GURU KASHI UNIVERSITY

Masters of Science (Information Technology)
Session: 2024-2025
Department of Computer Applications

GRADUATE OUTCOME OF THE PROGRAMME

Graduates will have a strong foundation in technical skills related to computer science and information technology, including programming, database design and management, software development, networking, security, web development and including the ability to adapt to new technologies and trends in the field.

PROGRAM LEARNING OUTCOMES

After completion, the program the learner will be able to:

- Apply mathematical foundation, computing knowledge for the conceptualization of computing models from defined problems.
- Identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
- Use the modern programming languages, tools, techniques, and skills necessary for designing, developing, and deploying software-based applications.
- Apply ethical principles and commit to professional ethics, responsibilities, and norms of the computer practice.
- Communicate effectively with different stakeholders using a variety of modes and techniques, including written reports, oral presentations, and visual aids.
- Adopt a research culture and implement policies to address pressing local and global concerns.

Program Structure of the Master of Science (Information Technology)

SEMESTER 1st						
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**Credits**
MIT123	Introduction to programming languages	Core	4	0	0	4
MIT124	Relational Database Management Systems	Core	4	0	0	4
MIT125	Computer System Architecture	Multidisciplinary	3	0	0	3
MIT116	Fundamentals of Information Technology Lab	Compulsory Foundation	0	0	4	2
MIT126	Introduction to programming languages Lab	Technical Skill	0	0	2	1
MIT127	Relational Database Management Systems Lab	Technical Skill	0	0	2	1
MIT128	Ethical Hacking	VAC	2	0	0	2
Discipline Elective I (Any one of the following)						
MIT111	Internet Concepts and Web Designing	Discipline Elective I	3	0	0	3
MIT118	Data Warehousing and Data Mining					
MIT119	IoT and Its Applications					
Discipline Elective II (Any one of the following)						
MIT129	Deep Learning	Discipline Elective II	3	0	0	3
MIT121	Data Network & Security					
MIT122	Software Project Management					
Total			**19**	**0**	**8**	**23**

SEMESTER 2nd						
Course Code	**Course Title**	**Type of course**				
			L	**T**	**P**	**Credits**
MIT201	Data Structures	Core	4	0	0	4
MIT202	Digital Electronics	Core	4	0	0	4
MIT212	Programming Using Python	Core	4	0	0	4
MIT220	Data Structures Lab using Python	Technical Skill	0	0	2	1
MIT299	XXXX	MOOC	0	0	0	3
Discipline Elective III (Any one of the following)						
MIT210	Machine Learning	Discipline Elective III	3	0	0	3
MIT221	Data Visualization					
MIT222	Natural Language Processing					
Discipline Elective IV (Any one of the following)						
MIT216	Software Engineering & Testing	Discipline Elective IV	3	0	0	3
MIT223	Data Visualization Lab					
MIT224	Natural Language Processing Lab					
Total			**18**	**0**	**2**	**22**

SEMESTER 3rd						
Course Code	**Course Title**	**Type of Course**				
			L	**T**	**P**	**Credits**
MIT312	Research Methodology	Compulsory foundation	2	0	0	2
MIT318	Research Publication &Ethics (IPR)	Research Skill	2	0	0	2
MIT319	Digital Image Processing	Research Skill	2	0	0	2
MIT320	Digital Image Processing Lab with Python	Computer Lab	0	0	2	1
MIT397	Proficiency in Teaching	Research Skill	2	0	0	2
MIT396	Service Learning	Skill Based	0	0	4	2
MIT321	Entrepreneurship Development	Entrepreneurship Skill	2	0	0	2
MIT322	Numerical Aptitude & Reasoning	VAC	2	0	0	2
MIT399	XXXX	MOOC	-	-	-	3
Open Elective Course						
XXXX		OEC	2	0	0	2
Total			**14**	**0**	**6**	**20**
Open Elective Course (For Other Departments)						
OEC059	E-Commerce	OEC	2	0	0	2

SEMESTER 4th						
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**Credits**
MIT402	Dissertation	Research Skill	-	-	-	20
MIT403	Communication Skills	AEC	1	0	0	1
Total			1	0	0	**21**
Grand Total			**52**	**0**	**18**	**86**

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]
   CA1- Surprise Test (Two best out of three) (10 Marks)
   CA2- Assignment(s)(10 Marks)
   CA3-Term Paper/Quiz/Presentations (05 Marks)
B. Attendance (5 Marks)
C. Mid SEMESTER Test: [30 Marks]
D. End-SEMESTER Exam: [40 Marks]

Evaluation Criteria for Practical Subjects

Total 20 Marks (Each Practical)

A. Performance of each practical (10 Marks)
B. Report (05 Marks)
C. Practical Viva (05 Marks)

Evaluation Criteria for Training/Internship/Survey Camp etc.

Total 25 Marks

A. Each Report (25 Marks) – Weekly/Monthly (25 Marks)

Evaluation Criteria for other courses has been given separately with the respective courses.

SEMESTER-I

Course Title: Introduction to programming languages

Course Code: MIT123

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes:

After the Completion of this course the learner will able to

1. Describe all the basic concepts of C++ and its features such as composition of objects, Operator overloading.
2. Implement the various access modifiers in C++ programs.
3. Analyze inheritance with the understanding of early binding and late binding.
4. Analyze and explore various Stream classes, I/O operations and exception handling.

Course Content

UNIT I **17 Hours**

Programming Basics: Introduction to Programming, Programming Paradigms, Programming Languages and Types. Basic Program Structure, Execution flow charts of Program, Directives, Basic Input /Output, Advantages, Applications, Data Types, Control Structures, Operators and Expressions.

Introduction Structure, Execution flow, Classes and Objects, Access modifiers, Data Members, Member Functions, Inline Functions, Passing parameters to a Function (pass by Value, Pass by Address, Pass by Reference), Function with default arguments, Function Overloading, Object as a Parameter, Returning Object Static data members and functions, Constant Data members and functions

Constructors- Default, Parameterized, Copy, Constructor Overloading, Destructors Arrays, Array as a Class Member, Array of Objects, Strings String Class.

UNIT II **14 Hours**

Operator Overloading and Pointers: Operator Functions-Member and Non Member Functions, Friend Functions Overloading Unary operators Overloading binary operators(Arithmetic, Relational, Arithmetic Assignment, equality), Overloading Subscript operator Type Conversion Operators-primitive to Object, Object to primitive, Object to Object Disadvantages of operator Overloading, Explicit and Mutable Pointers, Pointer and Address of Operator, Pointer to an Array and Array of Pointers, Pointer arithmetic, Pointer to a Constant and Constant Pointer, Pointer Initialization, Types of

Pointers(void, null and dangling), Dynamic Memory Allocation, Advantages and Applications of pointers .

UNIT III **13 Hours**

Inheritance and Polymorphism: Inheritance Concept, protected modifier, Derivation of Inheritance- Public, Private and Protected,
Types of Inheritance-Simple, Multilevel, Hierarchical, Multiple, Hybrid, Constructors and Inheritance, Function Overriding and Member hiding Multiple Inheritance, Multipath inheritance – Ambiguities and solutions Polymorphism, Static and Dynamic Binding, Virtual Functions, Pure Virtual Functions, Virtual destructors, Abstract Classes, Interfaces

UNIT IV **16 Hours**

Streams and Exceptions: Files, Text and Binary Files, Stream Classes, File IO using Stream classes, File pointers, Error Streams, Random File Access, Manipulators, Overloading Insertion and extraction operators Error handling, Exceptions, Throwing and catching exceptions, Custom Exceptions, Built in exceptions , Casting- Static casts, Const Casts, Dynamic Casts, and Reinterpret Casts. Creating Libraries and header files. Namespaces Generic Programming, Templates, Class Templates, Function Templates, Template arguments.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Kamthane, A. (2012). Programming in C++, 2/e. Pearson Education India.*
- *Salaria, R. S. (2016). Mastering Object-Oriented Programming with C++. KHANNA PUBLISHING HOUSE.*
- *Balagurusamy, E. (2001). Object-Oriented Programming with C++, 7e. McGraw-Hill Education.*

Web Sources

- *https://www.tutorialspoint.com/basic-concepts-of-object-oriented-programming-using-cplusplus*
- *https://www.geeksforgeeks.org/operator-overloading-cpp/*
- *https://www.simplilearn.com/tutorials/cpp-tutorial/types-of-inheritance-in-cpp*

Course Title: Relational Database Management Systems
Course Code: MIT124

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes:
After the Completion of this course the learner will able to
1. Develops an Entity-Relationship model based on user requirements.
2. Implements the role of the database administrator and his responsibilities.
3. Apply Normalization techniques to normalize a database.
4. Declares and enforces integrity constraints on a database

Course Content

UNIT I **14 Hours**
Traditional file processing system: Characteristics, limitations, Database: Definition, composition. Database Management System: Definition, Characteristics, advantages over traditional file processing system, User of database, DBA and its responsibilities, Database schema, instance.

