

MATHEMATICAL FOUNDATION FOR INFORMATION TECHNOLOGY

Semester I
21MITC01

Hours of Instruction/week: 5
No of credits: 4

Objectives:

1. To learn the concepts of set theory, functions and relations.
2. To understand the formal languages.
3. To acquire the knowledge of finite state automata.
4. To calculate critical path.
5. To get familiar with correlation and regression techniques.

UNIT-I BASIC SET THEORY 15

Basic Definitions - set operations - Venn Diagrams - Algebraic laws of set theory - Relations - Types of relations - Properties of relations - Functions - Types of functions

UNIT-II FORMAL LANGUAGES 15

Languages and Grammar - Phrase structure Grammar – Types of Phrase structure Grammar - Context Free Languages.

UNIT-III FINITE STATE AUTOMATA 15

Finite state Automata -Deterministic Finite State Automata (DFA)- Non Deterministic Finite state Automata(NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

UNIT-IV PERT and CPM 15

Introduction - Critical Path analysis-Distinction between PERT and CPM- Applications of Network Techniques-Advantages of Network Techniques –Limitations and difficulties in using network.

UNIT-V CORRELATION AND REGRESSION 15

Karl Pearson’s coefficient of correlation - Rank correlationRegression equations - Difference between Correlation and Regression.

Total Hours: 75

TEXT BOOKS

1. T.Veerarajan, *“Discrete Mathematics with Graph theory and Combinatorics”*, Tata Mcgraw Hill Education Pvt.Ltd, New Delhi, 2010. (Unit I, II & III)
2. KantiSwarup,P.K.Gupta,& Manmohan ,*“An Introduction to Management Science operation research”* sultan chand and sons,2010.(Unit IV)

3. PA. Navanithan , *“Business Mathematics and Statistics”*, Jai publishers,2008.(Unit V)

REFERENCES

1. G.Balaji, *“Discrete Mathematics”*,Balaji Publishers, 2008.(Unit I)
2. Hopcroft and Ullam, *“Introduction to Automata Theory, Languages and Computation”*, Narosa Publishing House, Delhi, 2002.
- 3.RM. Somasundaram, *“Discrete Mathematical Structures”*, Prentice Hall of India Pvt.Ltd, New Delhi, 2003

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Illustrate simple set relationships in probability, statistics and computer science.
2. List out the operations on formal languages.
3. Understand the algorithm used to turn an NFA in to an equivalent DFA.
4. Apply PERT and CPM in project scheduling problems.
5. Identify the impact of varied factors on business sales and profits using regression analysis.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	H	-	M	L	-	-	M	-	M	L	L	M	M
CLO 2	L	M	-	M	L	-	-	M	-	M	L	L	M	M
CLO 3	L	M	-	M	L	-	-	M	-	M	L	L	M	M
CLO 4	L	H	-	H	L	-	-	M	M	H	L	L	M	M
CLO 5	L	H	-	H	L	L	-	M	M	H	L	L	M	M

ADVANCED JAVA PROGRAMMING

Semester I
21MITC02

Hours of Instruction/week: 4
No of credits: 4

Objectives:

1. To recall the features and basic concepts of core java and object oriented programming.
2. To understand about the distributed strategies of Java using RMI and java networking concepts.
3. To apply different events and applet programming.
4. To enumerate the JDBC-ODBC connectivity through servlets.
5. To know about the advanced features of Java such as JSP and Java Beans.

UNIT I BASIC CONCEPT 12

JAVA – Features and Characters of JAVA - Object-Oriented Programming – Encapsulation – Inheritance – Polymorphism - Overriding– Constants -Variables – Types – Swing features – Difference between Swing and AWT components.

UNIT II DISTRIBUTED APPLICATION AND NETWORKING 12

Client/Server communication - Overview of the RMI – Advantages of RMI – RMI Architecture – Developing RMI Applications – Parameters in RMI - Java Virtual Machine - Java Serialization - Java Networking.

UNIT III APPLETS AND EVENTS 12

Applets - HTML applet tags – Order of Applet initialization – Graphics – Mouse Event Handling – Examples of key event handling - The Delegation Event Model – Event class and event listener.

UNIT IV JDBC AND SERVLETS 12

JDBC Vs ODBC – Types of JDBC Drivers – Basic operations on JDBC. Features of servlets – Servlet lifecycle service – Steps to run the servlet program – Cookies Vs Session – Database Connectivity with JDBC using Servlet.

UNIT V JSP and EJB 12

Define JSP – Advantages of JSP – JSP tags - Servlet Vs JSP – JSP Syntax Basics – JSP Directories – EJB Benefits – Types of Enterprises Beans – Session Bean with types – Entity Bean – Entity Beans Vs Session Beans – Message Driven Beans.

Total Hours: 60

REFERENCES

1. Professional Java Server Programming, SubrahmanyamAllamaraju and Cedric Bues, Apress, SPD, 2005.
2. Java The Complete Reference, Herbert Schildt, Tata McGraw-Hill, Eighth edition, 2011.
3. Advanced Java for Students, Dr.AshwinMetha and Sarika Shah, The X team, Published by SPD Pvt. Ltd, 2012.
4. Jamie Jaworski, “Java Unleashed” , SAMS Techmedia Publications 1999.
5. Jim Keogh,” The Complete Reference J2EE”, Tata McGrawHill Publishing Company Ltd,2002
6. <https://nptel.ac.in/courses/106105084/>
<https://www.edureka.co/blog/advanced-java-tutorial>

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	-	L	L	H	-	-	M	M	M	-	H	M	L
CLO 2	H	L	H	M	H	-	M	M	M	H	-	H	M	L
CLO 3	H	L	H	M	H	-	-	M	M	H	-	H	M	L
CLO 4	H	L	H	M	H	-	-	M	M	H	-	H	M	L
CLO 5	H	L	H	M	H	-	-	M	M	H	-	H	M	L

DESIGN AND ANALYSIS OF ALGORITHMS

Semester I
21MITC03

Hours of Instruction/week: 4

No of credits: 4

Objectives:

1. To describe the fundamental techniques to design efficient algorithms and to analyze their running time.
2. To find optimal solution by applying the greedy method.
3. To solve problems using dynamic programming methods.
4. To derive and solve recurrences describing the performance of search and traversal techniques.
5. To explore NP-Hard and NP-Complete problems.

UNIT I INTRODUCTION

12

Introduction to algorithms, Analyzing algorithms. Divide and Conquer: General Method, Binary Search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort, Strassen's matrix multiplication.

UNIT II THE GREEDY METHOD

12

General method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, Minimum spanning trees, Single source shortest paths.

UNIT III DYNAMIC PROGRAMMING

12

General method, Multistage graphs, All pairs shortest paths, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem, Flow-shop Scheduling.

UNIT IV BASIC SEARCH AND TRAVERSAL TECHNIQUES

12

Techniques, Code Optimization, AND/OR graphs, Game trees, Red Black trees Back Tracking: General method, 8-queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem. Branch and Bound: General method, travelling salesperson problem.

UNIT V NP-HARD and NP-COMPLETE PROBLEMS

12

Basic concepts: Non deterministic algorithms —The classes NP hard and NP complex , Cook's theorem .NP hard graph problems : Clique Decision Problem — Node cover decision problem — chromatic number decision problem — Directed Hamiltonian cycle — Traveling sales person decision problem. NP-hard scheduling Problems: scheduling identical processors— flowshop scheduling—job shop scheduling; NP-hard code generation problems: code generation with common sub expressions — Implementing parallel assignment instructions, Some simplified NP-hard problems.

