objects, Enumerating Properties
- **Control Flow:** Loops; Conditional Statements; Working with Arrays, Callbacks.

Unit 2: The Basics of Angular JS.

- **Basics of Angular JS:** Why need framework, what is a framework, Downloading and Installing Angular JS, First Angular JS Application, Declarative vs Procedural Programming, Basic Directives, Declaring Angular's Boundaries with ng-app, what are expressions.
- **Introduction to MVC:** Design Patterns, Model View Controller.

Unit 3: Filters and Modules

- **Filters:** Introduction to Filters, Built-in Filters, Date Filters, limitTo Filter, creating Custom Filter,
- **Angular JS Modules:** What are Modules, Bootstrapping Angular JS.

Unit 4: Directives and Creating Forms

- **Directives:** The Basics of Directives, Using Directives, Built-in Directives, Creating Custom Directives.
- **Creating Forms:** HTML Forms Overview, Model Binding, Angular JS Forms, Validating Forms.
- **Connectivity:** Connection with PHP and AngularJS for CRUD Operations using Directives and all types of services.

Unit 5: Services and Server Communication

- Using Services, Why Use Services, Creating Services.
- Server Communication, Handling returned Data: Accessing Returned Data, Handling Errors
- **Organizing Views:** Installing ngRoute Module, Using URL routes, Defining Routes, Route Parameters, Eager vs Conservative routes.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Grant, Andrew, Beginning AngularJS .Apress Publication, 2014.

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit 1 and Unit 2	After 3 Weeks	Within 10 Days
2	Unit 3 and Unit 4	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC306	Machine Learning with Python	03

❖ Aim of the Course:

Machine learning is a flourishing area for researcher and developer to build various models to map with real life situation. Python programming knowledge is intended to be useful to data analyst, data scientist, data visualization,machine learning, deep learning, computer vision, natural language processing and many other computer science fields. Goal of this course is to understand and develop model of ML with Python.

❖ Course Overview and Context:

The course provides fundamental insight about types of machine learning, some of the methods of supervised and unsupervised learning, natural language processing, speech recognition, computer vision and fundamental image processing operations using python. The course focuses on conceptual as well as hands-on training on each topic.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **define** and **explain**machine learning and its relation with AI and DL along with types of ML.	Remember, Understand
2	To **determine** regression or classification supervised learning method of ML to any real-life application and **estimate** accuracy of the model.	Understand, Apply, Evaluate
3	To be able to **contrast** various unsupervised learning methods and **solve** any real-life situation using ML and **estimate** accuracy of the model.	Understand, Apply, Evaluate
4	To **Solve** any fundamental text-processing and speech-recognition problem given.	Understand, Apply
5	To be able to **determine** filter operation on given image and **construct a model** to detect object from it.	Understand, Apply

❖ Content of the Course:

Unit-1 Introduction to Machine Learning

- **Introduction to ML:** Relation of ML with AI and DL, defining machine learning, how machines learn, types of machine learning: supervised learning, unsupervised learning, reinforcement learning, applications of machine learning.

Unit-2 Supervised Learning

- **Regression:** Pre-processing data using different techniques – mean removal, scaling, normalization, binarization, Label encoding, linear regression, Case study implementation using Python.
- **Classification:** Building simple classifier, logistic regression classifier, Naïve bayes classifier, training and testing dataset, accuracy using cross-validation, visualizing confusion matrix, extracting the performance report.
- **Predictive Modeling:** Building linear and non-linear classifier using Support Vector Machine (SVM),

extracting confidence measurements, Case study implementation using Python.

Unit-3 Unsupervised Learning

- **Clustering:** data using k-means clustering, compressing image using vector quantization, Mean shift clustering model, agglomerative clustering, Case study implementation using Python.

Unit-4 Natural Language Processing and Speech Recognition

- **Natural Language Processing:** pre-processing data, stemming data, using lemmatization, diving chunks, text classifier, Case study implementation using Python.
- **Speech Recognition:** Reading and plotting audio data, transforming signal to frequency domain, synthesizing music, building speech recognizer, Case study implementation using Python.

Unit-5 Image filtering operations and Computer vision with OpenCV

- **Image filtering operations:** Edge detection and various image filters: Blur an image, detect edge in image, motion blur to an image, sharpen and emboss an image, erode and dilate image, enhance image contrast, applying advance image filters.
- **Object detection:** Detecting and tracking objects using Haar cascades from images and videos: Detecting face, eyes, mouth, nose, pupils

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	"Machine Learning" by SaikatDutt, Subramanian Chandramouli, Amit Kumar Das – Pearson.
2	"Python Machine Learning Cookbook" by Prateek Joshi – PACKT Publishing – 2016 Edition.
3	"OpenCV : Computer Vision Projects with Python – Learning Path" by Joseph Howse, Prateek Joshi, Michael Beyeler – PACKT Publishing – 2016 Edition.