UNIT II **16 Hours**
DBMS architecture, data independence, mapping between different levels. Database languages: DDL, DML, DCL. Database utilities, Data Models, Keys: Super, candidate, primary, foreign.

UNIT III **15 Hours**
Entity relationship model: concepts, mapping cardinalities, entity relationship diagram, weak entity sets, strong entity set, aggregation, generalization, Overview of Network and Hierarchical model. Relational Data Model: concepts, constraints. Relational algebra: Basic operations, additional operations.

UNIT IV **15 Hours**
Database Design: Functional dependency, decomposition, problems arising out of bad database design, Normalization- Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF), multi-valued dependency, Database design process, database protection, database integrity.
Database concurrency: Definition and problems arising out of concurrency.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Ramakrishnan, R., Gehrke, J., &Gehrke, J. (2003). Database management systems (Vol. 3). New York: McGraw-Hill.KorthF. Henry. Database System Concepts, McGraw Hill.*
- *Dittrich, K. R., Gatziu, S., &Geppert, A. (1995, September). The active database management system manifesto: A rulebase of ADBMS features. In International Workshop on Rules in Database Systems (pp. 1-17). Springer, Berlin, Heidelberg.*

Web Sources

- *https://www.tutorialspoint.com/dbms/dbms_architecture.htm*
- *https://www.geeksforgeeks.org/introduction-of-er-model/*
- *https://www.javatpoint.com/dbms-tutorial*
- *https://www.w3schools.in/dbms*
- *https://www.youtube.com/watch?v=T7AxM7Vqvaw*
- *https://www.youtube.com/watch?v=c5HAwKX-suM*
- *https://www.youtube.com/watch?v=DxoRUmW44JE*

Course Title: Computer System Architecture
Course Code: MIT125

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes

After the Completion of the course the learner will be able to

1. Determine the designing process of combinational and sequential circuits.
2. Understanding of instruction pipelining and RISC architecture.
3. Simplify Boolean expressions.
4. Design basic Gates, Sequential & Combinational circuits.

Course Content

UNIT I **14 Hours**

Boolean Algebra: Boolean operations, Truth Tables, Boolean Laws, K-maps 2,3 and 4 variable maps, don't care about conditions).Basic Gates, Combinational logic design: half-adder, full adder, parallel adder.

UNIT II **16 Hours**

Sequential circuits: concept, flip-flops (D, RS, JK, T), counters (Ripple, Asynchronous, Synchronous). Instruction codes, Instruction formats, Instruction cycle, addressing modes.

UNIT III **15 Hours**

Register Transfer Language, Arithmetic, Logic and Shift micro-operations, Arithmetic Logic Shift Unit Control Memory: Design of control unit, Micro programmed and hardwired control unit (overview only), Features of RISC and CISC.

UNIT IV **15 Hours**

Memory Organization: memory hierarchy, Memory types: cache, associative and other types. I/O organization: I/O interface, Modes of data transfer: Programmed I/O, Interrupt initiated I/O, DMA, Block diagram depicting architecture of 8085 machine.

Transaction Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *M.M. Mano.Computer System Architecture. Third Edition, Prentice-Hall of India, 2002.*
- *A.S.Tanenbaum. (1999).Structured Computer Organisation. Prentice-Hall of India,*
- *William Stallings.(2002)Computer Organisation and Architecture. 6th Edition, Pearson Education.*

Web Sources

- *https://www.javatpoint.com/computer-organization-and-architecture-tutorial*
- *https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/*
- *https://www.learncomputerscienceonline.com/computer-organization-and-architecture/*
- *https://www.gatevidyalay.com/computer-organization-architecture/*

Course Title: Fundamentals of Information Technology Lab

Course Code: MIT116

L	T	P	Credits
0	0	4	2

Total Hours: 30

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Compose, format and edit a word document.
2. Discover, Navigate and search through the internet.
3. Use Open Office (Word processing, Spreadsheets and Presentation).
4. Utilize the MS PowerPoint.

Course Content

1. Creating, opening, closing, saving and editing a word Document.
2. Insert header and footer in the document.
3. Create a link between two files using Hyperlink.
4. Create a mail-merge and add data of 5 recipients.
5. Protect a document.
6. Implement macro.
7. Create duplicate slides in PowerPoint. Give an example.
8. Make a master slide.
9. Design a chart of population.
10. Insert Animation.
11. Insert a background in PowerPoint.
12. How you can filter your data.
13. Sort data in ascending and descending order.
14. To show the use of goal seek
15. To show the use of scenarios.
16. Perform any 5 Date and Time functions.
17. Perform any 5 Math & Trig functions.

Course Title: Introduction to Programming Languages Lab

Course Code: MIT126

L	T	P	Credits
0	0	4	2

Total Hours: 30

Learning Outcomes: After the Completion of the course the learner will be able to

1. Design an algorithmic solution for a given problem.
2. Debug a given Program.
3. Identify solutions to a problem and apply control structures and use defined functions for solving the problem.
4. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

Course Content

1. Program to display Names, Roll No., and grades of 3 learner who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Program to swap two Characters of different data types using function overloading.
3. Program to demonstrate the use of inline, friend functions and this keyword.
4. Program to implement static data members and member functions.
5. Program to implement Constructor and Destructor.
6. Program to demonstrate Constructor Overloading.
7. Program to calculate factorial using Copy Constructor.
8. Program to allocate & deallocate memory using new [ ] and delete [ ].
9. Program to demonstrate the use of function overloading.
10. Program to overload comparison operator operator== and operator !=.
11. Program to create an array of pointers.
12. Create a base class containing the data member roll number and name. Also create a member function to read and display the data using the concept of single level inheritance. Create a derived class that contains marks of two subjects and total marks as the data members.
13. Program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
14. Program to demonstrate the concept of function overriding.
15. Program to demonstrate the use of virtual functions and polymorphism.
16. Program to demonstrate the use of pure virtual functions.
17. Program to demonstrate the concepts of abstract class.
18. Program to perform exception handling.
19. Program to copy the contents of one file to another file.
20. Program to create Generic Functions using Template.

Course Title: Relational Database Management Systems Lab
Course Code: MIT127

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes: After the Completion of the course the learner will be able to:

1. Populate and query a database using SQL DML/DDL commands.
2. Designs SQL queries to create database tables and make structural modifications.
3. Design the concept of inbuilt functions.
4. Implement the concept of join, views and indexes.

Course Content

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update and Delete Commands.
3. Nested Queries and Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end Tools
7. Forms
8. Triggers
9. Menu Design
10. Reports
11. Database Design and implementation (Mini Project).

Course Title: Ethical Hacking
Course Code: MIT128

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Evaluate new Hacking Methodology.
2. Install hacking software on a closed network environment.
3. Identify tools and techniques to carry out penetration testing.
4. Exemplify security techniques used to protect system and user data.

Course Content

UNIT I **8 Hours**

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Footprinting and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques.

UNIT II **9 Hours**

Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

UNIT III **7 Hours**

Web and Network Hacking: SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

UNIT IV **6 Hours**

Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Karake-Shalhoub, Z., & Al Qasimi, L. (2010). Cyber law and cyber security in developing and emerging economies. Edward Elgar Publishing.*
- *Palmer, C. C. (2001). Ethical hacking. IBM Systems Journal, 40(3), 769-780.*
- *Farsole, A. A., Kashikar, A. G., &Zunzunwala, A. (2010). Ethical hacking. International Journal of Computer Applications, 1(10), 14-20.*

Web Sources

- *https://www.javatpoint.com/ethicalhacking#:~:text=Ethical%20hacking%20involves%20an%20authorized%20attempt%20to%20gain,hackers%20improve%20the%20security%20posture%20of%20an%20organization.*
- *https://www.bing.com/ck/a?!&&p=075f840600d8da28JmltdHM9MTY4MzUwNDAwMCZpZ3VpZD0yYzYwNzgyMS05YmI2LTY0ZDItMDJmNi02OGJmOWEyZDY1NjkmaW5zaWQ9NTIwMw&ptn=3&hsh=3&fclid=2c607821-9bb6-64d2-02f6*

Course Title: Internet Concepts and Web Designing
Course Code: MIT111

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Recognize the basic HTML Tags, List, Types of lists, Adding graphics to HTML documents.
2. Design forms with various attributes, Buttons, Text Area and Radio Button.
3. Develop a web site with the help of HTML tags and CSS.
4. Apply the fundamentals of PHP to develop a dynamic website.

Course Content

UNIT I **10 Hours**

Introduction The World Wide Web (WWW) , History, Hypertext and Hypertext Markup Language, Microsoft Front Page, HTML Documents, various Tags.