Total Hours: 60

TEXT BOOK

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, algotia Publications, 2011.

REFERENCES

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “ Introduction to Algorithms”, Massachusetts Institute of Technology, MIT Press, III Edition, 2009.
2. Sara Baase, Allen Van Gelder, Computer Algorithms, Pearson education, 2008.
3. Mark Allen Weiss “Data Structures and Algorithm Analysis”, Benjamin/Cummings Pub. Co, 2007

WEB REFERENCES

1. <https://nptel.ac.in/courses/106101060/>
2. https://swayam.gov.in/nd2_cec20_cs03/preview

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Understand the basic techniques for designing algorithms.
2. Evaluate and estimate the performance of the algorithms.
3. Select the appropriate algorithm to solve a problem by considering the problem characteristics.
4. Construct efficient algorithms for simple computational tasks.
5. Analyze NP-Hard and NP-Complete problems

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	M	M	H	-	-	-	L	M	M	-	H	L	H
CLO 2	M	H	M	H	-	-	-	L	M	M	-	H	L	H
CLO 3	M	H	M	H	-	-	-	L	M	M	-	H	H	M
CLO 4	M	H	M	H	-	-	-	L	M	M	-	H	H	M
CLO 5	H	H	L	L	-	-	-	L	M	M	-	M	M	M

CLOUD COMPUTING

Semester I

Hours of Instruction/week: 5

21MITC04

No of credits: 5

Objectives:

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To understand cloud models.
3. To facilitate the students to understand the cloud Infrastructure.
4. To explore significant cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services .
5. To explain the security issues related to cloud computing.

UNIT I- CLOUD INTRODUCTION

15

Cloud Computing Fundamentals: Cloud Computing definition, Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Types of cloud based on deployment model, Issues in Cloud -Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT II - CLOUD SERVICES, PROVIDERS AND FILE SYSTEM

15

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT III VIRTUALIZATION

15

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, High Level Language VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT IV CLOUD INFRASTRUCTURE

15

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT V SECURITY IN THE CLOUD

15

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Total Hours: 75

TEXT BOOKS

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies” (Wiley India Edition),2010 (UNIT-I)
2. John Rittinghouse& James Ransome, “Cloud Computing Implementation Management and Strategy”,CRC Press, 2010.(UNIT-II)
3. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, ‘Mastering Cloud Computing”, TMGH,2013. (UNIT-III)
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012. (UNIT IV)
5. Ronald L. Krutz, Russell Dean Vines, “Cloud Security – A comprehensive Guide to Secure Cloud Computing”, Wiley – India, 2010. (UNIT-V)

REFERENCES

1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
2. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India,2011.
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly
4. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
5. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, “Grid and Cloud Computing – A Business Perspective on Technology and Applications”, Springer.

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Assess various cloud models and services.
2. Describe Virtualization and classify its types.
3. Identify the infrastructure of cloud computing.
4. Demonstrate the use of Map-Reduce.
5. Analyze the Risks and challenges in Cloud environment.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	L	M	M	L	-	L	L	M	-	H	-	M	M
CLO 2	H	L	M	M	L	-	L	L	M	-	H	-	M	M
CLO 3	H	H	M	M	H	-	L	L	M	-	H	-	M	M
CLO 4	H	M	M	H	M	-	L	L	M	-	H	-	M	H
CLO 5	H	H	M	H	M	M	M	L	M	-	H	-	M	H

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Semester I
21MITC05

Hours of Instruction/week: 4
No of credits: 5

Objectives

1. To describe the fundamentals of Artificial Intelligence
2. To illustrate the Knowledge Representation in Artificial Intelligence
3. To relate Machine Learning concepts
4. To estimate Supervised Learning
5. To devise Unsupervised Learning

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE

12

Definition of Artificial Intelligence – Learning Systems – Knowledge Representation and Reasoning – Planning – Knowledge Acquisition – Intelligent Search – Logic Programming – Soft Computing – Branches and Applications of Artificial Intelligence.

UNIT II KNOWLEDGE REPRESENTATION

12

Knowledge Management: Value of Knowledge Management – Categories of Knowledge. Types of Knowledge: Declarative Knowledge – Procedural Knowledge. Knowledge Representation: Approaches – Issues. Knowledge Base.

UNIT III MACHINE LEARNING

12

Why Machine Learning – History of Machine Learning – Timeline of Machine Learning – Types of Problems in Machine Learning. Aspects: Inputs to Training – Outputs of Training – Learning Systems. Machine Learning Applications and Examples.

UNIT IV SUPERVISED LEARNING

12

Support Vector Machines – Inductive Logic Programming – Case-based Reasoning – Ensemble Classifiers – Nearest Neighborhood – Fuzzy Network: Fuzzy Systems – Info Fuzzy Networks – Fuzzy Neural Systems. Case Studies: Word Model – SVM, Education Loans – K-Nearest Neighbors.

UNIT V UNSUPERVISED LEARNING

12

Types of Unsupervised Learning – Challenges in Unsupervised Learning – Clustering: K-Means, Agglomerative, DBSCAN, Comparing and evaluating Clustering Algorithms. Summary of Clustering Methods – Data Compression – Principal Component Analysis.

Total Hours: 60

1.

TEXT BOOKS

1. Vinod Chandra S.S, AnandHareendran S, “Artificial Intelligence and Machine Learning”, PHI Learning Private Limited, 2014.
2. Andreas C.Muller, Sarah Guido “Introduction to Machine Learning with Python”, O’Reily, 2017.

REFERENCES

1. Paul Wilmot, “Machine Learning – An Applied Mathematics Introduction”, Panda Ohana, 2019.
2. Stuart Russell, Peter Norvig, “Artificial Intelligence: A Modern Approach”, Pearson Education, 2016.
3. Deepak Khemani, “A First Course in Artificial Intelligence“, McGraw Hill Education, 2013

WEB REFERENCES

1. <http://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning>
2. https://www.tutorialspoint.com/artificial_intelligence/index.html
3. https://en.wikipedia.org/wiki/Artificial_intelligence
4. <https://towardsdatascience.com/machine-learning-an-introduction>
5. <https://www.youtube.com/watch?v=9f-GarcDY58>
6. https://india.springboard.com/npf/artificial_intelligence_machine_language_course_india
7. <https://www.simplilearn.com/ai-and-machine-learning-post-graduate-certificate-program>
8. <https://www.greatlearning.in/great-lakes-artificial-intelligence-and-machine-learning>
9. <https://www.edvancer.in/artificial-intelligence-course>
10. <http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=MachineLearning>

Course Learning Outcomes:**On successful Completion of this course, the student will be able to**

1. Locate the Branches and Applications of Artificial Intelligence
2. Explain Knowledge Management
3. Discover problems in Machine Learning
4. Estimate Support Vector Machines and Fuzzy Networks
5. Evaluate Clustering Algorithms

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	-	-	-	-	-	-	-	-	-	-	M	-	-
CLO 2	H	-	-	-	-	-	-	-	-	-	-	M	-	-
CLO 3	H	H	-	-	-	-	-	H	H	H	H	H	M	M
CLO 4	H	H	M	M	M	M	M	H	H	H	H	H	M	M
CLO 5	H	H	M	M	M	M	M	H	H	H	H	H	M	M

ADVANCED JAVA PROGRAMMING–PRACTICAL I

Semester I
21MITC06

Hours of Instruction/week: 6
No of credits: 3

Objectives:

1. To Practice an IDE like Eclipse or Netbeans for quicker coding/debugging.
2. To understand and develop the Client server programming using different networking concepts.
3. To Develop GUI applications to handle events with JDBC connectivity.
4. To learn to write reusable programs to solve specific problems.
5. To apply advanced Java features such as RMI, Servlets, JSP and Java Beans in programming.