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Supervised and Unsupervised learning methods	After 3 Weeks	Within 10 Days
2	NLP, Speech recognition, Object detection, Image filtering operations	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC307	**Big Data Tools**	**03**

❖ Aim of the Course:

1 The aim of this course is to introduce to the students the rudiments of Big Data. Students will become familiar with problem solving of big data using the different technologies and tools.

❖ Course Overview and Context:

2 The course is divided into five units. The first units deal with basic introduction of the Big Data and NoSQL. Unit-2 designed to learn concepts of Hadoop and MapReduce. Unit-3 is designed to learn the concept of NoSQL Database MongoDB. Unit-4 is designed to learn the concept of PIG and HIVE. Unit-5 is an introductory unit for SPARK and CASSANDRA.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **illustrate** and **explain** basic concepts of Big Data	Understand
2	To **explore** the Hadoop environment.	Understand
3	To **translate** the real-life situations generated by big data and **solve** them using some concept of Map Reduce.	Understand, Apply
4	To **translate** the real-life situations generated by big data and **solve** them by executing pig script and hive queries.	Understand, Apply, Analyze
5	To **explore** the real-life situation generated by big data and **solve** it using concepts of SPARK and CASSANDRA.	Understand, Apply

❖ Content of the Course:

Unit-1 Introduction to Big Data and NoSQL

Big Data:

- Types of Digital Data: classification of Data (Structured, semi structured and unstructured),
- Characteristics of Data,
- Evolution of Big Data, Definition of Big Data,
- Challenges of Big Data,
- Characteristics of Big Data (Volume, Velocity, Variety), Other characteristics of Big Data which are not Definitional Traits of Big Data,
- Why Big Data? Are we Information consumer of producer? , Traditional BI vs Big Data, Typical Data warehouse environment, Typical Hadoop Environment, What is changing in realms of Big Data?

NoSQL:

- Introduction of NoSQL
- What is it? Where It is Used? Why NoSQL?
- Types of NoSQL databases, Why NoSQL?
- Advantages of NoSQL,
- Use of NoSQL in Industry, SQL vs NoSQL, NewSQL

Unit-2 Introduction to Hadoop and MapReduce

Hadoop:

- Introduction (features, key advantages of Hadoop, Versions of Hadoop,
- Overview of Hadoop ecosystems,
- Hadoop distributions,
- Hadoop vs SQL,
- HDFS, Anatomy of Read and Write
- Integrated Hadoop Systems offered by leading market vendors,
- Cloud based Hadoop solutions)

MapReduce:

- Introduction of MapReduce
- Mapper, Reducer, Combiner, Practitioner,
- Searching, Sorting, Compression
- Practical in Java

Unit-3 Introduction to MongoDB

- Introduction (What is MongoDB, Why Mongo DB,
- Using JSON to MongoDB key features, Core Server tools,
- MongoDB through the JavaScript's Shell,
- Creating and Querying through Indexes,
- Document Oriented, principles of schema design,
- Constructing queries on Databases, collections and Documents,
- MongoDB Query Language.

Unit-4 Introduction to Hive and Pig

Hive:

- What is HIVE?
- HIVE Architecture,
- HIVE data Types,
- HIVE File Formats,
- HIVE Query Language (HQL),
- RCFile implementation,
- Sharding,
- User-Defined Functions (UDF)

Pig:

- What is Pig?
- The anatomy of Pig, Pig on Hadoop,
- Pig philosophy,
- Use Case for Pig- ETL Processing,
- Pig Latin overview
- Datatypes in Pig, running Pig, Execution modes of Pig,
- HDFS commands,
- Relational operators,
- Eval function, complex Data Types,
- Piggy Bank, User-Define Functions,
- Parameter substitution, Diagnostic Operator,
- Word Count Example using Pig,

- When to use and not use Pig,
- Pig at Yahoo,
- Pig vs HIVE

Unit-5 Overview of SPARK, TensorFlow and Cassandra

Cassandra

- Introduction of Cassandra
- Features of Cassandra
- CQL Data Types
- CQLSH
- Key spaces
- CRUD Operations
- Time to Live
- Alter Commands
- Import and Exports
- Querying System Tables

Spark, TensorFlow and Theone.

