MASTER OF COMPUTER APPLICATION

Syllabus w.e.f. the Academic Session 2020-2021

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY
WEST BENGAL

Second Year: Semester-III

Code: MCAN-301	**Paper: Software Engineering using UML**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Analyze the problem scenario and identify classes/ objects and their properties, relationship in class model.
- ✓ Demonstrate the conceptual modeling techniques of UML for solving Real-World problem.
- ✓ To learn software development life cycle for Object-Oriented solutions for Real-World Problems.
- ✓ Ability to apply the concepts of object oriented methodologies to analyze requirements and design to the point where it is ready for implementation.
- ✓ Demonstrate the concept of Testing to measure quality of software.

UNITS	COURSE CONTENT
1	**Introduction to Software Engineering:** **(2L)** What is Software Engineering? Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development.
2	**Object Oriented Concept and Modelling:** **(5L)** **Object-Oriented Principals and Concepts:** Classes and Object, Modularity, Abstraction and Encapsulation; Object Relationship like Association, Aggregation and Composition; Inheritance, Polymorphism and Dynamic Binding Interfaces **Model:** Importance of Modeling, Object Oriented Modeling **Identifying the Elements of an Object Model:** Identifying classes and objects, Specifying the attributes Defining operations, Finalizing the object definition.
3	**Introduction to UML:** **(3L)** Overview of UML, Conceptual Model of UML, Architecture, S/W Development Life Cycle.
4	**Basic and Advanced Structural Modeling:** **(7L)** Classes Relationship, Common mechanism, Diagrams, Class Diagram, Advanced classes, Advanced Relationship, Interface, Types and Roles, Packages, Object Diagram.
5	**Basic and Advanced Behavioral Modeling:** **(7L)** Interactions, Use cases, Use Case Diagram, Sequence Diagram, Collaboration Diagram, Interaction Diagram, Activity Diagram, State Chart Diagram.
6	**Architectural Modeling:** **(3L)** Artifacts, Artifact Diagram, Implementation Diagram, Deployment Diagram.
7	**Object-Oriented Design:** **(5L)** Generic components of Object-Oriented Design model, System Design process, Partitioning the Analysis Model, Concurrency and subsystem Allocation, Task Management component, Data Management Component, Resource Management Component, Inter Sub-system Communication.
8	**Object Oriented Analysis:** **(4L)** Iterative Development, Unified process & its Phases: Inception, Elaboration, Construction, Transition, Understanding requirements.
9	**Object Oriented Testing:** **(4L)** Overview of Testing and object oriented Testing, Types of Testing, Object oriented Testing strategies, Test case design for Object-Oriented software, Inter class test case design.

Reference Books:

- The Unified Modeling Language User Guide, Grady Booch, James Raumbaugh, Ivar Jacobson.
- Object Oriented Software Engineering, Ivar Jacobson, ACM Press
- Applying UML and Patterns, Craig LarmanMotilalUk Books Of India
- Object-Oriented Software Engineering: Using UML, Patterns, and Java, Bernd Bruegge, Allen Dutoit, Pearson.
- Software Engineering – A Practitioner's Approach, Roger. S. Pressman and Bruce R. Maxim, McGraw Hill

Code: MCAN–302	**Paper: Artificial Intelligence**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

- ✓ After successful completion of this course, students will be able to understand the underlying assumption of philosophy of the logical sequences of real life problem by applying State Space Search behind the limitation of non-solving method of conventional computational approach.
- ✓ Incorporating heuristic search technique on Game Playing.
- ✓ Various strategies of representing knowledge with decision making algorithms. Creation of substantial domain knowledge base with meta data. Application of knowledge representation issues using Prolog/LISP.
- ✓ To recognize the adoption of new system through learning by an Intelligent System and processing of Natural Language.
- ✓ Ability to apply machine learning techniques to solve real world problems and how Expert Systems can be carried out by the help of learning, analyzing by applying various search techniques and resolute to provide solutions.

UNITS	COURSE CONTENT
1	**Introduction to Intelligent Systems:** **(8L)** Overview of Artificial intelligence- Problems of AI, AI technique, Tic – Tac – Toeproblem.
2	**Search Techniques:** **(10L)** Problems, Problem Space & search. Heuristic Search Techniques, Game planning –Minimax search procedure, adding alpha beta cut-off's, Iterative Deepening.
3	**Knowledge Representation Issues:** **(7L)** Representing knowledge using rules. Weak slot & filler structures. Strong slot & filler structures. Implementation of Knowledge with Prolog Programs. Basic knowledge of programming language like Prolog & Lisp.
4	**Adoption of New Knowledge:** **(10L)** Deep Learning: Introduction to Neural Networks, Convolution of New Knowledge Natural language processing, Understanding. Learning – induction & explanation based learning.
5	**Expert systems:** **(5L)** Expert system shells, knowledge acquisition.

Reference Books:

- Artificial Intelligence: A Modern Approach, Stuart Russell & Peter Norvig, Pearson Education.
- Artificial Intelligence, Rich & Knight, TMH.
- Reference Books
- Artificial Intelligence & Intelligent Systems, N.P Padhy, Oxford University Press.
- Introduction to Artificial Intelligence & Expert Systems, Dan W. Patterson, PHI.
- Artificial Intelligence: A new Synthesis, Nils J. Nilsson, Morgan Kaufmann Publishers, Inc.
- M.C. Trivedi, Artificial Intelligence, Khanna Publishing House, New Delhi

Code: MCAN-303	**Paper: Design and Analysis of Algorithm**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 4**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand and analyze the running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- ✓ Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- ✓ Understand and implement the greedy paradigm for a given problem.
- ✓ Design the dynamic-programming paradigm and implement it.
- ✓ Understand and implement the Back Tracking and Branch-&-Bound problem.
- ✓ For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
- ✓ Explain the ways to analyze randomized algorithms (expected running time, probability of error).