List of Programs

1. Java Applet program.
2. Java program using AWT itemListener.
3. Java program using AWT ActionListener.
4. Java program to create TCP chat Application.
5. Java program for UDPClient Server Communication.
6. Java program for retrieving IP Address
7. Java program for multicasting messages.
8. Java program to store, delete and update data in a database with the support of JDBC-ODBC connectivity.
9. Java Servlet program to display different styles of phrase.
10. Java Servlet program to display cookie id
11. Java Servlet program to create a dynamic HTML form to accept and display user name and password with the help of ‘get()’ and ‘post()’ methods.
12. JSP program to implement form data validation to accept correct data.
13. JSP program for demonstrating creation and accessing Java Beans
14. Java program to demonstrate the use of Java Swing components,
15. Message transfer using RMI.

Total Hours : 90

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Use an IDE like Netbeans for quicker coding/debugging
2. Develop Client/server programming using different networking concepts
3. Demonstrate GUI applications to handle events with JDBC connectivity
4. Apply advanced Java features such as RMI, Servlets, JSP and Java Beans in programming.
5. Produce reusable and extensible design to minimize rework.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	-	H	M	M	-	-	H	M	H	H	M	M	M
CLO 2	H	-	H	H	H	-	M	H	M	H	H	H	H	H
CLO 3	H	-	H	H	M	-	-	H	M	H	H	M	M	M
CLO 4	H	-	H	H	H	-	M	H	M	H	H	H	H	H
CLO 5	H	-	H	L	M	-	-	H	M	H	H	H	M	M

INTERNET OF THINGS

Semester II
21MITC07

Hours of Instruction/week: 4
No of credits: 5

Objectives:

1. To develop knowledge on basics of IoT, its characteristics, and levels.
2. To compose a clear vision about sensors, microcontrollers and interfaces.
3. To provide knowledge on protocols for IoT.
4. To interpret the importance on integration of IoT with cloud.
5. To inculcate the comprehensive knowledge about the applications of IoT

UNIT 1 INTRODUCTION TO INTERNET OF THINGS**12**

Introduction – IoT Growth – Application areas of IoT – Characteristics of IoT – Things in IoT- IoT Stack – Enabling Technologies – IoT Challenges – IoT Levels

UNIT II SENSORS, MICROCONTROLLERS AND INTERFACES**12**

Sensor Interfacing – Types of Sensors – Controlling Sensors through webpages – 8051 Microcontroller - ARM (Advanced RISC Machine)

UNIT III PROTOCOLS FOR IoT**12**

Messaging Protocols :Message Queuing Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) –Transport Protocols : Bluetooth Low Energy (BLE) – Light Fidelity (Li-Fi) – Internet Protocol Version 4 : IPV4 Protocol Frame Format,Internet Protocol Version 6 : IPV6 Protocol Frame Format – Uniform Resource Identifier

UNIT IV CLOUD FOR IoT**12**

IoT with Cloud – Challenges – Selection of Cloud Service Provider for IoT Applications : An Overview – Introduction to Fog Computing – Cloud Computing: Security Aspects

UNIT V APPLICATIONS BUILDING WITH IoT**12**

Case Studies: Smart Healthcare – Elderly Fall Detection with IoT Sensors, IoT based Application to Monitor Water Quality, Smart Retail, IoT based Smart Driver Assistance Systems

Total Hours: 60

REFERENCES

1. Internet of things, Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, 2019, ISBN : 9788126578375
2. Designing the Internet of Things, HakinCassimally and AdrainMceweb, John Wiley and Sons Ltd. 2014.
3. Internet of things – A Hands on Approach, Bagha and Madiseti, 2014, ISBN-10: 0996025510, ISBN-13: 978-0996025515.
4. The Internet of Things, Samuel Greengard, The MIT Press Essential Knowledge series, 2015.
5. <https://nptel.ac.in/courses/106/105/106105166/>

Course LearningOutcomes:

On successful completion of this course,the student will able to,

1. Interpret the fundamental functionalities of IoT and enabling technologies.
2. Understand the significance of sensors and microcontrollers.
3. Gain knowledge about the protocols of IoT.
4. Identify the importance of Cloud for IoT
5. Integrate real world day-to-day applications with IoT systems.

CLO-PLO Mapping and Matrix

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CLO 2	H	M	L	M	-	H	-	L	M	M	-	M	H	M
CLO 3	H	M	L	M	-	M	-	L	M	M	-	M	H	M
CLO 4	H	M	L	M	-	M	-	L	M	M	-	M	H	M
CLO 5	H	H	L	M	-	H	-	L	M	M	-	M	H	M

DEEP LEARNING

Semester II
21MITC08

Hours of Instruction/week: 4
No of credits: 5

Objectives

1. To recognize the foundation of Deep Learning and Neural Networks
2. To understand Gradient Descent and Learning Rates
3. To analyze TensorFlow
4. To describe the Convolutional Layer
5. To demonstrate Deep Reinforcement Learning

UNIT I INTRODUCTION TO DEEP LEARNING AND NEURAL NETWORKS

12

What is Deep Learning - Why Deep Learning. The mechanics of Machine Learning -The Neuron - Expressing Linear Perceptrons as Neurons– Feed-Forward Neural Networks - Linear Neurons and their Limitations.

UNIT II TRAINING FEED-FORWARD NEURAL NETWORKS

12

Gradient Descent - The Delta Rule and Learning Rates - Gradient Descent with Sigmoidal Neurons - The Back Propagation Algorithm - Stochastic and Minibatch Gradient Descent - Test Sets - Validation Sets and Overfitting – Preventing Overfitting in Deep Neural Networks.

UNIT III NEURAL NETWORKS IN TENSORFLOW

12

What is TensorFlow - How does TensorFlow compare to Alternatives? TensorFlow Variables – Operations – Placeholder Tensors – Sessions in TensorFlow – Navigating Variable Scopes and Sharing Variables – Specifying the Logistic Regression Model in TensorFlow.

UNIT IV CONVOLUTIONAL NEURAL NETWORKS

12

Neurons in Human Vision – Shortcomings of Feature Selection – Filters and Feature Maps – Full Description of the Convolutional Layer – Max Pooling – Full Architectural Description of Convolution Networks – Image Processing Pipelines– Accelerating Training with Batch Normalization – Visualizing Learning in Convolutional Networks.

UNIT V DEEP REINFORCEMENT LEARNING

12

What is Reinforcement Learning – Markov Decision Processes – Explore Versus Exploit – Policy Versus Value learning – Pole-Cart with Policy Gradients – Creating an Agent – Building the Model and Optimizer – Sampling Actions – Keeping Track of History – Policy Gradient Main Function.