Elements of an HTML Document: Text Elements, Tag Elements, Special Character Elements Structural elements of HTML documents: Header tags, Body tags, Paragraphs, Titles, Numbered list, Non-Numbered lists, and Definition lists.

Formatting HTML Documents: Logical styles (source code, text enhancements, variables), Physical Styles (Bold, Italic, underlined, crossed).

UNIT II **10 Hours**

Managing images in Html: Image format (quality, size, type), Importing images (scanners), Tags used to insert images, Frames.

Tables in HTML documents Hypertext and Link in HTML Documents, URL/FTP/HTTP

Types of links:Internal Links, External Links, Link Tags, Links with images and buttons, Links that send email messages

UNIT III **12 Hours**

Special effects in HTML documents: Text fonts, Sensitive Images, Tip tables, Page background (Variable, Fixed), Rotating messages (Marquee)

Managing forms: Interactive forms, creating data entry forms

Cascading Style Sheets: ways of inserting a style sheet: External style sheet, Internal style sheet, Inline style.CSS Id and Class, Inheritance in CSS

UNIT IV **13 Hours**

Scripting and websites: Java scripting

PHP: This course is an introduction to the PHP programming language. Topics include installation and configuration with the Apache http server, variables and data types, language syntax, control structures, functions, strategies and tools for handling input and generating output, error handling, sending email, manipulating dates and times, string manipulation and regular expressions, SQL and MySQL database access, object oriented programming (OOP). Though primarily focused on PHP 5.0. We will emphasize security and sound coding practices throughout.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Duckett, J. (2014). Web design with HTML, CSS, JavaScript and jQuery set (Vol. 1). IN: Wiley.*
- *Raggett, D., Lam, J., Alexander, I., &Kmiec, M. (1998). Raggett on HTML 4. Addison-Wesley Longman Publishing Co., Inc*

Web Sources

- *https://www.tutorialspoint.com/internet_technologies/website_designing.htm*
- *https://tutorial.techaltum.com/webdesigning.html*
- *https://www.w3schools.com/css/css_intro.asp*
- *https://www.w3schools.com/js/js_operators.asp*
  https://www.codecademy.com/catalog/subject/web-design
- *https://www.entheosweb.com/website_design/responsive_web_design.asp*

Course Title: Data warehousing and Data Mining
Course Code: MIT118

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes: After the Completion of the course the learner will be able to

1. Understand the functionality of various Data mining techniques.
2. Familiarize yourself with the process of data analysis, identifying the problems, and choosing the relevant models and algorithms to apply.
3. Identify the Classifications & Prediction Data Mining Techniques
4. Compare the classification Techniques.

Course Content

UNIT I **10 Hours**

Data Warehousing: Definition, Characteristics of a Data Warehouse, Data warehouse Usage, DBMS vs. Data warehouse.

Developing Data Warehouse: Data warehousing components, Steps and Crucial decisions for the design and construction of Data Warehouses, Three-tier Data warehouse architecture, Data Warehouse Implementation, Design, performance and technological considerations, Metadata.

UNIT II **10 Hours**

Developing Data Mart based Data warehouse: Types of data marts, Metadata for a data mart, Data model for a data mart, Maintenance of a data mart, Software components for a data mart, Performance issues, Security in data mart.

OLAP Systems: Types of OLAP, Relational vs. Multidimensional OLAP, Data modeling: Star schema, Snowflake schema, OLAP tools.

UNIT III **12 Hours**

Data Mining: Introduction to data mining, Data mining process, Major issues and Application of Data mining, Data preprocessing: Data cleaning, Data integration and transformation and Data reduction; Tools for data mining.

Data Mining Techniques: Association rules: Introduction, Market basket analysis, Frequent Pattern Mining algorithms: Apriori algorithm, Partition algorithm.

UNIT IV **13 Hours**

Classification and Prediction: Definition, Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Support Vector

Machines, k-Nearest-Neighbour Prediction: Linear and Non-Linear Regression.
Clustering: Definition, Types of data in cluster analysis, Clustering paradigms: K-Means and K-Medoids, Mining Sequence patterns: Generalized Sequential Patterns(GSP) mining algorithm, Hidden Markov Model, Social Network Analysis.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Inmon, W. H., 2002: Building the Data Warehouse, John Wiley.*
- *Prabhu, C.S.R., 2010 : Data Warehousing, PHI.*
- *Jiawei Han, MichelineKamber, 2000: Data Mining: Concepts and Techniques, Morgan KoffmanElsvier.*
- *Pujari, Arun K, 2013 : Data Mining Techniques, Universities Press*

Web Sources

- *https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing*
- *https://www.ibm.com/topics/data-warehouse*
- *https://www.geeksforgeeks.org/difference-between-data-warehousing-and-data-mining/*
- *https://www.investopedia.com/terms/d/data-warehousing.asp*

Course Title: IOT & Its Applications
Course Code: MIT119

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Identify the different types of sensors and devices used in IoT.
2. Understand the security and privacy challenges associated with IoT.
3. Compare and contrast different IoT platforms and architectures
4. Develop IoT prototypes using hardware and software components.

Course Content

UNIT I **10 Hours**

FUNDAMENTALS OF IoT- Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II **10 Hours**

IoT PROTOCOLS- IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT

UNIT III **12 Hours**

DESIGN AND DEVELOPMENT- Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details

UNIT IV **13 Hours**

Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M

Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.

CASE STUDIES/INDUSTRIAL APPLICATIONS: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment, Industry 4.0 concepts.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry,Cisco (2017),IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Press.*
- *ArshdeepBahga, Vijay Madisetti (2015),Internet of Things – A hands-on approach, Universities Press.*
- *Rajkamal, Internet of Things: Architecture, Design Principles and Applications, McGraw Hill Higher Education.*

Web Sources

- *https://www.javatpoint.com/iot-internet-of-things*
- *https://www.simplilearn.com/tutorials/data-analytics-tutorial/what-is-data-analytics*
- *https://www.tutorialspoint.com/iot-network-protocols*

Course Title: Deep Learning
Course Code: MIT129

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

After the Completion of the course the learner will be able to

1. Understand the mathematics behind functioning of artificial neural networks.
2. Analyze the given dataset for designing a neural network-based solution.
3. Design and implementation of deep learning models for signal/image processing applications.
4. Able to design and deploy simple Tensor Flow-based deep learning solutions to classification problems

Course Content

UNITI **15 Hours**

Artificial Neural Networks- The Neuron-Expressing Linear Perceptrons as Neurons-Feed-Forward Neural Networks- Linear Neurons and Their Limitations –Sigmoid – Tanh – and ReLU Neurons -Softmax Output Layers – Training Feed-Forward Neural Networks-Gradient Descent-Delta Rule and Learning Rates- Gradient Descent with Sigmoidal Neurons- The Backpropagation Algorithm-Stochastic and Minibatch Gradient Descent – Test Sets – Validation Sets – and Overfitting- Preventing Overfitting in Deep Neural Networks – Implementing Neural Networks in TensorFlow.

UNIT II **8Hours**

Local Minima in the Error Surfaces of Deep Networks- Model Identifiability- Spurious Local Minima in Deep Networks- Flat Regions in the Error Surface – Momentum-Based Optimization – Learning Rate Adaptation.

UNIT III **15 Hours**

Convolutional Neural Networks(CNN) – Architecture -Accelerating Training with Batch Normalization- Building a Convolutional Network using TensorFlow- Visualizing Learning in Convolutional Networks – Embedding and Representation Learning -Autoencoder Architecture-Implementing an Autoencoder in TensorFlow –DenoisingSparsity in Autoencoders Models for Sequence Analysis – Recurrent Neural Networks- Vanishing GradientsLong Short-Term Memory (LSTM) Units- TensorFlow Primitives for RNN Models- Augmenting Recurrent Networks with Attention.

UNIT IV **7 Hours**

Sequence Modeling: Recurrent Nets: Unfolding computational graphs, recurrent neural networks (RNNs), bidirectional RNNs, encoder-decoder

sequence to sequence architectures, deep recurrent networks, LSTM networks.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Nikhil Buduma, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithm", O'Reilly, 2017.
- Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press, 2016.
- Bunduma, N. (2017). Fundamentals of Deep Learning
- Heaton, J.(2015). Deep Learning and Neural Networks, Heaton Research Inc.

Web Sources

- https://sscbs.du.ac.in/wp-content/uploads/2020/05/BHCS-18B-Deep-Learning-Update-Awaited.pdf
- https://www.studocu.com/in/document/jeppiaar-engineering-college/computer-science-and-engineering/1-unit-iv-notes/84195701
- https://www.turing.com/kb/mathematical-formulation-of-feed-forward-neural-network
- https://www.javatpoint.com/perceptron-in-machine-learning

Course Title: Data Network & Security
Course Code: MIT121

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Understand the fundamental concepts of data networks
2. Explain the different network security threats and vulnerabilities
3. Evaluate network security measures and technologies
4. Implement network security controls

Course Content

UNIT I **12 Hours**

Introduction to Computer networks and applications: Network Structure and Architecture, Network Hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture-point to point, multicast, broadcast, Classification of networks on the basis of Geographical Span (PAN, LAN, MAN and WAN) , LAN topologies (Bus, Ring, Star, Mesh, Tree and Hybrid). Network Connecting Devices: Repeaters, Hubs, Bridges, Routers, Gateways and Switches, Network Reference models: OSI model, TCP / IP model. Comparison between OSI and TCP/IP.