- Introduction to Data Analysis with Spark,
- Downloading Spark and Getting Started,
- Programming with RDDs,
- Machine Learning with Mllib
- TensorFlow Implementation

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley
2	Shashank Tiwari, “Professional NoSQL”, WROX
3	Kyle Banker, PiterBakkum, Shaun Verch, “MongoDB in Action”, Dream tech Press
4	Vignesh Prajapati, A, “Big Data Analytics with R and Hadoop”, Packet Publishing
5	“Big Data Black Book”, DreamTech

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Introduction of Big Data, NoSQL & Hadoop	After 3 Weeks	Within 10 Days
2	MongoDB, Pig, Hive	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC308	**Programming with ReactJS**	**3**

❖ Aim of the Course:

1	This course is actually working on various attributes of web development.
2	The students would learn various web development techniques of this JavaScript and would learn new techniques based on industry requirement.

❖ Course Overview and Context:

1	The Course contains various units divided which explains its core context.
2	The first 3 units covers the ReactJS components and its implementation.
3	After getting the grip over the ReactJS component the 4th and 5th Unit would comprise of Hooks

❖ Course Outcomes:

S #	Course Outcome	Cognitive Level
1	To **Understand** the Actual Implementation of Object-Oriented Programming with Application. To **Understand** the use of JavaScript and various React Applications	*Understand*
2	To **Compute** the various attributes of ReactJs Web applications	*Apply*
3	**Remembering** the components and syntax of ReactJS.	*Remembering*
4	To **Construct a model** to prepare a Single Page Applications	*Remembering*
5	**Implementing** various logics and packages to ReactJS for generating the web applications.	*Apply*
6	**Implementing** the ReactJS with Hooks for web applications.	*Apply*

❖ Content of the Course:

Unit 1: Getting Started with React JS

- **Introduction:** What is ReactJS? Installation or Setup, Hello World Program, Create a first app, folder structure
- **Components:** Creating components, Basic components, Nesting components, functional component, class component
- **Introduction to JSX:** JSX Programs
- **Props:** ReactJS Props, React State, Destructing Props and State, setState, methods as Props.

Unit 2: Form Handling, components and fragments

- **Event Handling:** Event Handling and Binding event handlers
- **Rendering:** Conditional Rendering and List Rendering, List and keys, Index as Key Anti-pattern

- **Introduction:** Basic form handling
- **Components:** Components Life Cycle Methods, Components Mounting Lifecycle methods, Components Updating Lifecycle methods, Pure Components
- **Fragments**

Unit 3: Memo, Refs, Props and Context

- **Memo**
- **Introduction to Refs:** Refs, Refs with Class Components, Forwarding Refs and Portals
- **Components:** Higher Order Components
- **Props Again!**: Rendering Props and Context
- **HTTP:** HTTP and React, GET and React, POST and React.

Unit 4: Introduction to Hooks and its implementation

- **Introduction:** React Hooks introduction, useState Hook, useState Previous state, useState with object, useState with array.
- **useEffect:**useEffect Hook, useEffect after render, Condionally run effects, run effects only once, useEffect with cleanup, useEffect with incorrect dependency.
- **Fetching data:** Fetching data with useEffect, useContext Hook

Unit 5: Deep Dive in Hooks

- **useReducer Hook:** useReducer – simple state and action, complex state and action, multiple useReducers
- **useContext:**useContext, useReducer, Fetching data with useReduer, useState vs useReducer
- **Hooks:**useCallback, useMemo, useRef, custom Hooks, useDocumentTitle, useCounter Custom hook, useInput Custom Hook.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Learning React, Martin Bean, KirupaChinnathambi Pearson Addison Wesley
2	ReactJS Notes for Professional, GoalKicker, Website ebook,
3	The Road to React_ Your journey to master plain yet pragmatic React, LeanPub Book, Robin Wieruch - Independently Published (2020)
4	Codevolution. “ReactJS Tutorial for Beginners.” YouTube, YouTube, www.youtube.com/playlist?list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3.

❖ Assignments:

Sr #	Description	Available From (Date)	Submission Date
1	Preparing a simple application based on Unit – 1,2 and 3	4th Week of Teaching	Within a week
2	Preparing a simple application based on the Unit 4 and 5	8th Week of Teaching	Withing a week.

❖ Aim of the Course:

1	Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

❖ Course Overview and Context:

1	The Internet of Things (IOT) is everywhere. It provides advanced data collection, connectivity, and analysis of information collected by computers everywhere — taking the concepts of Machine-to-Machine communication farther than ever before
2	This course gives a foundation in the Internet of Things, including the components, tools, and analysis by teaching the concepts behind the IOT and a look at real-world solutions.