UNITS	COURSE CONTENT
1	**Introduction:** **(8L)** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.
2	**Divide-&-Conquer and Greedy Method:** **(8L)** ***Divide & Conquer***: General Method - Finding maximum and minimum – Merge sort, Quick sort, Selection, Strassen's matrix multiplication. ***Greedy Method***: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.
3	**Dynamic Programming:** **(6L)** Assembly-line programming, Matrix Chain Multiplication, 0-1 knapsack problem
4	**Graph Algorithms:** **(4L)** Introduction to Spanning tree, growing a minimum spanning tree, Prims and Kruskal Algorithm
5	**Back Tracking and Branch-&-Bound:** **(8L)** ***Back Tracking***: General Method – 8-queens - Sum of subsets - Graph Coloring –Hamiltonian cycles. ***Branch and Bound***: General Method - Traveling Salesperson problem.
6	**Lower Bound Theory:** **(6L)** Comparison trees - Oracles and advisory arguments – Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

Reference Books:

- E. Horowitz, S. Sahni and S. Rajasekaran, 2008, Computer Algorithms, 2ndEdition, Universities Press, India.
- Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, 4TH Edition, MIT Press/McGraw-Hill.
- A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The Design and Analysis of Computer Algorithms, Addison Wesley, Boston.

Code: MCAN-E304A	**Paper: Image Processing**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Describe the fundamental concept of the digital image processing system.
- ✓ Experiment the images in the frequency domain and spatial domain using various transforms.
- ✓ Evaluate the techniques for image enhancement and restoration.
- ✓ Explain different feature extraction techniques for image analysis and recognition.
- ✓ Categorize various compression techniques.
- ✓ Develop any image processing application.

UNITS	COURSE CONTENT
1	**Introduction** **(4L)** Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.
2	**Digital Image Formation** **(4L)** A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.
3	**Mathematical Preliminaries** **(6L)** Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform
4	**Image Enhancement** **(6L)** Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.
5	**Image Restoration** **(5L)** Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation – Spatial Transformation, Gray Level Interpolation.
6	**Image Segmentation** **(5L)** Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection – Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

Reference Books:

- Digital Image Processing, Rafael C.Gonzalez& Richard E.Woods, Pearson
- Fundamentals of Digital Image Processing, Anil K. Jain, Pearson Education-2003.
- Digital Image Processing, Jahne, Springer India
- Digital Image Processing & Analysis, Chanda &Majumder, PHI
- Fundamentals of Digital Image Processing, Jain, PHI

Code: MCAN-E304B	**Paper: Web Enabled JAVA Programming**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand the basic working methodology of JSP, servlet and JSF Frameworks
- ✓ Create dynamic web application using JSP and servlet and database.
- ✓ Design and develop a Web site using AJAX.
- ✓ Debug the Programs by applying concepts and error handling techniques.

UNITS	COURSE CONTENT
1	**Core Java Overview: (4L)** Object oriented concepts, Exception Handling, Multi Threading Introduction to JDBC: Overview of JDBC API, The Java.sql package, JDBC Drivers, Executing SQL commands using JDBC Drivers, static and dynamic Execution of SQL statements, Execution of Stored Procedures using JDBC. Introduction to Transactions and Transaction Methods. Introduction to JNDI, Introduction to Data Source and Connection pooling, Introduction to Web Applications, Web Servers Overview of J2EE Technologies. (6L)
2	**Introduction to Java Servlets: (6L)** Static and Dynamic contents, Servlet life Cycle and Life cycle methods, Servlet Request and Response Model, Deploying a Servlet, Servlet State Transitions, Servlet Config and Servlet Context, Servlet Redirection and Request Dispatch, Servlet Synchronization and Thread Model. Maintaining Client State: Cookies, URL rewriting, Hidden form fields, Session Tracking. (8L)
3	**Introduction to JSP : (6L)** JSP & Servlet as Web Components, Servlets vs. JSP, JSP Lifecycle, JSP Page Lifecycle Phases, General Rules of Syntax, JSP syntactic elements, JSP element syntax, Template content. JSP elements-directives, declarations, expressions, scriptlets, actions. JSP Standard Actions: jsp:useBean, jsp:getPreoperty, jsp:setProperty, jsp:include, jsp:forward, jsp:plugin, jsp:param,java Server Pages Standard Tag Library(JSTL).
4	**Introduction to JSF Frameworks: (8L)** Getting started: A Simple Example, Sample Application Analysis, Development Environments for JSF. Managed Beans: A Sample Application, Bean Scopes Configuring Beans, Navigation, Static Navigation, Dynamic Navigation, Standard JSF tags, Data tables, conversion and validation Overview of the Conversion and Validation Process, Using Standard Converters. Event Handling: Life Cycle Events, Value Change Events, Action Events, Event Listener Tags, Immediate Components, Passing Data from the UI to the Server, Custom Components, Converters and Validators: Classes for Implementing Custom components, Tags and Components, The Custom Component Developer's Toolbox, Encoding: Generating Markup, Decoding: Processing Request Values, Using Converters, Implementing Custom Component Tags, The TLD File, The Tag Handler Class, Defining Tag Handlers in JSF 1.1.
5	**AJAX: (6L)** Ajax Fundamentals, JavaScript Libraries, The Prototype Library, The Fade Anything Technique Library, Form Completion. Realtime Validation, Propagating Client-Side View State Direct Web Remoting, Ajax Components, Hybrid Components, Keeping JavaScript Out of Renderers, Transmitting JSP Tag Attributes to JavaScript Code,Ajax4jsf,Implementing Form Completion with Ajax4jsf,Implementing Realtime Validation with Ajax4jsf.Introduction to Java Web Services.