Total Hours: 60

TEXT BOOKS

1. Nikhil Buduma and Nicholas Lacascio, “Fundamentals of Deep Learning”, O’Reilly Media, 2017.
2. Francois Chollet, “Deep Learning with Python”, Manning, 2018.

REFERENCES

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
2. Josh Patterson, Adam Gibson, Aaron Courville, “Deep Learning – A Practitioner’s Approach”, O’Reilly Media, 2017.
3. Jeff Heaton, “Artificial Intelligence for Humans Volume 3: Deep Learning and Neural Networks”, Heaton Research, 2015.

WEB REFERENCES

1. <http://neuralnetworksanddeeplearning.com>
2. <https://www.datacamp.com/community/tutorials/deep-learning-python>
3. <http://www.deeplearning.net/tutorial/>
4. <http://deeplearning.stanford.edu/tutorial>
5. <https://medium.com/tensorflow/mit-deep-learning-basics-introduction>
6. <https://www.classcentral.com/course/swayam-deep-learning-iitkgp-13988>
7. <https://www.edureka.co/blog/deep-learning-with-python/>
8. <https://www.eckovation.com/course/deep-learning-certification-course>
9. <https://www.zapmeta.co.in/?q=deep+learning+free+course>
10. <https://www.apdaga.com/2019/03/coursera-neural-networks-and-deep-learning>

Course Learning Outcomes:

On successful Completion of this course, the student will be able to

1. Identify the fundamentals of deep learning and Neurons
2. Discover Feed Forward Neural Networks
3. Apply Neural Networks in Tensorflow
4. Estimate Convolution Networks
5. Structure Markov Decision Processes

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
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CLO 2	H	H	-	-	-	-	-	-	-	-	-	H	-	-
CLO 3	H	H	M	M	M	M	M	H	H	M	H	H	M	M
CLO 4	H	H	M	M	M	M	M	H	H	M	H	H	M	M
CLO 5	H	H	M	M	M	M	M	H	H	M	H	H	M	M

INTERNET AND WEB PROGRAMMING

Semester II

Hours of Instruction/week: 4

21MITC09

No of credits: 4

Objectives

1. To endow students with principles, knowledge and skills for the construction of web enabled applications using HTML.
2. To provide a comprehensive knowledge of the semantics and syntax of Cascading Style Sheet.
3. To learn about Bootstrap, XML documents, AJAX, XPATH and XSLT.
4. To use Java script, jQuery, Angular JS for dynamic effects.
5. To understand the concepts of website creation and hosting using Word press.

UNIT I INTRODUCTION TO INTERNET & WORLD-WIDE WEB

12

History-Web Browsers-Web Servers - Uniform Resource Locator- Tools and Web Programming Languages. Hypertext Mark Up Language (HTML):Basics of HTML page-Text Formatting- Table-Headers-Linking-Images-List-Forms.HTML5: Control elements –Semantic elements – Drag and Drop – Audio – Video controls

UNIT II CASCADING STYLE SHEETS (CSS)

12

Introduction-CSS Syntax-Inline, Internal and External style sheet- CSS properties-selector. CSS styling: Background-text formatting-controlling fonts. Working with the block elements-working with lists and tables-Image gallery-Image sprites-CSS ID and class.Box model: Introduction- Border properties-padding properties-margin properties. CSS color-grouping-Dimensions- display-positioning-align-class- Navigation bar-Animation-Transition.

UNIT III BOOTSTRAP AND XML

12

Bootstrap: Introduction—Grid system-Typography-Tables-Forms-Buttons-Images-Glyphicons-Dropdowns-button groups-Input groups-Navbar-Progress Bar-Jumbotron-Panels-Header-Tooltip.

XML: Basics of XML-XML Document Type Definition-XML Namespaces-Document Object Model-XML Parser-SAX Parser -XPATH-XSLT

UNIT IV JAVASCRIPT

12

Javascript: Introduction to JavaScript–JavaScript Document Object Model-Date and Objects-Regular Expressions- Exception Handling-Validation.**jQuery:** Overview-Selectors-Events-effects-Traversing-AJAX-DOM-plugins-Validation.**Angular JS:** Introduction- Expression-Events-Forms-Validation-Controllers-Scopes and MVC architecture

UNIT V WORDPRESS

Word Press: Introduction-Content management system-Website Planning and hosting-Settings-Dashboard-Categories-Posts-Pages-Menus-Media-Tags-Links-Comments-Users-permalink.

Appearance: Theme management-Customize theme-Widget Management. Elementor–slider-plugins-social media plugins. Search engine optimization: On-page SEO-Off- page SEO.

Total Hours: 60

REFERENCES :

1. Internet and World Wide Web: How to Program (Third Edition), Deitel and Goldberg Pearson Prentice Hall ISBN 0-13-124682-8
2. Programming the WWW Third Edition, Robert W. Sebesta, Pearson Prentice Hall.

WEB REFERENCES

1. <https://www.coursera.org/learn/html-css-javascript-for-web-developers>
2. <https://www.edx.org/course/introduction-to-bootstrap-a-tutorial>
3. https://onlinecourses.swayam2.ac.in/ugc19_hs26/
4. <https://www.w3schools.in/>
5. <https://www.tutorialspoint.com/>
6. <https://www.lynda.com/WordPress-tutorials/Welcome/504072/533857-4.html>

Course Learning Outcomes:

At the end of the course, the student should be able to:

- Have knowledge in advanced techniques necessary for the development of web-based applications.
- Apply stylesheets for processing, identifying, and presenting of information in web pages.
- Develop well-formed web browser-based documents utilizing XML and website using bootstrap
- Use scripting languages to transfer data and add interactive components to web pages.
- Design a basic web site using Word press.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CLO 2	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CLO 3	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CLO 4	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CLO 5	H	-	M	M	M	L	M	M	-	M	M	L	H	M

OPEN SOURCE TECHNOLOGIES

Semester II
21MITC10

Hours of Instruction/week: 4
No of credits: 4

Objectives:

1. To give an exposure to PHP programming concepts.
2. To explore MySQL Environment.
3. To understand the fundamentals of Python Programming.
4. To gain advanced knowledge in Python Programming
5. To enable students to gain knowledge in modern web Databases.

UNIT I PHP

12

Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators ; Statements – Flow Control functions – Dates and Times - Working With Arrays -Using Functions – Object oriented Programming in PHP - String Manipulation and Regular Expression - File and Directory Handling - Working With Forms

UNIT II MySQL

12

Data Types - Primary Keys and Auto Increment Fields – Queries - SQL programs - Closing a Connection.- Create Database and Tables - Sorting Query Results – Connecting to MySQL with PHP, Inserting data with PHP, Retrieving data with PHP.

UNIT III PYTHON

12

Variables - Data types – Strings - Operators – Control Statements - Loops - Sequences: Lists – Tuples - Sets – Dictionaries – File Handling -Exception – Handling exception

UNIT IV

12

File Handling -Exception – Handling exception – Object oriented Programming in Python

Unit V Data Base for the Modern Web:

12

Introduction to MongoDB : key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language.

Total Hours: 60

REFERENCES

1. Chris DiBona, Danese Cooper and Mark stone O'Reilly,"Open Sources 2.0-The Continuing Evolution", First Edition, 2005.
2. Elliot White III, Jonathan.D.Eisenhamer, "PHP 5 in practice" pearson Education,2007.
3. Mark Lutz, O'Reilly, "Programming Python 4E" ,2011.
4. Paul Du Bois,O'ReillyPublishers,"My SQL- Cookbook",Second Edition,2010.