❖ Course Outcomes:

Sr.#	Course Outcome	Cognitive Level
1	The definition and significance of the Internet of Things	Understand
2	The architecture, operation, and business benefits of an IOT solution	Remember
3	The potential business opportunities that IOT can uncover	Apply
4	The relationship between IOT, cloud computing, and big data	Analyze
5	How IOT differs from traditional data collection systems	Remember

❖ Content of the Course:

Unit-1: IOT an Overview

- Internet of Things (IOT) and Web of Things (WOT)
- The Internet of Things Today
- IOT Strategic Research and Innovation Directions
- Sensing and Actuation
- Future Internet Technologies

Unit-2: Basics of Networking

- Network Architecture, Networking Protocols,
- Wireless Network Protocols,
- SDN, Introduction to cloud computing

Unit-3: Introduction to Arduino Programming

- Introduction to Arduino
- Arduino Programming syntax
- Basic Arduino programming
- Sensors and Actuator interfacing with Arduino

Unit-4: Introduction to Python Programming& Raspberry Pi

- Introduction to Linux operating System
- Installing Linux in Raspberry Pi

- Introduction to Python programming language
- Interfacing of devices with Raspberry Pi

Unit-5: Industrial IOT

- Smart Cities and Smart Homes
- Agriculture, Healthcare, Activity Monitoring

❖ Learning Resources:

Sr. #	Textbook | References | Internet Links
1	"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).
2	"Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti(Universities Press)
3	Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1.
4	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence: By Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2014.
5	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, by Francis daCosta, 1st Edition, Apress Publications, 2013.

Course Code	Course Name	Credits
20MCADC310	Cloud Computing with AWS	03

❖ Aim of the Course:

1	The main aim of the course is to understand how the cloud computing works.
2	It also concentrates on how the cloud computing works?
3	It also demonstrates the various ways on how the compute engines and networking work?
4	This course allows it to accelerate your knowledge in Amazon Web Services.

❖ Course Overview

1	The course presents a top-down view of cloud computing, from applications and administration to programming, infrastructure, billing and security.
2	The topics include: overview of cloud computing,cloud systems, Load balancing in AWS, distributed storage systems, virtualization, security in AWS, andmanagement services and Billing. Students will study state-of-the-art solutions for cloud computingdeveloped by Amazon.
3	Students will also apply what they learn in one programming assignments and one project executed over Amazon Web Services.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **explain** the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	Understand
2	To **apply** the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost by Load balancing approach.	Apply
3	To **discuss** system virtualization and outline its role in enabling the cloud computing system model.	Understand, Remember
4	To **illustrate** the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.	Apply
5	To **analyze** various cloud programming models and apply them to solve problems on the cloud.	Understand, Apply
6	To **understand** various management and other distinguish services of AWS.	Understand, Remember
7	To **understand** security and compliances for AWS.	Understand

❖ Content of the Course:

Unit 1: Introduction to Cloud, Virtualization and AWS

- **Introduction to Cloud Technologies:** Introduction to the cloud Computing, History of cloud computing, Cloud service options, Cloud Deployment models, Business concerns in the cloud.
- **Virtualization and Cloud Platforms:** Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, Comparison of Cloud providers.
- **Introduction to AWS:** AWS history, AWS Infrastructure, AWS service, AWS ecosystem.

Unit 2: Management Console, AWS Identity Services

- **Programming, management console and storage on AWS:** Basic Understanding APIs, AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block storage – Simple Service, Glacier – Content delivery platforms.
- **AWS identity Services, security and compliance:** Users, groups and roles – Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security – AWS compliance initiatives, Understanding public/private keys, Other AWS security capabilities.

Unit 3: AWS Marketplace, Networking and Database

- **AWS Computing and Marketplace:** Elastic cloud compute – Introduction to servers, Imaging computers, Auto scaling, Elastic load balancing, Cataloging the marketplace, AMIs, Selling on the marketplace.
- **AWS networking and databases:** Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service – DynamoDB, ElastiCache, Redshift.

Unit 4: AWS Management Services

- **Other AWS services and management services:** Analytics services, Application services, Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks.

Unit 5: Billing and Disaster Management

- **AWS Billing and Dealing with disaster:** Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, Examining logs.