Reference Books

- Professional Java Server Programming- J2EE 1.3 Edition- SubrahmanyamAllamaraju and Cedric Buest- Apress publication, 2007.
- Core JavaServer Faces-Second Edition-David Geary,CayHorstmann-Prentice Hall-2007

Code:MCAN-E304C	**Paper: Cloud Computing**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understandand identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud,hybrid cloud.
- ✓ Describe the core issues of cloud computing such as security, privacy, and interoperability to choose the appropriate technologies, algorithms, and approaches for the identified problems.
- ✓ Analyze various cloud computing solutions.
- ✓ Understand cloud Storage systems and Cloud security, the risks involved, its impact.
- ✓ Apply knowledge for solving real life cloud computing problem scenario and illustrate solutions.

UNITS	COURSE CONTENT
1	**Basics of Cloud Computing** **[4L]** Defining a Cloud, Cloud Types – NIST Cloud Reference Model, Cloud Cube Model, Deployment Models (Public, Private, Hybrid and Community Clouds), Service Models – IaaS, PaaS, SaaS, Benefits and Advantages of Cloud Computing
2	**Concepts of Abstraction and Virtualization** **[4L]** Taxonomy of Virtualization, Reference model for Virtualization
3	**Services and Applications by Type** **[5L]** IaaS – Basic Concept, Workload, Partitioning of Virtual Private Server Instances, Pods, Aggregations, Silos PaaS – Basic Concept, Tools and Development Environment with examples SaaS - Basic Concept and Characteristics, Open SaaS, examples of SaaS Platform Identity as a Service (IDaaS), Compliance as a Service (CaaS)
4	**Concepts of Service Oriented Architecture (SOA) and Web Service (WS)** **[2L]** Service Oriented Architecture – Basics, Terminologies, Components, Standards and Technologies, Benefits and Challenges Web Services – Basics, Characteristics, Terminologies, Characteristics and Scope, Business Models
5	**Cloud-based Storage** **[3L]** Cloud File Systems, including GFS and HDFS
6	**Cloud Security** **[2L]** Cloud security concerns, security boundary, security service boundary Overview of security mapping Security of data: cloud storage access, storage location, tenancy, encryption, auditing, compliance Identity management (awareness of identity protocol standards) Risk Management and Compliance
7	**Cloud Security** **[2L]** Cloud security concerns, security boundary, security service boundary Overview of security mapping Security of data: cloud storage access, storage location, tenancy, encryption, auditing, compliance Identity management (awareness of identity protocol standards) Risk Management and Compliance
8	**Introduction to Various Web Services** **[6L]** Amazon Web Services, Google Web Services, Microsoft Cloud Services
9	**Cloud Federation** **[2L]** Definition, different scenario description, replace ability and negotiation mechanism

Reference Books:

- Mastering Cloud Computing by RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, McGraw Hill Education
- Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd
- Cloud Computing: A Practical Approach by Anthony T. Velte, Tata Mcgraw-Hill
- Building Applications in Cloud: Concept, Patterns and Projects by Moyer, Pearson.
- Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Code: MCAN-E304D	**Paper: Web Technology using PHP**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

- ✓ After successful completion of this course, students will be able to understand the underlying assumption of defining variables, constants, operators, expressions, HTML Form creation and submissions. POST & GET Method.
- ✓ Incorporating HTML form with PHP
- ✓ Implementation of Decision, Loops, Functions, Array and Exception Handling concepts using PHP server concept.
- ✓ Strategy to connect with MYSQL Server.
- ✓ Ability to check validation using JavaScript & JQuery.
- ✓ Connecting Forms using AJAX Concept.

UNITS	COURSE CONTENT
1	**Introduction to Web Technology & implementation of PHP Programs: (4L)** Evaluation of PHP. Basic Syntax. Defining variables and constants. PHP Data type Operator and Expression. Basics of HTML: Form Creation, Handling of Forms, Submission of Forms. POST& GET method.
2	**Handling Html Form With PHP (4L)** Capturing Form. Data Dealing with Multi-value files. Generating File uploaded form. Redirecting a form after submission.
3	**Decisions, Functions, String, Array & Exception Handling (8L)** Making Decisions. Doing Repetitive task with looping. Mixing Decisions and looping with Html What is a function? Cookies, Session and in-built functions. Creating and accessing String. Searching & Replacing String. Formatting String. String Related Library function. PHP Array. Creating index based and Associative array. Accessing array Element. Looping with Index based array. Looping with associative array using each() and foreach(). Some useful Library function. Understanding Exception and error. Try, catch, throw.
4	**Database Connectivity with MySql (6L)** Introduction to RDBMS. Connection with MySql Database. Performing basic database operation(DML) (Insert, Delete, Update, Select). Setting query parameter. Executing query Join (Cross joins, Inner joins, Outer Joins, Self joins.).
5	**Java Script & JQuery (4L)** Introduction to Javascript. Three ways to use Javascript. Working with events Client-side Validation. Introduction to JQuery. Validation using JQuery. JQuery Forms. JQuery Examples.
6	**Connecting Forms using AJAX Concept (4L)** Introduction to AJAX. PHP with AJAX. Working with database.