UNIT II **10 Hours**

Introduction: Attacks, Services and Mechanisms, Security Attacks, Security Services, Integrity check, digital Signature, authentication, has algorithms.
Secret Key Cryptography: Block Encryption, DES rounds, S-Boxes IDEA: Overview, comparison with DES, Key expansion, IDEA rounds, Uses of Secret key Cryptography; ECB, CBC, OFB, CFB, Multiple encryptions DES.

UNIT III **13 Hours**

Hash Functions and Message Digests: Length of hash, uses, algorithms (MD2, MD4, MD5, SHS) MD2: Algorithm (Padding, checksum, passes.) MD4 and 5: algorithm (padding, stages, digest computation.) SHS: Overview, padding, stages.

Public key Cryptography: Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: PKCS, Diffie-Hellman, El-Gamal signatures, DSS, Zero-knowledge signatures.

UNIT IV **10 Hours**

Authentication: Password Based, Address Based, Cryptographic Authentication. Passwords in distributed systems, on-line vs offline guessing, storing. Cryptographic Authentication: passwords as keys, protocols, KDC's Certification Revocation, Inter domain, groups, delegation. Authentication of People: Verification techniques, passwords, length of passwords, password distribution, smart cards, biometrics.

Security Policies and Security Handshake Pitfalls: What is security policy, high and low level policy, user issues? Protocol problems, assumptions, Shared secret protocols, public key protocols, mutual authentication, reflection attacks, use of timestamps, nonce and sequence numbers, session keys, one-and two-way public key based authentication.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Tanenbaum, A. S. (2002). Computer networks. Pearson Education India.*
- *Peterson, L. L., & Davie, B. S. (2007). Computer networks: a systems approach. Elsevier.*
- *Kiesler, S. (1986). The hidden messages in computer networks (pp. 46-47). Harvard Business Review Case Services.*
- *AtulKahate .Cryptography and Network Security ,TMH.*
- *Behourz A Forouzan,Data Communications and Networking*

Web Sources

- *https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/*
- *https://www.studytonight.com/computer-networks/reference-models-in-computer-networks*
- *https://www.bing.com/ck/a?!&&p=2b949258678ed6ceJmltdHM9MTY4MzUwNDAwMCZpZ3VpZD0yYzYwNzgyMS05YmI2LTY0ZDItMDJmNi02OGJmOWEyZDY1NjkmaW5zaWQ9NTIxMQ&ptn=3&hsh=3&fclid=2c607821-9bb6-64d2-02f6-68bf9a2d6569&psq=cOMPUTER+nETWORKS&u=a1aHR0cHM6Ly93d3cuamF2YXRwb2ludC5jb20vY29tcHV0ZXItbmV0d29yay10dXRvcmlhbA&ntb=1*

Course Title: Software Project Management
Course Code: MIT122

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

On completion of this course, the learner will able to

1. Identify the different project contexts and suggest an appropriate project management strategy.
2. Practice the role of project planning, risks associated in successful software development.
3. Understand the role of resource allocation and effort estimation in the project management process.
4. Learn to apply the concept of project management and planning to organize team and people's behavior.

Course Content

UNIT I **10 Hours**

Introduction to Software Project Management: Project Definition, Contract Management, Activities Covered by Software Project Management, Overview Of Project Planning, plan methods, methodology.

Project Evaluation: Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation, selection of project approach: discussion on models, choice of process models.

UNIT II **12 Hours**

Activity Planning : Objectives, Project Schedule, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass, Backward Pass, Activity Float, Shortening Project Duration, Activity on Arrow Networks,

Risk Management: Nature Of Risk, Types Of Risk, Managing Risk, Hazard Identification, Hazard Analysis, Risk Planning And Control.

UNIT III **11 Hours**

Monitoring and Control: Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value analysis, Prioritizing Monitoring, Getting Project Back to Target, and Change Control.

Managing Contracts: Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.

Resource allocation: introduction and nature of resources, identification of resource requirements, scheduling, creating critical path, cost schedule, counting cost.

UNIT IV **12 Hours**

Effort estimation: basics of software estimation, techniques, COCOMO-II, cost, staffing pattern.

Managing People and Organizing Teams: Introduction, Understanding Behavior, Organizational Behavior: Background, Selecting The Right Person For The Job, Instruction In The Best Methods, Motivation , The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming A Team, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Bob Hughes, Mike Cotterell, Software Project Management, Tata McGraw Hill Publishing*
- *Ramesh, GopalaSwamy, Managing Global Projects, Tata McGraw Hill Publishing*
- *Royce, Software Project Management, Pearson Education Publishing*
- *Jalote, Software Project Management in Practice, Pearson Education Publishing*

Web Sources

- *https://www.javatpoint.com/software-project-management*
- *https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/*
- *https://www.wrike.com/project-management-guide/faq/what-is-software-project-management/*
- *https://www.tutorialspoint.com/software_engineering/software_project_management.htm*

SEMESTER II

Course Title: Data Structures
Course Code: MIT201

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes:

On the completion of this course, the learner will be able to

1. Algorithms and algorithm complexity.
2. Attain knowledge of tree and graph concepts.
3. Implement link list and its applications in data structures.
4. Apply the different linear data structures like stack and queue to various computing problems.

Course Content

UNITI **15Hours**

Basic concept and notations: data structures and data structures operations, mathematical notation and functions, algorithmic complexity, Big'O'notations and time space tradeoff.

Arrays: Linear array, representation of linear array in memory, Traversing linear array, insertion and deletion in an array, multi-dimensional array: row-major, column major order, sparse array.

UNIT II **16 Hours**

Stacks: Push and Pop in stack. Representation of stack in memory (linked and sequential) application so f Stack: conversion from infix notation to postfix notations, evolution of postfix notation, matching of Parentheses, recursion, Tower of Hanoi.

UNIT III **14 Hours**

Queue: Queues and Dequeue, Priority Queues, Operations on queues. Linked list: Representation of linked list using static and dynamic data structures, Comparison of Linear and non-linear data structures, Insertion and deletion of a node from a linear linked list, Introduction to doubly and circular linked lists, Application of linked lists.

UNIT IV **15 Hours**

Searching and Sorting: Linear and binary search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Radix Sort and Quick sort comparison of various searching and sorting algorithms.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Samet, H. (1990).The design and analysis of spatial data structures (Vol.85,p.87).Reading, MA: Addison-Wesley.*
- *Wirth, N.(1985).Algorithms & data structures. Prentice-Hall, Inc.*
- *Samet, H.(1990). Applications of spatial data structures: computer graphics, image processing, and GIS. Addison-Wesley Longman Publishing Co. Inc.*

Web Sources

- *https://www.javatpoint.com/data-structure-introduction*
- *https://www.javatpoint.com/ds-linked-list*
- *https://www.geeksforgeeks.org/array-data-structure/*
- *https://www.programiz.com/dsa/bubble-sort*
- *https://www.geeksforgeeks.org/binary-search-tree-data-structure/*
- *https://www.programiz.com/dsa/bubble-sort*

Course Title: Digital Electronics
Course Code: MIT202

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

On the completion of his course, the learner will be able to:

1. Solve the conversions of various number systems.
2. Learn the basics of Logic Gates.
3. Analyze and Design various combinational and sequential circuits.
4. Analyzeandpreventvarioushazardsandtimingproblemsina digitaldesign.

Course Content

UNITI **12Hours**

Information Representation: Number systems, Integer and floating pointer presentation, character codes (ASCII, EBCDIC). Digital IC's: Logic gates, flip-flops, clocks and timers, shift registers, counters.

UNIT II **12Hours**

Boolean Algebra & Circuit Design: Basic laws of Boolean algebra, circuit design using standard (NAND) Gates, Adder, coder/De-multiplexer, encoder/multiplexer design.

UNIT III **11Hours**

MOS & LSI Digital Systems: Semiconductor memory, static and dynamic devices, read only & random-access memory chips, PROMS and EPROMS. Address selection logic. Read and write control timing diagrams for memory ICs.