Web References

1. https://swayam.gov.in/nd2_aic20_sp32/preview
2. https://swayam.gov.in/nd2_aic20_sp33/preview

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Choose appropriate open source software for the given problem.
2. Analyze various open source Technologies.
3. Correlate, Python and PHP programming.
4. Develop programs using PHP and Python.
5. Create database applications using PHP/Python and MySQL/Mongo DB.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	L	H	M	M	-	-	M	-	M	L	H	L	M
CLO 2	H	L	H	M	M	-	-	M	-	M	L	H	L	M
CLO 3	H	L	H	M	H	-	-	M	-	M	-	H	M	M
CLO 4	H	L	H	H	H	M	-	M	-	M	-	H	H	M
CLO 5	H	L	H	H	H	M	-	M	-	M	-	H	H	M

WEB TECHNOLOGIES -PRACTICAL II (OPEN BOOK)

Semester II
21MITC11

Hours of Instruction/week: 3
No of credits: 3

Objectives:

1. To gain knowledge in fundamental techniques for the development of web-based applications.
2. To impart students with essential knowledge in HTML, CSS, XML and DTD.
3. To be able to write simple JavaScript, jQuery and Angular JS programs.
4. To understand the importance of Bootstrap and use it to create Web pages.
5. To develop websites using WordPress as a Content Management System.

List of Programs:

1. Create a static Web page using HTML tags for Information Technology Department.
2. i) Create a HTML table to provide the layout of the university infrastructure.
ii) Design a mark sheet and display all your marks with subjects in a table
iii) Design a webpage to List a table of content and navigate within the pages.
3. Create a college website using html 5 and embed audio, video content.
4. Create a web page using Inline, Internal and external CSS.
5. Write an XML file which will display the Food Menu information and validate it with DTD
6. Programs using XML and CSS
7. Programs using XML DOM
8. Design an employee login form, registration form and validate its field using java script.
9. Create a web page with jQuery effects
10. Create a shopping list using Angular JS features.
11. Create an Animal museum Website using Bootstrap
12. Create a book store website using Bootstrap
13. Design a photography website using Word Press.
 - i) Create home page of your website using Elementor plug in.
 - ii) Add a new post and pages to your website, a topic should be related to your Website.
 - iii) Create top Menu of your website

14. Design a website using Word Press

- i) Add a contact us form in the website (Use Contact Form 7 Plug-in).
- ii) Add Slider to any page of your website
- iii) Add Social media plugins in the website

15. Word Press SEO tools: Install Yoast SEO Plug-in. Perform SEO Analysis and readability analysis of the post that you created in previous exercise.

Total Hours :45

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Create web pages using several technologies such as HTML, CSS and XML.
2. Apply inline, internal and external style sheets in web page development.
3. State the technological differences between static web sites and dynamic web sites.
4. Construct the website using bootstrap
5. Build simple and easy tomaintain website using Word Press.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	H	H	M	M	H	M	H	H	M	M	H	H	M
CLO 2	H	M	H	M	M	H	M	H	H	M	M	H	H	M
CLO 3	H	H	H	M	M	H	M	H	H	M	M	H	H	M
CLO 4	H	M	H	M	M	H	M	H	H	M	M	H	H	M
CLO 5	H	M	H	M	M	H	M	H	H	M	M	L	H	M

OPEN SOURCE -PRACTICAL III

Semester II
21MITC12

Hours of Instruction/week: 4
No of credits: 3

Objectives:

1. To provide skills and knowledge necessary to create dynamic database-driven websites using PHP, PYTHON, MySQL and Mongo DB.
2. To understand PHP and MYSQL data types, logic controls, built-in and user-defined functions.
3. To gain knowledge on working .with form data
4. To retrieve, insert, update, and delete data from MySQL in PHP and Python environment.
5. To retrieve, insert, update, and delete data from Mongo DB in PHP and Python environment.

List of Programs:

1. Use of conditional and looping statements in PHP
2. File manipulation using PHP
3. Creation of sessions and cookies
4. Creating forms and form validation using PHP
5. Insertion, Updation and Deletion of rows in MYSQL tables using PHP
6. Searching of data and sorting by different criteria using PHP and MySQL
7. Joining tables using PHP and MySQL
8. Use of Functions in Python
9. String manipulation using python
10. File manipulation using python
11. Plotting graphs using python
12. Insertion, Updation and Deletion of rows in MYSQL tables using Python
13. Searching of data and sorting by different criteria using Python and MySQL
14. Insertion, Updation and Deletion of rows in Mongo DB using PHP/Python
15. Searching of data and sorting by different criteria using PHP/ Python and Mongo DB

Total Hours :60

Course Learning outcomes:

On successful completion of this course, the student will be able to

1. Validate input using PHP.
2. Construct cookies and sessions.
3. Develop Web applications using PHP and Python
4. Create tables and Test various MySQL database queries.
5. Establish PHP and MYSQL/MongoDb and Python MySql/MongoDB database connectivity.

CLO-PLO Mapping and Matrix

CLO/ PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	-	H	M	L	M	-	H	M	H	H	H	M	H
CLO 2	H	-	H	H	M	H	-	H	M	H	H	H	H	H
CLO 3	H	H	H	H	H	H	-	H	M	H	H	H	H	H
CLO 4	H	-	H	M	M	L	-	H	M	H	H	H	H	H
CLO 5	H	-	H	M	M	M	-	H	M	H	H	H	H	H

TECHNICAL COMMUNICATION

Semester III
21MITC14

Hours of Instruction/week: 3
No of credits: 3

Objectives:

1. To acquire basic knowledge about technical communication.
2. To explain the active listening skills and their types.
3. To gain knowledge about the fundamentals of effective writing.
4. To recite about the technical reports and their importance.
5. To devise interviews and their characteristics

UNIT I BASICS OF TECHNICAL COMMUNICATION

9

Process, Characteristics, Levels, Flow, Networks and Importance. Barriers to Communication: **Interpersonal, Intrapersonal, and Organizational. Non Verbal Communication:** Kinesics, Proxemics, Paralinguistics, Chronemics. Technology in Communication: Software for Creating, Messages, Software for writing Documents, Software for Presenting Documents, and Transmitting Documents

UNIT II ACTIVE LISTENING

9

Types, Traits of a good Listener, Active versus Passive Listening, and Implications of Effective Listening. Fundamentals of Effective Writing: Words and Phrases, Sentences and Paragraphs

UNIT III FUNDAMENTALS OF EFFECTIVE WRITING

9

Art of Condensation, Reading Comprehension. Effective Presentation Strategies: Analyzing Audience, Organizing Contents, Preparing an outline, Visual aids, Types of Delivery.

UNIT IV TECHNICAL REPORTS

9

Importance, Preparatory Steps and Structure. Letters, Memos and E-mails: Structure, Principles, Types. Group Communication: Group Discussions, Meetings and Conferences.

UNIT V INTERVIEWS

9

Types, Preparation, Success and Failure Factors. Technical Proposals: Definition, Types, Structure and Style. Research Paper, Dissertation and Thesis: Definition, Characteristics Style and Presentation. Referencing Conventions: Preparing List of References and Bibliography. Instruction Manuals and Technical Description: Structure, Importance and style.