Reference Books:

- The Joy of PHP Programming: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL**.** Alan Forbes, Fifth Edition, Plum Island
- Beginning Web Programming, Jon Duckett, WROX
- Open Source for the Enterprise: Managing Risks, Reaping Rewards,DanWoods and GautamGuliani, O'Reilly, Shroff Publishers and Distributors, 2005.

Code:MCAN-E304E	**Paper: Android Application Development**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand mobile application development trends and Android platform
- ✓ Analyze the need of simple applications, game development, Location map based services
- ✓ Be familiar with SMS, email, service, binding and deploying APks
- ✓ To develop, deploy and maintain the Android Applications.

UNITS	COURSE CONTENT
1	**Android Fundamentals** **(6L)** Mobile Application development and trends – Android overview and Versions – Android open stack, features – Setting up Android environment (Eclipse, SDK, AVD)- Simple Android application development – Anatomy of Android applications – Activity and Life cycle – Intents, services and Content Providers
2	**Android User Interface** **(6L)** Layouts: Linear, Absolute, Table, Relative, Frame, Scroll view, Resize and reposition - Screen orientation – Views: Text view, Edit Text, Button, Image Button, Checkbox, Toggle Button, Radio Button, Radio Group, Progress Bar, Auto complete Text, Picker, List views and Web view– Displaying pictures with views: Gallery and Image View, Image Switcher, Grid view – Displaying Menus: Helper methods, Option and Context
3	**Data Persistence** **(6L)** Shared User preferences – File Handling: File system, System partition, SD card partition, user partition, security, Internal and External Storage – Managing data using SQLite –User defined content providers
4	**Messaging, Networking And Services** **(6L)** SMS Messaging: Sending and Receiving – Sending email and networking – Downloading binary and text data files – Access Web services – Developing android services: create your own services, performing long running task in a service-performing repeated task in a service
5	**Location Access And Publish Android Application** **(6L)** Location based services: Display map, zoom control, view and change, Marking, Geocoding, Get location - Publish Android applications and Deployment

Reference Books:

- Beginning Android Application Development, WeiMeng Lee,(2012) Wrox Publications (John Wiley, New York)
- Hello Android: Introducing Google's Mobile Development Platform, Ed Burnette (2010), The Pragmatic Publishers, 3rd edition, North Carolina USA
- Professional Android 4 Application Development, Reto Meier (2012),Wrox Publications (John Wiley, New York).
- Programming Android: Java Programming for the New Generation of Mobile Devices,ZigurdMednieks, Laird Dornin, Blake Meike G, Masumi Nakamura (2011), OReilly Media, USA

Code:MCAN-E304F	**Paper: Basic Data Science**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand the fundamental knowledge of Data Science and the task of Data Science people.
- ✓ Understand fundamental of statistics.
- ✓ Calculate the correlation, covariance, central tendency.
- ✓ Estimate confidence interval.
- ✓ Perform hypothesis testing.
- ✓ Understand the mechanics of regression analysis.
- ✓ Carry out regression, classification using kNN, decision tree.
- ✓ Use clustering method to cluster records.

UNITS	COURSE CONTENT
1	**Introduction to Data Science** **(2L)** Define Data Science, why data science, data science in business
2	**Descriptive Statistics** **(4L)** Matrix, Matrix operations, Sample, Population, Descriptive statistics, Central tendency, outlier detection
3	**Inferential Statistics** **(4L)** Basics of probability, probability distribution, Central Limit theorem
4	**Hypothesis testing** **(6L)** Null and Alternate Hypothesis, Making a Decision, and Critical Value Method, p-Value Method and Types of Errors, Two-Sample Mean and Proportion Test
5	**Regression Analysis** **(4L)** Fundamentals of Regression analysis, assumption of regression analysis, accuracy, validity, Dealing with categorical data
6	**Classification** **(4L)** Introduction, Logistic regression, model building and evaluation
7	**Clustering** **(2L)** Introduction to clustering, k-means clustering, hierarchical clustering
8	**Decision tree and kNN** **(4L)** Introduction to decision tree, regression tree, truncation & pruning, random forest, kNN for regression, classification, weighted kNN

Reference Books:

- Introducing Data Science; Davy Cielen, Arno D Meysman and Mohamed Ali; Dreamtech Press
- Practical Statistics for Data Scientists; Peter Bruce and Andrew Bruce; O"Reilly Media Inc.
- Doing Data Science; Cathy O"Neil and Rachel Schutt; O"Reilly Media Inc.
- Mining of Massive Datasets; Jure Leskovek, AnandRajaraman and Jeffrey Ullman; Cambridge University Press

Datasets may be downloaded from the website "http://www1.aucegypt.edu/faculty/hadi/RABE5/"

Code: MCAN-E305A	**Paper: Information Retrieval**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Learn the information retrieval models.
- ✓ Be familiar with Web Search Engine.
- ✓ Be exposed to Link Analysis.
- ✓ Understand Hadoop and Map Reduce.
- ✓ Learn document text mining techniques.

UNITS	COURSE CONTENT
1	**Introduction** **(6L)** 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.
2	**Information Retrieval** **(6L)** Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion.
3	**Web Search Engine – Introduction And Crawling** **(6L)** 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.
4	**Web Search – Link Analysis And Specialized Search** **(6L)** 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 recommendation of documents and products – handling “invisible” Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.
5	**Document Text Mining** **(6L)** Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

Reference Books:

- Manning, P. Raghavan, and H. Schütze, “Introduction to Information Retrieval”, Cambridge University Press.
- Ricardo Baeza -Yates and Berthier Ribeiro - Neto, “Modern Information Retrieval: The Concepts and Technology behind Search”, ACM Press Books.
- Bruce Croft, Donald Metzler and Trevor Strohman, “Search Engines: Information Retrieval in Practice”, Addison Wesley.
- Mark Levene, “An Introduction to Search Engines and Web Navigation”, Edition Wiley.
- Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, “Information Retrieval: Implementing and Evaluating Search Engines”, The MIT Press.
- Ophir Frieder “Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series“, Springer.
- Manu Konchady, “Building Search Applications: Lucene, Ling Pipe”, and First Edition, Gate Mustru Publishing.