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	Barrie Sosinsky, “Cloud Computing Bible”, John Wiley & Sons. ISBN-13: 978-0470903568.
2	Benard Golden, “Amazon Web Services For Dummies”, ISBN-13: 978- 1118571835
3	Rajkumar Buyya, 1st Edition, “Cloud Computing: Principles and Paradigms”, John Wiley & Sons.
4	Amazon Security overview whitepaper, https://aws.amazon.com/whitepapers
5	Francis Shanahan, “Amazon.com Mashups”, Wrox, Wiley Publishing Inc.,ISBN-13: 978-0470097779, ISBN-10: 0470097779
6	Michael Wittig and Andreas Wittig, “Amazon Web Services in Action”, Dreamtech Press, ISBN: 9789351198758
7	Christopher M. Moyer, “Building Applications in the Cloud: Concepts, Patterns and Projects”, Pearson Addison-Wesley Professional, ISBN-10: 0321720202, ISBN-13: 978-0321720207
8	Thomas Erl, “Cloud Computing Design Patterns” Prentice Hall, ISBN-10: 0133858561, ISBN-13: 978-0133858563

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Unit 1 and Unit 2	After 3 Weeks	Within 10 Days
2	Unit 3,4,5	After 6 Weeks	Within 7 Days

Course Code	Course Name	Credits
20MCADC311	Statistical Methods-II	05

❖ Aim of the Course:

1	Statistics is used for data mining, speech recognition, vision and image analysis, data compression, artificial intelligence, and network and traffic modeling. A statistical background is essential for understanding algorithms and statistical properties that form the backbone of computer science

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To **recall** basic concepts of statistics	Remember
2	To **understand** the concept of probability and their need in real life.	Understand
3	To **translate** the real-life situations in mathematical form and **solve** them using some discrete probability distributions.	Understand, Apply
4	To **translate** the real-life situations in mathematical form and **solve** them using some continuous probability distributions.	Understand, Apply
5	To **understand** the real-life statistical problem and to **solve** it using concepts of hypothesis testing and to give generalized conclusion of the same.	Understand, Apply

❖ Content of the Course:

Unit-1 Testing of Hypothesis (Double Population) & χ^2-Test

- Testing of Hypothesis for double population means (Large Samples) (z-test)
- Testing of Hypothesis for double population means (Small Samples) (t-test)
- Testing of hypothesis for dependent populations(t-test)
- Testing of Hypothesis for double proportions(z-test)
- χ^2- test for independency, χ^2-test for poison distribution and uniform distribution

Unit-2 Analysis of variance and design of experiment

- The Completely Randomized Design (One-Way ANOVA)
- One-Way Analysis of Variance
- The Randomized Block Design
- A Factorial Design (Two-Way ANOVA)
- Factorial Designs with Two Treatments

Unit-3 Non-parametric Inference

- Comparison with parametric inference,
- Use of order statistics.
- Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test
- Kolmogorov- Smirnov test.
- Spearman's and Kendall's test. Tolerance region

Unit-4 Simple Regression

- Introduction to Simple Regression Analysis

- Determining the Equation of the Regression Line
- Scatter Plot
- Residual Analysis
- Using Regression to Develop a Forecasting Trend Line

Unit-5 Basics of Time Series Analysis & Forecasting

- Stationary Model
- ARIMA Models
- Identification, Estimation and
- Time Series and Forecasting

❖ Learning Resources:

Sr #	Textbook | References | Internet Links
1	J.Susan Milton & Jesse Arnold, "Introduction to Probability & Statistics: Principles & Applications for Engineering & Computing Sciences"
2	Bharat Jhunjhunwala, "Business Statistics", first edition, S Chand, 2008
3	Richard Levin, David Rubin, "Statistics for Management", 7th edition, PHI
4	Nabendu Pal, Sahadeb Sarkar, "Statistics-Concepts and Applications", 2nd edition, PHI

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Examples on χ^2 – test	After 3 Weeks	Within 10 Days
2	Examples on One Way and Two-Way ANOVA	After 6 Weeks	Within 7 Days

Hint*

Sr#	Keyword	Action Verb
1	Remember	Recognize, **recall**, list, tell, locate, write, find, mention, state, draw, label, define, name.
2	Understand	**Translate**, Paraphrase, Represent, Clarify, Illustrate, Instantiate, Categorize, Subsume, Generalize, Abstract, find a pattern, Extrapolate, Predict, Contrast, Match, Distinguish, Differentiate, construct a model, Explain
3	Apply	determine, calculate, compute, estimate, **solve**, draw, modify, etc.
4	Analyze	discriminate, select, focus, distinguish, structure, integrate, find coherence, outline, parse, Deconstruct
5	Evaluate	Test, detect, monitor, coordinate, Judge (accuracy, adequacy, appropriateness, clarity, cohesiveness, completeness, correctness, reasonableness, reliability, validity)
6	Create	Develop alternative hypotheses, theories, explanations, Plan, Design, Construct