Total Hours: 45

REFERENCES

1. Raman, Meenakshi and Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2nd Edition, 2011.
2. Sharma Sangeeta and Binod Mishra, Communication Skills for Engineers and Scientist, Pearson Education, 2009.
3. Kumar, Sharma and PushpLata, Communication Skills, New Delhi: Oxford University Press, 2012.

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Read, understand and trace the fundamentals of effective listening and writing.
2. Implement effective listening.
3. Relate and apply presentation strategies.
4. Assess the group communication.
5. Demonstrate using technical description.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CLO 2	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CLO 3	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CLO 4	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CLO 5	-	L	-	-	-	-	-	H	H	M	H	-	-	H

BIG DATA ANALYTICS

Semester III
21MITC15

Hours of Instruction/week: 4
No of credits: 5

Objectives:

1. To explore the Big Data fundamentals and learn about Big Data Analytical process.
2. To Describe the Hadoop Eco Sytsem and HDFS.
3. To understand the MapReduce programming and serialization.
4. To identify the difference between Pig and Hive and learn the frameworks
5. To gain knowledge of applying tools and techniques for real big data problems.

UNIT I INTRODUCTION TO HADOOP AND BIG DATA ANALYTICS

12

Introduction to big data:Data, Characteristics of data and Types of digital data,Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data

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

12

UNIT-II INTRODUCTION TO HADOOP

Introducing Hadoop, need of Hadoop, limitations of RDBMS, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop , Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS (Hadoop Distributed File System) , Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Interacting with Hadoop Ecosystem

12

UNIT-III INTRODUCTION TO MAPREDUCE PROGRAMMING

Introduction , Mapper, Reducer, Combiner, Partitioner, Searching, Sorting , Compression, Real time applications using MapReduce, Data serialization and Working with common serialization formats, Big data serialization formats

12

UNIT-IV: INTRODUCTION TO HIVE AND PIG

HIVE: Introduction to Hive, Hive Architecture, Hive Data Types, Hive File Format, Hive Query Language (HQL), User-Defined Function (UDF) in Hive.

PIG: Introductionto Pig, The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig,

HDFS Commands, Relational Operators, Piggy Bank, Word Count Example using Pig , Pig at Yahoo!, Pig versus Hive

12

UNIT-V SPARK

Introduction to data analytics with Spark, What is Apache Spark, A Unified Stack, Downloading Spark, Spark's Python and Scala Shells, Core Spark concepts, Programming with RDDs, RDD Basics, RDD Operations, Passing functions to Spark, Working with key/value pairs, Data Partitioning, Loading and Saving your Data, File Formats

Total Hours: 60

REFERENCES

1. Big Data Analytics, Seema Acharya, SubhashiniChellappan, Wiley
2. Learning Spark: Lightning-Fast Big Data Analysis, Holden Karau, Andy Konwinski, Patrick Wendell, MateiZaharia, O'Reilly Media, Inc.
3. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
4. Chris Eaton,Dirkerooset al. , "Understanding Big data ", McGraw Hill, 2012.
5. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
6. VigneshPrajapati, "Big Data Analyticswith R andHadoop", Packet Publishing 2013.

WEB REFERENCES

1. <http://www.bigdatauniversity.com/>
2. <https://www.coursera.org/courses?query=big%20data%20analytics>

Course Learning Outcomes:

On successful completion of this course,the student will able to,

1. Analyze the difference between structured, semi-structured and unstructured data.
2. Summarize the challenges of big data and how to deal with the same.
3. Recognize the significance of NoSQL databases.
4. Formulate about Hadoop Ecosystem and MapReduce programming.
5. Distinguish between Pig and Hive and other frameworks.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	-	-	-	-	-	-	-	-	-	-	-	H	H	-
CLO 2	-	M	-	-	-	M	-	M	-	-	M	H	H	-
CLO 3	-	M	-	-	-	M	-	M	-	-	M	M	M	-
CLO 4	H	H	M	M	M	M	M	H	H	H	H	H	H	H
CLO 5	H	H	M	M	M	M	M	H	H	H	H	H	H	H

INFORMATION SECURITY

Semester III
21MITC16

Hours of Instruction/week: 5
No of credits: 5

Objectives

1. To obtain knowledge about attacks, encryption techniques and algorithms.
2. To understand mathematical concept, various key distribution techniques.
3. To perceive about authentication techniques and its protocols.
4. To acquire in-depth knowledge on various security applications like Electronic, IP and Websecurity.
5. To understand an extending ideas about wireless, Mobile device and cloud security.

UNIT I CONVENTIONAL AND MODERN ENCRYPTION **15**

Services – Attacks – Classical Encryption Techniques: Substitution Techniques; Transposition Techniques; Steganography -Block ciphers and the data encryption standard:Block Cipher Principles; Data Encryption Standard(DES); Block Cipher Design Principles; Advanced Encryption Standard (AES)–Block Cipher Operations: Multiple Encryption and Triple DES- Modes of operation.

UNIT II PUBLIC KEY ENCRYPTION **15**

Number Theory concepts: Fermat & Euler Theorem; Euclid Algorithm – RSA Algorithm – Elliptic Curve Cryptography – Diffie Hellman Key Exchange

UNIT III AUTHENTICATION AND SECURITY PRACTICE **15**

Message Authentication and Hash function - Authentication Requirements; Authentication Functions; Message Authentication Codes - MACs Based on Hash Functions: HMAC; MACs Based on Block Ciphers: DAA and CMAC; Authenticated Encryption: CCM and GCM- Digital Signature and Authentication Protocols

UNIT IV NETWORK AND INTERNET SECURITY I **15**

Authentication Application: Kerberos; x.509 authentication service – Electronic Mail security: PGP; S/MIME – IP Security – Web Security

UNIT V NETWORK AND INTERNET SECURITY II **15**

System Security: Intruders and Intrusion – Malicious Software – Firewalls – Trusted systems – Wireless Security - Mobile Device Security – Cloud Security

Total Hours: 75

REFERENCES

1. William Stallings, “Cryptography & Network Security”, Pearson Education, New Delhi 2005.
2. C.Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks – Architecture and Protocols, Pearson Education, Second Edition.

Web references

1. <https://nptel.ac.in/courses/106/106/106106129/>
2. <https://nptel.ac.in/courses/106/105/106105162/>

Course Learning Outcomes:

On successful completion of this course, the student will be able to,

1. Explore about attacks and gain ideas of handling it.
2. Establish a view about mathematical concepts and key distribution methods.
3. Compare different security techniques and identify the benefits.
4. Acquire opportunity to learn about various securities.
5. Develop knowledge in detail and ensure ideas about wireless, Mobile device and Cloud security.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	M	H	-	L	M	-	M	-	M	M	-	-	M	H
CLO 2	M	M	-	L	M	-	M	-	M	M	-	-	M	H
CLO 3	M	H	-	M	H	M	M	-	M	M	M	-	H	H
CLO 4	H	H	-	M	H	M	M	-	M	H	M	-	H	H
CLO 5	H	H	-	H	H	M	M	-	M	H	M	-	H	H

DIGITAL IMAGE PROCESSING

Semester III
21MITC17

Hours of Instruction/week: 4
No of credits: 4

Objectives

1. To explain basic principles and application of digital image processing.
2. To provide knowledge image transformation and Enhancement techniques.
3. To give understanding about image restoration techniques.
4. To differentiate various compression techniques and standards.
5. To apply different approaches to segmentation of digital image

UNIT I DIGITAL IMAGE FUNDAMENTALS

12

Introduction-applications-Steps in digital image processing – components of image processing system, Elements of Visual Perception, Light and electromagnetic spectrum, Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models RGB,CMY,HIS.