Code: MCAN-E305B	**Paper: Data Warehousing and Data Mining**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Study of different sequential pattern algorithms
- ✓ Study the technique to extract patterns from time series data and it application in real world.
- ✓ Can extend the Graph mining algorithms to Web mining
- ✓ Help in identifying the computing framework for Big Data

UNITS	COURSE CONTENT
1	**Introduction to Data Warehousing: (6L)** The need for data warehousing, Operational and informational Data stores, Data warehouse definition and characteristics, Data warehouse architecture, Data warehouse Database, Sourcing, Acquisition, Cleanup and transformation tools, Metadata, Access tools, Data marts, Data warehousing administration and management.
2	**Online analytical processing (OLAP)**: **(4L)** Need for OLAP, Multidimensional data model, OLAP guidelines, Multidimensional vs. Muilti-relational (OLAP), Categorization of OLAP tools, OLAP tools internet.
3	**Introduction to data mining: (6L)** The motivation, Learning from past mistake, Data mining, Measuring data mining effectiveness, Embedded data mining into business process, What is decision tree, Business score card, Where to use decision tree, The general idea, How the decision tree works.
4	**Classification and prediction: (5L)** Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns
5	**Time Series Analysis: (4L)** Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis.
6	**Web Mining: (5L)** Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining.

Reference Books:

- Data warehousing, Data mining and OLAP by Alex Berson& Stephon J. Smith, Tata McGraw Hill.2003.
- Data Warehousing Fundamentals for IT Professionals, Second Edition by PaulrajPonniah, Wiley India.
- Principles and Implementation of Data Ware housing, Rajeev Parida Fire Wall Media, Lakshmi Publications.2006.

Code: MCAN-E305C	**Paper: Introduction to Big Data Analytics**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ To optimize business decisions and create competitive advantage with Big Data
- ✓ analytics
- ✓ Explore the fundamental concepts of big data analytics.
- ✓ Learn to analyze the big data using intelligent techniques.
- ✓ Understand the various search methods and visualization techniques.
- ✓ Learn to use various techniques for mining data stream.
- ✓ Understand the applications using Map Reduce Concepts.
- ✓ Introduce programming tools PIG & HIVE in Hadoop echo system.

UNITS	COURSE CONTENT
1	**Introduction to big data** **(4L)** Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.
2	**Mining data streams** **(6L)** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications – Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.
3	**Hadoop** **(8L)** History of Hadoop, Hadoop Distributed File System, Components of Hadoop Analysing the Data with Hadoop, Scaling Out, Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.
4	**Frameworks** **(6L)** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.
5	**Predictive Analytics** **(6L)** Simple linear regression, Multiple linear regression, Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

Reference Books:

- Hadoop: The Definitive Guide, Tom White Third Edition, O'reilly Media, 2012.
- Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, McGrawHill Publishing, 2012.
- Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, CUP,2012.
- Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley& sons, 2012.
- Making Sense of Data, Glenn J. Myatt, John Wiley & Sons, 2007.

Code: MCAN-E305D **Paper: Graph Theory**
Contacts Hours / Week: 3 **Total Contact Hours: 30** **Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Write precise and accurate mathematical definitions of objects in graph theory.
- ✓ Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- ✓ Validate and critically assess a mathematical proof.
- ✓ Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- ✓ Reason from definitions to construct mathematical proofs.

UNITS	COURSE CONTENT
1	**Introduction:** **(6L)** Graph, Application of Graph, Finite and Infinite Graph, Incidence & Degree, Isolated & Pendant Vertex, Null Graph, Isomorphism, Subgraphs, Walks, Paths, and Circuits, Connected Graphs, Disconnected Graphs, and Components, Euler Graphs, Operations On Graphs, Hamiltonian Paths and Circuits, The Traveling Salesman Problem.
2	**Trees** **(6L)** Trees, Properties, Distance and Centres, Types of Tree, Tree Enumeration, Labeled Tree, Unlabeled Tree, Spanning Tree, Fundamental Circuits, Cut Sets, Properties, Fundamental Circuit and Cut-set, Connectivity, Separability, Related Theorems.Spanning trees, Fundamental circuits, Spanning trees in a weighted graph, cut sets, Properties of cut set, All cut sets, Fundamental circuits and cut sets, Connectivity and separability.
3	**Connectivity And Planarity** **(6L)** Network Flows, Planar Graph, Representation, Detection, Dual Graph, Geometric and Combinatorial Dual, Related Theorems, Digraph, Properties, Euler Digraph.
4	**Matrices, Colouring** **(6L)** Matrix Representation, Adjacency matrix, Incidence matrix, Circuit matrix, Cut-set matrix, Path Matrix, Properties – Related Theorems – Correlations. Graph Coloring, Chromatic Polynomial, Chromatic Partitioning, Matching, Covering, Related Theorems.
5	**Graph Theoretic Algorithm** **(6L)** Graph Algorithms- Connectedness and Components- Spanning Tree- Fundamental Circuits- Cut Vertices- Directed Circuits- Shortest Path – Applications overview.