UNIT IV **10 Hours**

Logical Families: TTL, STTL, CMOS logic families.
Digital Peripherals: Keyboard, multiplexed seven segment display, CRT display schemes, Printers, Control interfaces (parallel and serial) for the peripheral units.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Maini,A. K. (2007).Digital electronics: principles, devices and applications .John Wiley &Sons.*
- *Cook, N.P. (2001). Digital electronics with PLD integration.*
- *Rosen berg, P.(2005).Audel Basic Electronics(Vol.29).John Wiley & Sons*

Web Sources

- *https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/*
- *https://www.tutorialspoint.com/digital_circuits/index.htm*
- *https://youtu.be/DBTna2ydmC0*
- *https://youtu.be/XrSgsJ-28Do*
- *https://codescracker.com/digital-electronics/*
- *https://www.tutorialandexample.com/digital-electronics-tutorial*

Course Title: Programming using Python
Course Code: MIT212

L	T	P	Credits
4	0	0	4

Learning Outcomes

After the Completion of this course, the learner will be able to:

1. Understand basic of Python Programming
2. Apply conditional and looping constructs.
3. Learn basic algorithmic problem-solving techniques (decision structures, loops, functions).
4. Know the basics of Strings and Dictionaries of programming.

Course Content

UNITI **15Hours**

Introduction to Python Getting Started: Introduction to Python-an interpreted high-level language, interactive mode and script mode.

Variables, Expressions and Statements: Values, Variables and keywords; Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements (Assignment statement); Taking input (using raw input () and input ()) and displaying output (print statement); Putting Comments

Conditional constructs and looping: if else statement While, for (range function), break, continue, else, pass, Nested loops, use of compound expression in conditional constructs and looping

UNITII **15Hours**

Functions: Importing Modules (entire module or selected objects), invoking built in functions, functions from math module, using random () and randint() functions of random module to generate random numbers, composition.

Defining functions, invoking functions, passing parameters, scope of variables, void functions and functions returning values, flow of execution

UNITIII **16Hours**

Strings: Creating, initializing and accessing the elements; String operators: +, *, in, not in, range slice [n:m];

Comparing strings using relational operators; String functions & methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitile, partition, replace, join, split, count, decode, encode, swap case, Pattern Matching.
Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List Operations (joining, list slices); List functions & methods: len, insert, append, extend, sort, remove, reverse, pop

UNIT IV **14 Hours**

Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, traversing, appending, updating and deleting elements. Dictionary functions & Methods: cmp, len, clear(),get(), has_key() ,items(), keys(), update(), values()
Tuples: Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions: cmp(), len(), max(), min(), tuple() Input and Output: Output Formatting, Reading and Writing Files
Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Actions

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Dawson Michael. Programming with python, Ausers Book Cengage Learning*
- *Beazley Davi. Python EssentialReference,ThirdEdition*

Web Sources

- *https://www.w3schools.com/python/python_syntax.asp*
- *https://www.pythontutorial.net/python-basics/*
- *https://www.geeksforgeeks.org/python-programming-language/*

Course Title: Data Structures Lab using Python
Course Code: MIT220

L	T	P	Credits
0	0	4	2

Total Hours:30

Learning Outcomes

After the Completion of this course, the learner will be able to:

1. Demonstrate proficiency in writing Python programs.
2. Solve the algorithmic problems like insertion and deletion of data.
3. Summarize and describe the flow control structures (conditionals, loops) In Python.
4. UtilizePythonlibrariesandmodulestoextendthefunctionalityoftheirpr ograms.
5. DebugandfixerorsinPythonprogramsusingappropriatedebuggingt echniques.

Course Content

1. Program to install Python.
2. Program to print Hello Your Name in Python.
3. Program to add numbers and Concatenate strings.
4. Program to make input from a user.
5. Programtomakingasumoffirst10naturalnumberthrough Loopsinpython.
6. Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price.
7. Python program to implement Method Overloading and Method Overriding.
8. Program for Linear Search and Binary search.
9. Program to implement Bubble Sort and Selection Sort.
10. Program to implement Merge sort and Quick sort.
11. Program to implement Stacks and Queues.
12. Program to implement Singly Linked List.
13. Program to implement Doubly Linked list.
14. Program to implement Binary Search Tree.
15. Program to implement shortest path methods.
16. Program to make Calculator through Functions.
17. Program to delete the file from the system through File Handling

Course Title: Entrepreneurs Development
Course Code: MIT221

L	T	P	Credits
0	0	4	2

Total Hours: 30

Learning Outcome:

After the completion of the course the learner will be able to

1. Demonstrate the meaning, functions, types and roles of an entrepreneur and entrepreneurship
2. Acquire information about the process, procedure and rules and regulations for setting up a new project.
3. Demonstrate knowledge about basics of entrepreneurial skills and competencies to provide the participants with necessary inputs for creation of new ventures.
4. Analyze entrepreneurial environment impacted by the social, economic, cultural & legal conditions.
5. Create entrepreneurial skills to form their own business or become an entrepreneur.

Course Content

UNIT I **7Hours**

Entrepreneur, Entrepreneurship and Enterprise: Concept and role in development characteristics of Entrepreneurs, Developments Entrepreneurial Competencies, Types of Enterprises and ownership, Charms of becoming an entrepreneur

UNIT II **8Hours**

Reinforcing Entrepreneurial Motivation and Competencies. Creativity and innovation, problem solving, small-scale industry (SSI) sector and its role in economic development: Economic, environment and small-scale industries sector; Economic development through SSI.

UNIT III **8Hours**

Role and contribution of SSI in domestic as well as international markets. Planning a small scale, enterprise, Schemes and assistance of support agencies; Banks, DIC, SFC, TCO, KVIC representatives.

UNIT IV **7 Hours**

WTO and its impact on small sector industries, social responsibility of business. Achieving motivation training, perceiving a business

opportunity, assessing project feasibility, preparing the preliminary project report (PPR).

Transactional Mode

Project based learning, Team Teaching, Flipped teaching, Open talk, Collaborative Teaching, Case Analysis, Panel Discussions, Group Discussions

Suggested Readings

- Parker, S. C. (2018). The economics of entrepreneurship. Cambridge University Press.
  Frederick,H.,O'Connor,A.,&Kuratko,D.F.(2018).Entrepreneurs hip.CengageAU.
- Julien,P.A.(2018).Thestateoftheartinsmallbusinessandentrepren eurship.Routledge.
- European Commission. (2013). Entrepreneurship2020 action plan: Reigniting the entrepreneurial spirit in Europe. Brussels, Belgium: European Commission.

Web Sources

- *https://www.pasc.edu.in/wp-content/uploads/2021/04/ENTREPRENEURSHIP-DEVELOPMENT-III-BBA.pdf*
- *https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_Entr e preneurial_Development_NOTES.pdf*
- *https://sde.uoc.ac.in/sites/default/files/sde_videos/ENTREPRENE U RSHIP%20DEVELOPMENT.pdf*

Course Title: Machine Learning
Course Code: MIT210

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Recognize the basic concepts of Bayesian Decision Theory.
2. Apply structured thinking to unstructured problems.
3. Class conditional probability distributions.
4. Apply Multi-Layer Perceptions and Back Propagation learning.

Course Content

UNIT I **10 Hours**

Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications, pattern recognition concepts classification, regression, feature selection, supervised learning class conditional probability distributions, Examples of classifiers bayes optimal classifier and error, learning classification approaches.

UNIT II **12 Hours**

Linear machines: General and linear discriminates, decision regions, single layer neural network, linear reparability, general gradient descent, perception learning algorithm, mean square criterion and widrow-Hoff learning algorithm; multi-Layer perceptions: two-layers universal approximates, back propagation learning, on-line, off-line error surface, important parameters.

UNIT III **11 Hours**

Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information, ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data

Instance-based Learning: Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability

UNIT IV **12 Hours**

Machine learning concepts and limitations: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts, hypothesis

class, target class, inductive bias, occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors, Trade off.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Zhang, C., & Ma, Y. (Eds.). (2012). Ensemble machine learning: methods and applications. Springer Science & Business Media.*
- *Marsland, S. (2011). Machine learning: an algorithmic perspective. Chapman and Hall/ CRC..*
- *C. M. Bishop.Pattern Recognition and Machine Learning, Springer, (2006).*

Web Sources

- *https://www.geeksforgeeks.org/machine-learning/*
- *https://www.javatpoint.com/machine-learning*
- *https://www.w3schools.com/python/python_ml_getting_started.asp*
- *https://www.simplilearn.com/tutorials/machine-learning-tutorial*
- *https://www.tutorialspoint.com/machine_learning/index.htm*
- *https://www.kaggle.com/learn/intro-to-machine-learning*

Course Title: Data Visualization
Course Code: MIT223

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

After the Completion of this course learner will be able to

1. Build and maintain reliable, scalable, distributed systems with Apache Hadoop
2. Understand Spark framework and explore various ML tools for data processing
3. Apply HIVEQL, PIG techniques to solve big data queries
4. Understand conventional SQL query language and No SQL
5. Design, build and query Mongo DB
6. Visualize big data to perform decision making in real world problems

UNIT I **15 Hours**

Introduction to Big Data: Distributed file system– Big data and its importance, 3Vs of Data Volume, Velocity and Variety, Data sets, Data analysis, Data analytics, Business intelligence, KPI, Big data characteristics, Different types of data, Drivers for big data adoption. Big Data Analysis Techniques: Quantitative analysis, Qualitative analysis, Data mining, Statistical analysis, Machine learning, Semantic analysis, Visual analysis, Case studies.