UNIT II IMAGE TRANSFORMATION & ENHANCEMENT

12

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters- Color image transformation and enhancement.

UNIT III IMAGE RESTORATION

12

Image Restoration – Image degradation model and restoration process, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Linear, Position Invariant Degradation -Inverse Filtering – Wiener filtering-Geometric Mean Filter.

UNIT IV IMAGE COMPRESSION

12

Fundamentals of compression– Image Compression models – Error Free Compression – Variable Length Coding – Huffman coding – Arithmetic coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Transform coding - JPEG and MPEG coding .

UNIT V IMAGE SEGMENTATION

Morphological processing- erosion and dilation- opening and closing- Morphological algorithms- Boundary Extraction, Region Filling- Extraction of connected components- Convex Hull- Thinning-Thickening-Skeleton-Pruning- Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging .

Total Hours: 60**TEXT BOOK**

1. Gonzalez R.C and Woods R. E, “Digital image processing “Addison Wesley
2. Anil K Jain Fundamentals of Digital image processing, Prentice Hall.

REFERENCES

1. S.Annadurai and R.Shanmugalakshmi, ”Fundamentals of Digital Image Processing”, Pearson Education.
2. Anil.K.Jain, ”Fundamentals of Image Processing”, Prentice Hall.
3. Maher.A.SidAhmad, ”Image Processing-Theory, Algorithms and Architectures”, McGraw Hill Education Private Limited.
4. Chris Solomon , Toby Breckon , “ Fundamentals of Digital Image Processing , A Practical approach with Examples in Matlab” ,A John Wiley & Sons , Ltd, Publications.
5. <https://nptel.ac.in/courses/117105079/>

Course Learning Outcomes:**On successful completion of this course, the student will be able to**

1. Understand the principles and application of digital image processing.
2. Gain knowledge various image transformation and enhancement techniques.
3. Evaluate various image restoration techniques.
4. Analyze various compression techniques and standards.
5. Use different segmentation approaches to digital image processing.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CLO 2	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CLO 3	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CLO 4	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CLO 5	H	M	L	H	L	L	M	H	H	M	L	-	H	H

DATA ANALYTICS -PRACTICAL IV**Semester III****Hours of Instruction/week:6****21MITC18****No of credits: 3****Objectives:**

1. To install and setup Hadoop in different operating modes and use the Hadoop Eco system and MapReduce programming.
2. To implement different file management tasks in Hadoop system.
3. To apply mapReduce program for semi-structured or unstructured datasets to address real world problems.
4. To organise input data to handle it using HDFS.
5. To identify the appropriate tools for Analysis and learn the frameworks such as Pig, Hive, Spark, Scala and to work with NoSQL database.

List of Programs

1. Installation and Configuration of Hadoop.
2. Monitor the Daemons using CLI and Browser.
3. Implement the file management tasks in Hadoop:
Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
4. Create a MapReduce application for word counting on Hadoop cluster.
 - a. Create a word corpus and Count the words
 - b. Upload a document and Count the words
5. Write a Map Reduce program that mines the weather data. Weather sensors are periodically collecting the data every hour at many locations across the globe. Gather large volume of log data to analyse it with MapReduce.
Data is available at: <https://github.com/tomwhite/hadoopbook/tree/master/input/ncdc/all>.
 - Find average, max and min temperature for each year in NCDC data set.
 - Filter the readings of a set based on value of the measurement.
 - Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.

Hive Programming:

1. Working with Hive terminals.
 - a) Hive
 - b) MySql
 - c) Hadoop
2. Do the following in Hive.
 - a) Create the DB, Tables in Hive and check its reflection files and file entries in mysql and HDFS.
 - b) Delete the created table in Hive and check its reflections in mysql and HDFS.

3. Do the following in Hive.
 - a) Count the number of records in test table.
 - b) Form minimum of 10 queries (like RDBMs) in order to utilize the aggregation functions to get reports from your created table data entries.
4. Load and Manage records from external sources (i.e., .txt files) in Hive.
5. Write Hive Queries for Joins.
6. Write a Custom UDF for Hive in Python and invoke it in HiveQL.
7. Analysis of stock market data
 - a) Create stocks table to maintain stock market data with the following fields.
 1. dateString
 2. Ticker String
 3. Open Double
 4. High Double
 5. Low Double
 6. Close Double
 7. Volume_for_the_day int
 - b) Row format delimited field
 - c) should be terminated by ,
 - d) Load the table with the data from spmohst.txt
 - e) Display yesterday's closing price of the tickers.
 - f) Display the following day's closing price is higher or lesser than today's.
 - g) Display the first row high price of the ticker for all the days.
 - h) Display the last row high price value of the ticker for all the days.
 - i) Find the number of rows present for each ticker.
 - j) Find the sum of all the closing stock prices for that particular ticker.
 - k) Get the running total of the volume_for_the_day for all the days for every ticker
 - l) Find the percentage of the volume_for_the_day on the total volumes for that particular ticker.
 - m) Find the minimum closing stock price for each particular ticker.
 - n) Find the maximum closing stock price for each particular ticker.
 - o) Find the average closing stock price for each particular ticker.
 - p) Rank the closing prices of the stock for each ticker.
 - q) Get the ticker, closing price and its row number for each ticker.
 - r) Rank the closing prices of the stock for each ticker without skipping the rank for the subsequent rows of duplicate value, if present.
 - s) Display the cumulative value of each record for every ticker.
 - t) Calculate the percent_rank for every row in each partition.
 - u) Create 5 buckets for every ticker and the first 20% records for every ticker will be in the 1st bucket and so on.

- v) The 5 buckets for every ticker and the least 20% closing prices should be in the first bucket and the next 20% should be in the second bucket and so on till 5th bucket for all the tickers.

Pig Programming

1. Load the file from HDFS into Pig and use its aggregation functions to display its descriptive analysis from Pig shell.
2. Collect the real-time tweets from Twitter using Flume and keep them in the location '/user/flume/tweets' of HDFS.
3. Perform the Sentiment Analysis on Twitter data using Pig. Collect the real-time tweets from Twitter using Flume and keep them in the location '/user/flume/tweets' of HDFS.
4. Weblog analysis using Apache Pig

Spark and Scala Programming

1. Create an RDD using Spark and Scala.
2. Create a Spark Filter.

Total Hours : 90

Course Outcomes:

On successful completion of this course, the student will be able to

1. Install Hadoop and work with Hadoop File Systems
2. Create MapReduce Applications
3. Develop Hive Programs
4. Evaluate Pig Code
5. Implement Spark and Scala Programming

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	-	-	-	-	-	-	H	-	-	-	M	M	M
CLO 2	H	H	L	L	-	-	-	H	-	-	-	H	H	M
CLO 3	H	H	M	M	M	M	M	H	M	M	M	H	H	M
CLO 4	H	H	M	M	M	M	M	H	M	M	M	H	H	M
CLO 5	H	H	M	M	M	M	M	H	M	M	M	H	H	M