Reference Books:

- NarsinghDeo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India.
- Grimaldi R.P. “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley.
- Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers.
- Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians” , Prentice Hall of India.
- Liu C.L., “Elements of Discrete Mathematics”, McGraw Hill.
- Rosen K.H., “Discrete Mathematics and Its Applications”, McGraw Hill.

Code: MCAN-E305E **Paper: Operation Research and Optimization Techniques**
Contacts Hours / Week: 3 **Total Contact Hours: 30** **Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Describe the way of writing mathematical model for real-world optimization problems.
- ✓ Identify Linear Programming Problems and their solution techniques
- ✓ Categorize Transportation and Assignment problems
- ✓ Apply the way in which Game Theoretic Models can be useful to a variety of real-world scenarios in economics and in other areas.
- ✓ Convert practical situations into non-linear programming problems.
- ✓ Solve unconstrained and constrained programming problems using analytical techniques.

UNITS	COURSE CONTENT
1	**Linear Programming Problem (LPP)-I** **(8L)** Formulation of an LPP; Graphical Method of solution of an LPP; Convex Combination and Convex Set; Convex Hull and Convex Polyhedron; Canonical and Standard form of an LPP; Basic Solution of a system of linear equations; Simplex Method; Big-M Method; Concept of Duality; Mathematical formulation of duals.
2	**Linear Programming Problem (LPP)-II** **(8L)** Transportation Problems (TP) ; Representation of Transportation Problems as LPP; Methods of finding initial basic feasible solution of TP: North-West Corner Rule, Matrix Minima Method, Vogel's Approximation Method; Optimality test of the basic feasible solution; Assignment Problems; Hungarian Method.
3	**Game Theory** **(7L)** Introduction; Strategies; The Minimax and Maximin Criterion; Existence of Saddle Point; Two person zero some Games; Games with saddle Point – Pure Strategies; Games without a Saddle Point – Mixed Strategies; Symmetric Games; Dominance Principle; Graphical Method of Solution; Algebraic Method of Solution.
4	**Non-Linear Programming Problem (NLPP)** **(7L)** Single-variable Optimization; Multivariate Optimization with no constraints: Semidefinite Case, Saddle Point; Multivariate Optimization with Equality Constraints: Method of Lagrange Multipliers; Multivariable Optimization with inequality constraints: Kuhn-Tucker Conditions.

Reference Books:

- Linear Programming and Game Theory by J. G. Chakraborty and P. R. Ghosh, Moulik Library.
- Operations Research by KantiSwarup, P. K. Gupta and Man Mohan, S. Chand and Sons.
- Engineering Optimization by S. S. Rao, New Age Techno Press.
- Operations Research by J K Sharma, Macmillan India Ltd

Code: MCAN-E305F **Paper: Pattern Recognition**
Contacts Hours / Week: 3 **Total Contact Hours: 30** **Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Identify where, when and how pattern recognition can be applied.
- ✓ Equipped with basic mathematical and statistical techniques commonly used in pattern recognition
- ✓ Understand a variety of pattern recognition algorithms.
- ✓ Apply machine learning concepts in real life problems.
- ✓ Design and develop a pattern recognition system for the specific application
- ✓ Evaluate quality of solution of the pattern recognition system.

UNITS	COURSE CONTENT
1	**Basics of Probability, Random Processes and Linear Algebra (2L)** Probability: independence of events, conditional and joint probability, Bayes theorem Random Processes: Stationary and non-stationary processes, Expectation, Autocorrelation, Cross-Correlation, spectra.
2	**Linear Algebra (2L)** Inner product, outer product, inverses, eigen values, eigen vectors, singular values, singular vectors.
3	**Bayes Decision Theory (4L)** Minimum-error-rate classification. Classifiers, Discriminant functions, Decision surfaces. Normal density and discriminant functions. Discrete features.
4	**Parameter Estimation Methods (8L)** Maximum-Likelihood estimation :Gaussian case. Maximum a Posteriori estimation. Bayesian estimation: Gaussian case. Unsupervised learning and clustering - Criterion functions for clustering. Algorithms for clustering: K-Means, Hierarchical and other methods. Cluster validation. Gaussian mixture models, Expectation-Maximization method for parameter estimation. Maximum entropy estimation. Sequential Pattern Recognition. Hidden Markov Models (HMMs). Discrete HMMs. Continuous HMMs. Nonparametric techniques for density estimation. K-Nearest Neighbour method.
5	**Dimensionality reduction (6L)** Principal component analysis - it relationship to eigen analysis. Fisher discriminant analysis - Generalised eigen analysis. Eigen vectors/Singular vectors as dictionaries. Factor Analysis, Total variability space - a dictionary learning methods. Non negative matrix factorisation - a dictionary learning method.
6	**Linear discriminant functions (2L)** Gradient descent procedures, Perceptron, Support vector machines - a brief introduction.
7	**Artificial neural networks (4L)** Multilayer perceptron - feedforward neural network. A brief introduction to deep neural networks, convolutional neural networks, recurrent neural networks.
8	**Non-metric methods for pattern classification (2L)** Non-numeric data or nominal data. Decision trees: Classification and Regression Trees (CART). K-Nearest Neighbour method

Reference Books:

- Richard O. Duda, Peter E. Hart, David G. Stork, "Pattern Classification", 2/E, Wiley - Interscience, 2000.
- Christopher M. Bishop :, "Pattern Recognition And Machine Learning (Information Science and Statistics)" ,1/E, Springer, January 2008
- T. Hastie , R. Tibshirani, J. H. Friedman:, "The Elements of Statistical Learning",1/E ,Springer, Reprint 3/E, 2003
- Christopher M. Bishop ; "Pattern Recognition and Machine Learning", Springer, 2006
- Shigeo Abe, "Advances in Pattern Recognition", Springer, 2005

Datasets may be downloaded from the website "http://www1.aucegypt.edu/faculty/hadi/RABE5/"

Code: MCAN-305G	**Paper: Machine Learning**	
Contacts Hours / Week: 3	**Total Contact Hours: 30**	**Credit: 3**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Understand the concept of machine learning.
- ✓ Identify the regression and classification problem.
- ✓ Relate the supervised, unsupervised learning in the real life problem.
- ✓ Evaluate the machine learning models with respect to the performance parameters.
- ✓ Design and implement various machine learning algorithms in the range of real world problems.