UNIT II **8 Hours**

Hadoop Architecture: Overview of Distributed database Systems, Hadoop eco-system, Hadoopcore components, Hadoop distributions, Developing enterprise applications with Hadoop. Storing Datain Hadoop: Moving data in and out of Hadoop, HDFS architecture, HDFS files, Hadoop specific file types, HDFS federation and high availability, working with HDFS Commands, Fundamentals of HBASE, Zookeeper concepts and methods to build applications with Zookeeper.

UNIT III **15 Hours**

Introduction to SPARK: Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib. HIVE, HIVQL and PIG: HIVE: Architecture and installation, Comparison with traditional database, HIVQL querying data, Sorting and aggregating, Joins & sub queries, HIVEVs PIG, PIG: Architecture and installation, Execution Mechanisms, load/store operator, Pig scripts.

UNIT IV **7 Hours**

No SQL and Mongo DB: Introduction, Types of NoSQL databases, Advantages of No SQL, Use of No SQL in industry, SQL VS No SQL, Mongo DB: Mongo DB Support for dynamic queries, Replications, Sharding, Create Database and Drop Database, Collections and Documents, MongoDB Query Language.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Borislublinsky,Kevint.Smith,AlexeyYakubovich,"*ProfessionalHadoopSolutions*",Wiley, ISBN: 9788126551071, 2015
- ThomasErl," *BigDataFundamentals-Concepts,DriversandTechniques*",Pearson publication,2016
- KyleBanker,PiterBakkum,ShaunVerch,"*MongoDBinAction*",SecondEdition,Dreamtech Press
- TomWhite,"*HADOOP:ThedefinitiveGuide*", O Reilly2012
- AlainF. Zuur,ElenaN. Ieno,ErikH.W.G.Meesters, "*Beginner'sGuidetoR*",Springer2009

Web Sources

- https://www.techtarget.com/whatis/definition/3Vs
- https://www.geeksforgeeks.org/hadoop-architecture/
- https://www.oreilly.com/library/view/learning-spark/9781449359034/ch01.html
- https://www.mongodb.com/resources/basics/databases/nosql-explained/nosql-vs-sql

Course Title: Natural Language Processing
Course Code: MIT224

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

After the completion of this course, the learner are expected to Develop interactive augmented reality applications for both PC based mobile devices using a variety of novel input devices

1. In depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information
2. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches

UNIT I **15 Hours**

Introduction: Knowledge in speech and language processing, Ambiguity, Models and Algorithms, Brief History. Regular Expressions and Automata, Morphology and Transducers: Inflectional and derivational morphology, finite state morphological parsing, Combining FST Lexicon and rules. Lexicon free FST: Porter Stemmer N-grams: Counting Words in Corpora, Simple Unsmoothed n-grams, Smoothing, Entropy HMM and Speech Recognition: Speech Recognition Architecture, Overview of HMM, A* decoding.

UNIT II **15 Hours**

World Classes and Part-of-Speech Tagging: English word classes, Targets for English, Part of Speech tagging, Rule based part of speech Tagging, Transformation based tagging. Context Free Grammars for English: Constituency, Context Free rules and Trees, Sentence level construction, The Noun Phrase, Coordination, Agreement, The verb phrase and sub categorization. Spoken Language Syntax, Grammar Equivalence and Normal form, Finite state context free grammars, Grammar and human processing.

UNIT III **8 Hours**

Parsing with context free grammars: Parsing as Search, basic Top Down Parser, Problems with basic top-down-parsers, the early Algorithm, Finite state parsing method. Features and Unifications: Feature Structures, Unification of Features Structures, Features Structures in the grammar, Implementing Unification. Lexicalized and probabilistic parsing: Probabilistic context free grammars, problems with probabilistic context free grammars

UNIT IV **7 Hours**

Semantics: (Representing Meaning): Computational Desiderata for representation, meaning structure of language, First order predicate calculus, linguistically relevant concept, Related Representational approaches, Alternative approaches to meaning. Semantic Analysis: Syntax driven semantic analysis, Attachment of Fragment of English, Robust Semantic Analysis Lexical Semantics: Relation among lexemes and their senses, Internal Structure of words

Transactional Mode

Project based learning, Team Teaching, flipped teaching, Open talk, Collaborative Teaching, Case Analysis, Panel Discussions, Group Discussions

Suggested Readings

- Speech and Language processing an introduction to Natural Language Processing, Computational Linguistics and speech Recognition by Daniel Jura sky and James H. Martin
- Natural Language Processing with Python by Steven Bird, Ewan Klein, Edward Lopper
- Handbook of Natural Language Processing, Second Edition— NitinIndurkhya, Fred J.Damerau,Fred J. Damerau

Web Sources

- https://www.scribd.com/document/475855485/NLP-Notes-Ch1-5-pdf
- https://www.geeksforgeeks.org/nlp-part-of-speech-default-tagging/
- https://ebooks.inflibnet.ac.in/csp10/chapter/top-down-parser-pre-processing/
- https://www.scaler.com/topics/nlp/computational-desiderata-for-representations/

Course Title: Software Engineering & Testing
Course Code: MIT216

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes:

After the Completion of the course the learner will be able to

1. Analyze and model customer's requirements and model its software design.
2. Estimate cost and efforts required in building software.
3. Analyze and compute impact of various risks involved in software development.
4. Design and build test cases, and to perform software testing.

Course Content

UNIT I **12 Hours**

Introduction: Software Engineering – A Layered Approach; Software Process – Process Framework, Umbrella Activities; Process Models – Waterfall Model, Incremental Model, and Evolutionary process Model (Prototyping, Spiral Model); Introduction to Agile – Agility Principles, Agile Model – Scrum.

Software Requirements Analysis and Specifications: Use Case Approach, Software Requirement Specification Document, Flow oriented Modeling, Data Flow Modeling, Sequence Diagrams.

UNIT II **11 Hours**

Design Modeling: Translating the Requirements model into the Design Model, The Design Process, Design Concepts – Abstraction, Modularity and Functional Independence; Architectural Mapping using Data Flow.

Software Metrics and Project Estimations: Function based Metrics, Software Measurement, Metrics for Software Quality; Software Project Estimation (FP based estimations, COCOMO II Model); Project Scheduling (Timeline charts, tracking the schedule).

UNIT III **12 Hours**

Quality Control and Risk Management: Quality Control and Quality Assurance, Software Process Assessment and Improvement Capability Maturity Model Integration (CMMI); Software Risks, Risk Identification, Risk Projection and Risk Refinement, Risk Mitigation, Monitoring and Management.

UNIT IV **10 Hours**

Testing and maintenance: Software Testing Techniques, Software testing fundamentals: objectives principles, testability; test case design, Unit testing: white box testing, basis path testing: Control structure testing: Black box testing, testing for specialized environments, Software Reliability and Quality Assurance: Quality concepts, Software quality assurance: SQA activities; Software reviews; cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting record keeping, review guidelines; Formal approaches to SQA;

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Pressman Roger S, Software Engineering - A Practitioner's Approach, MGH, New Delhi, New Delhi. Publications, New Delhi.*
- *Ian Sommerville, Software Engineering, Pearson Education, 5th Edition, New Delhi*
- *Jalote Pankaj, An Integrated Approach to Software Engineering, NarosaPublications,New Delhi.*
- *Mall Rajib, Fundamentals of Software Engineering, PHI, New Delhi.*
- *Ali Bethforooz, Frederick J. Software Engineering Fundamentals, Hudson Oxford University.*

Web Sources

- *https://www.tutorialspoint.com/software_engineering/index.htm*
- *https://www.javatpoint.com/software-engineering*
- *https://www.geeksforgeeks.org/software-engineering/*
- *https://www.tutorialsduniya.com/notes/software-engineering-notes/*
- *https://ecomputernotes.com/software-engineering/levels-of-software-testing*

Course Title: Data Visualization Lab
Course Code: MIT226

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

After the completion of his course, the learner will be able to:

1. Use Python, R and Tableau for data visualization
2. Apply data visuals to convey trends in data over time using tableau
3. Construct effective data visuals to solve workplace problems
4. Explore and work with different plotting libraries
5. Learn and create effective visualizations

Course Content

1. Introduction to various Data Visualization tools
2. Basic Visualization in Python
3. Basic Visualization in R
4. Introduction to Tableau and Installation
5. Connection to Data and preparing data for visualization in Tableau
6. Data Aggregation and Statistical functions in Tableau
7. Data Visualizations in Tableau
8. Basic Dashboards in Tableau
9. Program for Word Count Using Map Reduce Programming
10. Program in Map Reduce for Group Sum operation.
11. Program in Map Reduce for Matrix Multiplication
12. Program in Map Reduce for Intersection operation.
13. Program in Map Reduce for Union operation.