DIGITAL IMAGE PROCESSING -PRACTICAL V**Semester III****Hours of Instruction/week:5****21MITC19****No of credits: 3****Objectives**

1. To provide the students a general understanding of the fundamentals of digital image processing.
2. To introduce the student the analytical tools currently used in digital image processing
3. To develop the students ability to apply matlab tools in the laboratory for image restoration, enhancement.
4. To illustrate compression techniques on images
5. To experiment edge detection and segmentation techniques in image processing

List of Programs

1. Implement a Program to Perform the Bit-Slicing technique and Extract/Display the Resulting Plane as Separate Matlab Images. Consider Displaying a Mosaic of Several Different Bit-Planes from an Image Using the Subplot function.
2. Implement a Matlab Program to Display the Individual Hue, Saturation and Value Channels of a Given RGB Colour Image and also Display Individual Red, Green and Blue Channel.
3. Implement a Matlab Program to Perform Blurring and De-Blurring techniques on an Image
4. Implement a Matlab Program to Remove Different Noises from an Image Using filtering techniques
5. Implement a Matlab Program for Image Enhancement using Smoothing Techniques
6. Implement a Matlab Program to Enhance the Image using Histogram Equalization Techniques
7. Implement a Matlab Program to Implement Image Restoration Techniques
8. Implement a Matlab Program for Image Compression
9. Implement a Matlab Program for Color Image Processing
10. Implement Morphological Operation on Images Using Matlab
11. Implement and Analysis Different Edge Detection Algorithms
12. Implement a Program to Perform Segment Objects in an Image.

Total Hours : 75

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Use matlab tools to solve image processing problems.
2. Write mi function using matlab tool box
3. Develop application-specific algorithms for image processing.
4. Have a practical and visual understanding of the image enhancement and restoration
4. Gain knowledge on compression, edge detection and segmentation techniques in image processing

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CLO 2	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CLO 3	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CLO 4	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CLO 5	H	M	M	H	M	L	M	H	H	M	L	M	H	H

SOFTWARE PROJECT MANAGEMENT (SELF STUDY)

Semester III

Hours of Instruction/week: 1

21MITC20

No of credits: 4

Objectives:

1. To define basics of software project management.
2. To understand the software evaluation and costing.
3. To learn about software estimation techniques.
4. To apply Risk Management.
5. To experiment software quality management.

UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS 3

Introduction to Software Project Management: **An Overview of Project Planning**: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and Allocate resources.

UNIT II SOFTWARE EVALUATION AND COSTING 3

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, Structured methods.

UNIT III SOFTWARE ESTIMATION TECHNIQUES 3

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT IV RISK MANAGEMENT 3

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT V SOFTWARE QUALITY MANAGEMENT 3

TQM, Six Sigma, Software Quality: defining software quality, External Standards, Comparison of project management software's: dot Project, Launch pad, openProj. Case study: PRINCE2

Total Hours: 15

TEXT BOOK

1. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012.

REFERENCES

1. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition ,2013.
2. Richard H.Thayer “Software Engineering Project Management,”: IEEE Computer Society
3. Futrell , “Quality Software Project Management”, Pearson Education India, 2008
4. http://en.wikipedia.org/wiki/Comparison_of_project_management_software
5. http://www.ogc.gov.uk/methods_prince_2.asp

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Describe the basics of project planning.
2. Relate and apply project evaluation and approach.
3. Extend the software estimation to project planning.
4. Demonstrate how to manage risk and resource allocation.
5. Infer the software quality.

CLO-PLO Mapping and Matrix

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PSO 1	PSO 2	PSO 3
CLO 1	H	M	H	M	-	-	M	M	H	H	-	M	M	H
CLO 2	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CLO 3	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CLO 4	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CLO 5	H	M	H	M	-	-	M	M	H	H	-	M	M	H

**DEPARTMENT OF INFORMATION TECHNOLOGY
INTERDISCIPLINARY COURSE
CYBER FORENSICS**

Semester II
21MITI01

Hours of Instruction/week: 4

No of credits: 4

Objectives:

1. To introduce the importance of computer forensics technology and to identify various forensic services.
2. To describe various data recovery process for evidence collection and how to conserve the authentication of the evidence.
3. To provide a comprehensive knowledge in the procedures for discovering, identifying, constructing and preserving the electronic evidence.
4. To build up in-depth knowledge on global Information warfare and tactics accomplish by various groups.
5. To develop understanding on cyber Surveillance and advanced Computer Forensic systems and future directions.

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UNIT I TYPES OF COMPUTER FORENSICS

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

UNIT II DATA RECOVERY

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

UNIT III ELECTRONIC EVIDENCE

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT IV THREATS

Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

UNIT V SURVEILLANCE

Surveillance Tools – Victims and Refugees – Advanced computer forensics.

Total Hours: 60

TEXT BOOK:

1. John R. Vacca, “Computer Forensics”, Firewall Media, 2004.

REFERENCES:

1. Chad Steel, “Windows Forensics”, Wiley India, 2006.
2. Majid Yar, “Cybercrime and Society”, Sage Publications, 2006.
3. Robert M Slade, “Software Forensics”, Tata McGraw Hill, 2004.

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Describe the essential computer forensic technologies, services and vendors in the field of digital forensic science.
2. Demonstrate knowledge in numerous forensic tools and utilization of tools for data recovery and image verification procedures.
3. Identify the significance of a systematic procedure to investigate electronic data in order to discover digital evidence of unlawful activity.
4. Manage with threats related to security and *information warfare*
5. Procure hypothetical knowledge in many areas of computer forensic investigations.

**DEPARTMENT OF INFORMATION TECHNOLOGY
MULTIDISCIPLINARY COURSE
ICT FOR LEARNING**

**Semester III
21MITM01**

Hours of Instruction/week: 2

No of credits: 2

Objectives

1. To make the students understand about the basic concepts of ICT in detail.
2. To explore the online learning tools.
3. To explore mobile learning tools.
4. To teach the fundamentals of Internet.
5. To practice safe, ethical and legal ways of using ICT.

UNIT I

6

Introduction to ICT-Usage of ICT-Privacy in computer usage-Authentication-verification-ICT tools

UNIT II

6

Fundamentals of Internet-Internet Filtering- Search Engines-Searching Techniques,. E-Mail.

UNIT III

6

Online portals for learning – MOOC and other online learning resources.

UNIT IV

6

Mobile applications for learning-Benefits and challenges of mobile learning

UNIT V

6

Computer security-Threats-Security Measures- Impact of ICT on society—Computer Ethics-Cyber crimes and laws – government controls and laws on ICT.

Total Hours: 30

REFERENCES:

1. <http://download.nos.org/basiccomp/117.pdf>
2. http://www.itdesk.info/handbook_basic_ict_concepts.pdf
3. https://www.arstecb.com/book_argument/com_fun.pdf
4. <https://smksticted.files.wordpress.com/2010/11/la1-ict-topic-1-ict-and-society.pdf>
5. http://www.ou.ac.lk/home/images/OER/Computer_Science/ICT%20Skills%20Full%20Book.pdf

Course Learning Outcomes:

On successful completion of this course, the student will be able to

1. Understand the key concepts and benefits of using ICT in detail.
2. Effectively use ICT tools, software applications and digital resources.
3. Integrate ICT in to learning activities.
4. Employ online and mobile learning tools.
5. Examine legal and security issues.