UNITS	COURSE CONTENT
1	**Introduction to Machine Learning** **(2L)** Introduction to Artificial Intelligence, Machine Learning, Deep Learning Types of Machine Learning, Application of Machine Learning
2	**Linear Algebra** **(2L)** Scalar, Vector, Matrix, Matrix Operation, Norms, Probability, Joint Distribution, Bayes Theorem, Expectation, Co-variance.
3	**Regression and Classification** **(4L)** Simple Linear Regression, Multiple Linear Regression, Least square gradient descent, Linear Classification, Logistic Regression
4	**Decision Tree Learning** **(2L)** Representing concepts as decision trees. Recursive induction of decision trees. Picking the best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity. Overfitting, noisy data, and pruning.
5	**Ensemble Learning** **(2L)** Bagging, boosting, and DECORATE. Active learning with ensembles.
6	**Artificial Neural Networks** **(4L)** Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.
7	**Support Vector Machines** **(4L)** Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.
8	**Bayesian Learning** **(4L)** Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies.
9	**Clustering and Unsupervised Learning** **(2L)** Learning from unclassified data. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabled data.
10	**Dimensionality Reduction** **(4L)** Principal component Analysis(PCA), Linear Discriminant Analysis(LDA), Feature selection, Feature manipulation and normalization

Reference Books:

- Pattern Recognition and Machine Learning- Christopher M. Bishop, Springer
- The Elements of Statistical Learning: Data Mining, Inference, and Prediction - Trevor Hastie, Robert Tibshirani, and Jerome Friedman, Springer
- Machine Learning for Absolute Beginners: A Plain English Introduction - Oliver Theobald, Scatterplot Press
- Machine Learning -Tom M. Mitchell, Mc Graw Hill

Datasets may be downloaded from the website "http://www1.aucegypt.edu/faculty/hadi/RABE5/"

Code: MCAN-E394A	**Paper: Image Processing Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Students will learn to convert one image form to another image form.
- ✓ Able to learn various kinds of image enhancement and image restoration techniques.
- ✓ They will learn various techniques of image compression, image segmentation etc.

UNIT	COURSE CONTENT
1	Display of Grayscale Images
2	Histogram Equalization
3	Non-linear Filtering
4	Edge detection using Operators
5	2-D DFT and DCT
6	Filtering in frequency domain
7	Filtering in spatial domain
8	Display of color images
9	Discrete Wavelet Transform (DWT) of images
10	Segmentation using watershed transform
11	Image Compression
12	Applications of image zooming and image shrinking etc

Code: MCAN-E394B	**Paper: Web Enabled JAVA Programming LAB**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Create dynamic Website/ Web based Applications

UNIT	COURSE CONTENT
1	HTML to Servlet Applications
2	Applet to Servlet Communication
3	Designing online applications with JSP
4	Creating JSP program using JavaBeans
5	Working with Enterprise JavaBeans
6	Performing Java Database Connectivity.
7	Creating and Sending Email with Java
8	Building web applications

Code: MCAN-E394C	**Paper: Cloud Computing Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Adapt different types of virtualization and increase resource utilization.
- ✓ Build a private cloud using open source technologies.
- ✓ Analyze security issues on cloud.
- ✓ Develop real world web applications and deploy on commercial cloud.
- ✓ Demonstrate various service models.

UNIT	COURSE CONTENT
1	Study of NIST model of cloud computing
2	Understand different types of virtualizations, Host and bare metal hypervisors and implement horizontal scalability. **Technology:** XEN/ Vmwares EXSi
3	Implement IaaS using your resources. **Technology:** Open Stack / Eucalyptus
4	Simulate identity management in private cloud **Technology:** Open Stack
5	Explore Storage as a Service for remote file access using web interface. **Technology:** ownCloud
6	Understand security of web server and data directory **Technology:** ownCloud
7	Deploy Platform as a Service; web applications on commercial cloud . **Technology:** Google appEngine/ Windows Azure
8	To create and access VM instances and demonstrate various components such as EC2, S3, Simple DB, DynamoDB **Technology:** Amazon Web Services
9	Understand on demand application delivery and Virtual desktop infrastructure (Software as a Service) **Technology:** Ulteo
10	Understanding of implementation/applications of basic fog computing.

Code: MCAN-E394D	**Paper: Web Technology using PHP Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

- ✓ After successful completion of this course, students will be able to understand the underlying assumption of defining variables, constants, operators, expressions, HTML Form creation and submissions. POST & GET Method & Implementation of Decision, Loops, Functions, Array and Exception Handling concepts.
- ✓ How HTML forms are submitted with PHP Server.
- ✓ Strategy to connect with MYSQL Server.
- ✓ Ability to check validation using JavaScript & JQuery.
- ✓ Connecting Forms using AJAX Concept.