Course Title: Natural Language Processing Lab
Course Code: MIT227

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes

After the Completion of this course, the learner will be able to:

1. Understand formal methods of knowledge representation, logic and reasoning
2. Understand foundational principles, mathematical tools and program paradigms of Artificial intelligence
3. Formulate NLP tasks as learning and inference tasks, and address the computational challenges involved

Course Content

1. To Change the text into lower case
2. To Search digit pattern
3. To Remove URLs
4. Remove punctuation
5. Spelling Correction
6. Removing Stop Words (a, the, of, are, my)
7. Remove Numbers
8. Remove whitespace from text
9. Sentence Tokenization
10. Word Tokenization
11. Checking the type and number of tokens
12. Frequency of tokens
13. Bigrams, ngrams
14. Stemming
15. Lemmatization
16. Parts of Speech Tagging

SEMESTER-III

Course Title: Research Methodology
Course Code: MIT312

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes:

After the Completion of this course the learner will be able to:

1. Understand key research methodology concepts and issues
2. Identify the role and importance of research in the Computer Applications
3. Analyze appropriate research problem and parameters
4. Implement the basic concepts of research and its methodologies

Course Contents

UNIT I **15 Hours**

Research: its concept, nature, scope, need and Objectives of Research, Research types, Research methodology, Research process – Flow chart, description of various steps, Selection of research problem.

UNIT II **15 Hours**

Research Design: Meaning, Objectives and Strategies of research, different research designs, important experimental designs,

Methods of Data Collection and Presentation: Types of data collection and classification, Observation method, Interview Method, Collection of data through Questionnaires, Schedules, data analysis and interpretation, editing, coding, content analysis and tabulation

UNIT III **15 Hours**

Sampling Methods: Different methods of Sampling: Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Non probability Sampling methods, Sample size.

UNIT IV **15 Hours**

Report writing and Presentation: Types of reports, Report Format – Cover page, Introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration,

Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Panneerselvam, R, Research Methodology, PHI, New Delhi.*
- *Cooper, D.R.,Schindler,P.S., Business Research Methods, Tata McGraw Hill*
- *Gupta S P,Statistical Methods, Sultan Chand & Sons, Delhi*
- *Ronald E Walpole, Probability and Statistics for Engineers and Scientists (International Edition), Pearson Education.*
- *Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi*
- *Kothari C.R., Research Methodology, New Age Publisher*
- *Sekran, Uma, Business Research Method, Miley Education, Singapore*

Web Sources

- *https://www.academia.edu/*
- *https://www.studeersnel.nl*
- *https://www.scribd.com*

Course Title: Research Publication & Ethics (IPR)
Course Code: MIT318

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes:

After the completion of this course the learner will be able to

1. Understand the ethics in research, scientific conduct and Plagiarism.
2. Implement the Best Practices and Publication Ethics in Computer Science.
3. Apply various Open Access Publications Initiatives and Identify the Predatory Journals using various Software tools.
4. Identify the Conflicts of interest and file Complaints and appeals against plagiarized contents.

Course Contents

UNIT I **15 Hours**

Ethics: definition, moral philosophy, nature of moral judgments and reactions, scope, Ethics with respect to science and research, Intellectual honesty and research integrity Scientific.

Misconducts: Falsification, Fabrication, and Plagiarism (FFP) Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data,

Publication ethics: definition, introduction and importance

UNIT II **15 Hours**

Introduction to Intellectual Property rights: Concept & theories, Kinds of intellectual Property Rights, Advantages & Disadvantages of IPR, Development of IPR in India, Role & Liabilities of IPRs in India. Rights of trademark-kind of signs used as trademark-types, purpose & functions of a trademark, trademark protection, trademark registration, selecting and evaluating trade mark, trade mark registration process.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *MuralidharKambadur, Ghosh Amit, Singhvi Ashok Kumar. (2019). ETHICS in Science Education Research and Governance, Indian National Science Academy New Delhi, India*
- *Gupta Sudhir, Kamboj Sushil.(2020). Research and Publication Ethics. Alexis Press LLC.*
- *Paul Oliver.(2010). The Student's Guide to Research Ethics, Open University Press.*

Web Sources

- *https://en.wikipedia.org/wiki/Ethics*
- *https://psychologydictionary.org/publication-ethics/*
- *https://blog.ipleaders.in/ipr-description/*

Course Title: Digital Image Processing
Course code: MIT319

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes:

After the Completion of the course, the learner will be able to

1. Design the learner-centered instructional plans and learning outcomes.
2. Apply innovative teaching strategies and technologies to engage learners.
3. Analyze the different assessment methods to evaluate student learning.
4. Develop effective communication and classroom management skills.

Course Contents

UNIT I **10 Hours**

Background: Introduction to electronic systems for image transmission and storage, computer processing and recognition of pictorial data, overview of practical applications.

UNIT II **6 Hours**

Fundamentals: Mathematical and perceptual preliminaries, human visual system model, image signal representation, imaging system specification building image quality, role of computers,

Image data formats: Image Processing Techniques: Image enhancement, image restoration, image data compression and statistical pattern recognition.

UNIT III **7 Hours**

Techniques of Colour Image Processing: Colour image signal representation, colour system transformations, extension of processing techniques to colour domain.

UNIT IV **7 Hours**

Applications of Image Processing: Picture data archival, machine vision, medical image Processing.

TRANSACTION MODE

Discussions, Case Studies, Microteaching, Classroom Observations, Peer Teaching: Video Analysis, Role-Playing, Lecture-cum-demonstration, Classroom Simulations, Reflective Journals/Blogs, Teaching Portfolios and Technology Integration, Flipped Teaching.

SUGGESTED READINGS

1. *Pratt, W.K. Digital Image Processing, John Wiley, N.Y./ 1978.*
2. *Rosenfield, A and Kak, A.C., Picture processing, Academic Press N.Y., 1982.*
3. *Jain, A.K., Fundamentals of Digital Image Processing, Englewood Cliffs, Prentice Hall,*
4. *1989.*
5. *Chris Soloman, Stuart Gibson, Fundamentals of Digital Image Processing: A Practical*
6. *Approach using MatLab, John Wiley and Sons, 2007.*
7. *Digital Image Processing by Gonzalez & Wood, Addison Wesley, 2000.*

Course Title: Digital Image Processing Lab with Python
Course Code: MIT320

L	T	P	Credits
0	0	4	2

Total Hours: 30

Learning Outcomes:

On completion of this course the learner will be able to

1. Design the learner-centered instructional plans and learning outcomes.
2. Apply innovative teaching strategies and technologies to engage learners.
3. Analyze the different assessment methods to evaluate student learning.
4. Develop effective communication and classroom management skills.

Course Contents

1. Simulation and Display of an Image, Negative of an Image (Binary & Gray Scale)
2. 2. Implementation of Relationships between Pixels
3. 3. Implementation of Transformations of an Image
4. Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
5. Display of bit planes of an Image
6. Display of FFT (1-D & 2-D) of an image
7. Computation of Mean, Standard Deviation, Correlation coefficient of the given Image
8. Implementation of Image Smoothening Filters (Mean and Median filtering of an Image)
9. Implementation of image sharpening filters and Edge Detection using Gradient Filters
10. Image Compression by DCT, DPCM, HUFFMAN coding
11. Implementation of image restoring techniques
12. Implementation of Image Intensity slicing technique for image enhancement
13. Canny edge detection Algorithm

Course Title: PROFICENCY IN TEACHING
Course Code: MIT397

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes

After completion of this course, the learner will be able to:

1. Design the learner-centered instructional plans and learning outcomes.
2. Apply innovative teaching strategies and technologies to engage learners.
3. Analyze the different assessment methods to evaluate student learning.
4. Reflect on teaching experiences and continuously improve teaching practices.
5. Develop effective communication and classroom management skills.

Course content

UNIT I **10 Hours**

Overview of the course and its objectives – Specify 1-2 theories or give overview of theories of learning for teaching - Understanding the role of the teacher and student in the learning process - Writing clear and measurable learning outcomes -

Meaning Nature, definition, scope, and importance Pedagogy, Andragogy, and Heutagogy – Skills-based approach to teaching (Teaching skills), Micro-teaching, Macro teaching. Methods and approaches of teaching - CAM, Structure-function approach, Synthetic and Analytic approach, Jurisprudential inquiry model

UNIT II **6 Hours**

Understanding the diverse needs and backgrounds of learners - Creating an inclusive and supportive learning environment - Facilitating active learning and student engagement strategies

Lectures, discussions, and demonstrations - Group work, collaborative learning, and cooperative learning - Problem-based learning, case studies, and simulations

UNIT III **7 Hours**

Integrating technology tools into instruction – Online, blended learning, flipped learning, and M-learning approaches - Using educational software and platforms effectively

Formative and summative assessment methods – Difference between Assessment, Evaluation and Measurement, E-assessment tools,

UNIT IV **7 Hours**

The importance of reflective practice in teaching - Self-assessment and evaluation of teaching effectiveness –Need for Professional development - Teaching in multicultural and international classrooms - Culturally responsive teaching practices

Meaning, Definition of teaching model - Assumptions, Importance, Role, and type of teaching models. Historical teaching model, Philosophical model of teaching.

Transaction Mode

Discussions, Case Studies, Microteaching, Classroom Observations, Peer Teaching: Video Analysis, Role-Playing, Lecture-cum-demonstration, Classroom Simulations, Reflective Journals/Blogs, Teaching Portfolios and Technology Integration, Flipped Teaching

Suggested Readings

- *Ali, L. (2012). Teacher education. New Delhi: APH Publishing Corporation.*
- *Anandan, K. (2010). Instructional technology in teacher education. New Delhi: APH Publishing Corporation.*
- *Bruce R Joyce and Marsha Weil, Models of Teaching, Prentice Hall of India Pvt Ltd, 1985.*
- *Chalan, K. S. (2007). Introduction to educational planning and management. New Delhi: Anmol Publications Pvt. Ltd.*
- *Chand, T. (2008). Principles of teaching. New Delhi: Anmol Publications Pvt. Ltd.*
- *Chiniwar, P. S. (2014). The technology of teaching. New Delhi: Anmol Publications Pvt. Ltd.*
- *Curzon, L. B., & Tummons, J. (2004). Teaching in future education. U.S.A: Bloomsbury Academic Publications.*
- *Das, R.C. (1993): Educational Technology – A Basic Text, Sterling Publishers Pvt. Ltd.*
- *Evaut, M. The International Encyclopedia of Educational Technology.*
- *Gage N L, Handbook of Research on Teaching, Rand Mc Nally and Co., Chicago, 1968.*
- *Graeme, K. (1969): Blackboard to Computers: A Guide to Educational Aids, London, Ward Lock.*

- *Haas, K.B. and Packer, H.Q. (1990): Preparation and Use of Audio Visual Aids, 3rd Edition, Prentice Hall, Inc.*
- *Haseen Taj (2006): modern Educational Technology, Agra: H.P Bhargava Book House.*
- *Jarvis, M. (2015). Brilliant ideas for ICT in the classroom. New York: Routledge Publications.*

Course Title: Service Learning
Course Code: MIT396

L	T	P	Cr.
0	0	4	2

Learning Outcomes

On the completion of the course, the students will be able to

1. Participate in community activities to establish connections and build relationships.
2. Evaluate community needs through conversations with community members.
3. Develop and implement initiatives that address community needs.
4. Reflect on personal growth, community impact and ethical considerations related to service activities.

Course Content

This course aims to engross students in meaningful service-learning activities that foster community linking. Students will actively participate in community-based projects, collaborate with community members and organizations and reflect on the impact of their service activities. Through this experiential learning approach, students will develop a deep understanding of community needs, build relationships with diverse stakeholders and contribute to community development.

In this course, students are expected to be present in the community throughout the semester and reflect on their experiences regularly after working with them. The students will use experiential learning for providing service learning. They will be able to analyse and have understanding of the key theoretical, methodological and applied issues.

Select 10 community related activities which are to be performed in nearby villages. Students in groups of 8-10 shall work on one activity.

Evaluation Criteria

1. Every activity shall be evaluated on the same day out of 10 marks.
2. Total 10 activities out of 100 shall be evaluated and submitted to Examination branch.

Activity Evaluation

1. Type of activity- 2 marks

2. Participation of student- 2 marks
3. Engagement in the activity- 2 marks
4. Outcome of the activities- 2 marks
5. Attendance- 2 marks

Transaction Mode

Problem-solving learning, Blended learning, Gamification, Cooperative learning, Inquiry-based learning, Visualization, Group discussion, Experiential learning, Active participation.

Course Title: Numerical Aptitude and Reasoning Ability
Course Code: MIT321

L	T	P	Credits
2	0	0	2

Total Hours: 30

Course Learning Outcomes:

After the successful completion of this course, the learner will able to:

1. Develop skill to meet the competitive examinations for better job opportunities.
2. Enrich their knowledge and to develop their logical reasoning thinking ability.
3. Analyze the Problems logically and approach the problems in a different manner.
4. Solve the problems easily by using Short-cut method with time management, which will be helpful to them to clear the competitive exams for better job opportunities.
5. Acquire satisfactory competency in use of reasoning.

Course Contents

UNIT-I **8 Hours**

Quantitative Ability (Basic Mathematics): Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds& Indices, Percentages, Problems on Numbers.

UNIT-II **7 Hours**

Quantitative Ability (Applied & Engineering Mathematics): Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Time & Work, Ratio and Proportion, Area, Mixtures and Allegation.

UNIT-III **7 Hours**

Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams.

UNIT-IV **8 Hours**

Logical Reasoning (Deductive Reasoning): Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Venn Diagrams, Seating Arrangement, Syllogism, Mathematical Operations.

Transactional modes

Video-based learning, E–Team Teaching, Open talk, Panel Discussions, Mentee Meter

Suggested Readings

- Aggarwal, R. S. (2000). *A Modern Approach to Verbal & Non Verbal Reasoning*. S. Chand.
- Carter, P. (2007). *IQ and aptitude tests*. Kegan Page Publishers.

Course Title: E-Commerce
Course Code: OEC059

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes

After completion of this course, the learner will be able to:

1. Discuss about the basic concepts and technologies used in the field of E-Commerce and Governance.
2. Apply their knowledge of various Electronic Payment Systems in practical scenarios.
3. Analyze and differentiate between various Governance Process Models.
4. Evaluate Internet trading relationships, including Business-to Consumer (B2C), Business-to-Business (B2B), and Intra-organizational dynamics.

Course Content

UNIT I **8 Hours**

Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce. Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

UNIT II **8 Hours**

E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

UNIT III **7 Hours**

E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nationwide networking in e-governance, e-seva.

UNIT IV **7 Hours**

E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Winn, J. K., & Wright, B. (2000). The law of electronic commerce. Wolters Kluwer.
- United States. White House Office. (1997). A framework for global electronic commerce. White House.
- Andrea, G. (Ed.). (2002). Development Centre Studies Electronic Commerce for Development. OECD Publishing.

Web Sources

- *https://simplycoding.in/e-commerce-and-e-governance-notes/*
- *https://study.com/academy/lesson/what-is-e-governmentcommerce-definition-examples.html*
- *https://www.geeksforgeeks.org/e-governance/*
- *https://web.archive.org/web/20160103054145/http://www.isoc.org/inet96/proceedings/g7/g7_3.*htm

SEMESTER IV

Course Title: Communication skills

Course Code: MIT403

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes

After the Completion of this courses the learner will be able to:

1. Take a course overview of prerequisites to Business Communication and awareness of appropriate communication strategies.
2. Formulate an outline for effective Organizational Communication.
3. Summarize the information, ideas, concepts and opinions from a variety of sources.
4. Attain the competence in oral, written, and visual communication.
5. Learn the correct practices about the strategies of Effective Business writing.

Course Content

UNIT 1 **8 Hours**

English Language: Sentence, Sentence Formation, Parts of speech, Tenses, Active passive voice, Direct/Indirect speech, Vocabulary.

Business Communication: Definition, Types, Medias, Objectives, Modals, Process and Barriers to communication in an organization & ways to handle and improve barriers of business communication.

UNIT II **7 Hours**

Oral Communication: Verbal communication and its types, Non- Verbal Communication and its types. Listening Skills: Types of listening and Traits of a good listener, Note taking, barriers to listening & remedies to improve listening barriers, Cambridge Tests of listening.

UNIT III **8 Hours**

Reading Skills**:** Newspaper / Magazine/ Article Reading from English Newspaper, Cambridge Readings

UNIT IV **7 Hours**

Writing Skills: Essay Writing, Letter writing: Formal, informal and Job–application, Resume writing. Presentation Skills: Presentation Purpose in Business world, how to Prepare PPT, Tips for the required body language while delivering the presentation in front of third party.

Transactional Modes

Group Discussions, Team Teaching, Role play, Open talk and Power point Presentation.

Suggested Readings

- Kumar,S.,&Lata,P.(2011).*Communicationskills*.OxfordUniversityPress. Training, M. T. D. (2012). *Effective communication skills*. Bookboon.
- Hargie, O. (Ed.). (1986). *The handbook of communication skills* (p. 37). London: Croom Helm.