UNITS	COURSE CONTENT
1	**Fundamental of Web Design** **HTML:** Introduction, Editor(VS Code/ Sublime), Element, Attribute, Head, Heading, Paragraph, Style, Formatting, Quotation, Comment, Color, CSS, Link, Image, Table, List, Block & Inline, Class, ID, Iframe, Script, File path, Layout, Code, Entity, Symbol, Emoji, Charset, Forms, Form Attributes, Elements, Input types, Input Attributes. **CSS:** Introduction, Selector, External-Internal-Inline CSS, Comments, Color, Background, Border, Margin, Padding, Height, Width, Box model, Outline, Text, Font, Icon, Link, List, Table, Display, Max width, Position, Overflow, Float, Inline-bock, Align, Pseudo-class, Pseudo-element, Opacity, Navigation Bar, Dropdowns, Image gallery, Image sprites, Text Effect, Web Fonts, Transition, Animation, Tooltip, Style Image, Button etc.
2	**Advance Web Design** **CSS Responsive Design:** Introduction, Viewport, Grid view, Media queries, Responsive image, Responsive video. **Bootstrap:** Introduction, Container, Grid, Typography, Color, tables, Images, jumbotron, Alerts, Button, Button group, Badges, Progress bar, Spinner, Pagination, List group, Card, Dropdown, Collapse, Navs, Navbar, Forms, Input, Input group, Carousel, Modal, Tooltip, Popover, Toast, Scrollspy, Flex, Media object**.**
3	**Introduction to Web Technology & implementation of PHP Programs &Knowing about Connection Strings and Functions.** Implementing basic PHP programs with Form, Loop, Functions Array and Strings.
5	**Handling Html Form With PHP:** Capturing Form. Data Dealing with Multi-value files. Generating File uploaded form. Redirecting a form after submission.
6	**Database Connectivity with MySql:** Programs implementing displaying data from MYSQL to HTML forms using PHP. Programs implementing updating data from MYSQL to HTML forms using PHP. Programs implementing deleting data from MYSQL to HTML forms using PHP.
7	**Java Script & JQuery:** Validating forms using JAVASCRIPT.
8	**Connecting Forms using AJAX Concept:** Fetching data from one form to another form using AZAX.

Code: MCAN-E394E	**Paper: Android Application Development Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Learn to use Android Application development platform.
- ✓ To create simple android application
- ✓ To understand and implement various designing components of Android user interfaces
- ✓ To design application's main navigation screen
- ✓ To understand and designing Android Notification (including push notification)
- ✓ To connect android application to database for data insertion and retrieval

UNITS	COURSE CONTENT
1	**Writing First Application** Creating Android Project, Android Virtual Device Creation, Set up debugging environment, Workspace set up for development, Launching emulator, debugging on mobile devices.
2	**Basic UI design** Basics about Views, Layouts, Resources, Input controls, Input Events, Toasts.
3	**More UI Design** Layouts design GridView and ListView, Action bar, Adapters, Menus: Option menu, context menu, sub menu, Pickers - Date and Time, Spinners.
4	**Activity and Fragment** Activity, Fragment, Activity Lifecycle and Fragment Lifecycle.
5	**Intents** Implicit Intents, Explicit intents, communicating data among Activities.
6	**Navigation Drawer** Panel that displays the app's main navigation screens on the left edge of the screen
7	**Android Notifications** Toast, Dialogs (TimePicker, DatePicker, Progress, Alert), Notification Manager and Push Notification
8	**Introducing SQLite** SQLiteOpenHelper and creating a database - Opening and closing a database, Working with cursors Inserts, updates, and deletes

Code: MCAN-E394F	**Paper: Basic Data Science Lab**	
Contacts Hours / Week: 4	**Total Contact Hours: 40**	**Credit: 2**

Course Outcome:

After successful completion of this course, students will be able to:

- ✓ Perform the quantitative and qualitative analysis of the data.
- ✓ Realized the basic trends in two variable plots of numerical data.
- ✓ Compute the mean, median, mode, standard deviation, and variance of grouped data
- ✓ Determine the equation of the trend line to forecast outcomes for time periods in the future, using alternate coding for time periods if necessary.
- ✓ Use a computer to develop a regression analysis, and interpret the output that is associated with it.
- ✓ Construct machine learning models for providing business ideas.

UNITS	COURSE CONTENT
1	Read the datasets(.txt, .xlsx, .csv) from the local system
2	Make numerical summery(descriptive statistics) of data
3	Apply various measures- range, interquartile range, mean absolute deviation, variance, and standard deviation
4	Make graphical summery(histogram, scatterplot, pie plot, boxplot) of data
5	Detect the outliers(if exists), impute the outliers using suitable methods.
6	Implement simple linear regression with suitable datasets, observe the standard error, p-value, R-square values.
7	Implement the multivariate regression with suitable datasets and present the outputs (a) What percentage of variation in the response is explained by these predictors? (b) Which observation has the largest (positive) residual? Give the case number. (c) Compute the mean and median of the residuals. (d) Compute the correlation of the residuals with the fitted values. (e) Compute the correlation of the residuals with the target variable.
8	Implement the logistic regression using suitable datasets. Evaluate the performance of the model.
9	Implement kNN for classification and regression problem.
10	Implement weighted kNN for classification and regression problem.
11	Implement decision tree and regression tree and check the model performance.
	Datasets may be downloaded from the website "http://www1.aucegypt.edu/faculty/hadi/RABE5/"

Code: MCAN-381	**Paper: Minor Project and Viva-voce**	
Contacts Hours / Week: 8	**Total Contact Hours: 80**	**Credit: 5**

A student needs to pursue a research/application based project in his/her institution under the direct supervision/mentorship of assigned teacher(s) and on completion of the same an evaluation will be made on the basis of Project Report, Project Presentation and Viva-voce.