Tribhuvan University
Institute of Science and Technology

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Masters in Information Technology (MIT)
Course Structure

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Prepared by
Computer Science and Information Technology Subject Committee

Introduction:

The Masters in Information Technology (MIT) curriculum is designed by closely following the courses practiced in accredited international universities, subject to the condition that the intake students are mostly from Bachelor in Masters in Information Technology, Computer Science, Computer Engineering, Computer Application, Information Management, or Information Systems. The Masters in Information Technology (MIT) provides the knowledge, understanding and research skills to solve real-world problems with cutting-edge technology. The MIT program avails to develop deep theoretical and practical knowledge in specific areas of information technology so that MIT graduates will have the intellectual and conceptual foundation to play leading roles in the development of the information technology industry. The MIT program curriculum covers the standard core and elective Information Technology courses. In addition, the program offers several courses that provide knowledge for both research and development information technology areas. The foundation and core courses are designed to meet the graduate program requirement, and the service courses are designed to meet the need of fast changing computer technologies and their application. All graduate students are required to complete at least 59 credit hours and they may complete maximum of 62 credit hours. The program is under Institute of Science and Technology (IOST).

Objective:

The main objective of MIT program is to deliver comprehensive education in principles and practices on information technology so to provide students' depth knowledge and research skills in the information technology domain including theories, programming practices, and application of computers.

Admission Requirement:

The student entering the MIT program must have completed Bachelor of Information Technology degree offered by TU or its equivalent. Prospective student can apply for admission by submitting a completed from as required by the general rule of the university. The students for admission are selected based on the scores in the entrance test conducted by the admitting college. The program also admits students having Bachelor of Computer Science, Bachelor of Computer Science and Information Technology, Bachelor of Information Technology, Bachelor

of Engineering in Computer and Electronics, Bachelor of Information Management, Bachelor of Information Systems, Bachelor of Computer Application of their equivalent.

Evaluation:

All the courses, seminar, Literature Review Research, and Project/ Thesis should have internal weightage of 40% and external weightage of 60%. A student should secure minimum of 50% in overall weightage to pass a course. The final grade point in each course will be the sum of overall weightage of in all categories.

The Seminar, Literature Review Research, and Project/Thesis are evaluated by different evaluators. To pass these, students should secure at least 50% marks in the evaluation of each evaluator and the final grade point will be the sum of all the evaluations. For the evaluation of final presentations, an external examiner will be assigned.

Grading System:

The grade awarded to each student in each course is based on his/her overall performance through internal and external evaluations. Several evaluation criteria are used for the continuous internal evaluation. External evaluation is solely based on examination conducted by Institute of Science and Technology (IoST). The grade in each course is assigned using a letter grade that indicates the overall performance of each student in each course. The chart below represents letters with its corresponding grading scale, grade point, and performance remarks.

Letter Grade	Grading Scale	Grade Point	Performance Remarks
A	90-100	4	Distinction
A^-	80 – less than 90	3.7	Very Good
B^+	70 – less than 80	3.3	First Division
B	60 – less than 70	3	Second Division
B^-	50 – less than 60	2.7	Pass in individual subject
F	0 – less than 50	0	Fail

The performance of each student in each semester shall be evaluated in terms of Semester Grade Point Average (SGPA) which is the grade point average for the semester. SGPA is calculated as

$$SGPA=\frac{\text{Total Grade Points earned in a Semester}}{\text{Total number of credits earned in the semester}}$$

The cumulative grade point average (CGPA) is the grade point average for all completed semesters. CGPA is calculated as

$$CGPA=\frac{\text{Total Grade Points earned}}{\text{Total number of credits completed}}$$

Final Examination:

Institute of Science and Technology, Tribhuvan University, will conduct the final examination at the end of each semester for each course except Seminar, Literature review research, and Project/Thesis. The weightage of this final examination is 60% of the overall weightage.

Course Structure:

Semester I

Course Code	Course Title	Credit Hours	Full Marks
MIT501	Object Oriented Analysis and Design	3	75
MIT502	Advanced Database System	3	75
MIT503	Enterprise Applications	3	75
MIT504	Information Security	3	75
MIT505	Programming Language	3	75
Total		15	375

Semester II

Course Code	Course Title	Credit Hours	Full Marks
MIT551	Distributed and Cloud Computing	3	75
MIT552	Digital Marketing	3	75
MIT553	IT Project Management	3	75
MIT554	Intelligent Computing	3	75
MIT555	Seminar	1	25

	Elective I	3	75
Total		16	400

List of Electives:

1. Internet of Things (MIT556)
2. Data Structures and Algorithms Analysis (MIT557)
3. E-commerce and E-business (MIT558)
4. Advanced Programming (MIT559)

Semester III

Course Code	Course Title	Credit Hours	Full Marks
MIT601	Cybersecurity and Digital Forensics	3	75
MIT602	Data Anaytics and Visualization	3	75
MIT603	Digital Governance	3	75
MIT554	Term Paper	2	50
	Elective II	3	75
Total		14	350

List of Electives:

1. Digital Economy (MIT605)
2. Mobile Computing (MIT606)
3. Human Computer Interaction (MIT607)
4. Database Administration (MIT608)

Semester IV

Course Code	Course Title	Credit Hours	Full Marks
MIT651	IT Entrepreneurship and Innovation	3	75
MIT652	Thesis/Project	8	200
	Elective III	3	75
	Extra Elective	3	75
Total		14	350

List of Electives/Extra Electives:

1. Social Network Analytics (MIT653)
2. Software Testing (MIT654)
3. Network and System Administration (MIT655)
4. Web Technology (MIT656)
5. International Business (MIT657)

Object Oriented Analysis and Design

Course Title: Object Oriented Analysis and Design
Course No: MIT501
Nature of the Course: Theory + Lab
Semester: I

Full Marks: 45 + 30
Pass Marks: 22.5 + 15
Credit Hrs: 3

Course Description:
This course familiarizes students with the concepts of information systems development using object-oriented concepts. Special focus will be given to system development life cycle, development methodologies, and different phases of systems development such as analysis, design, construction, installation and operation.

Course Objectives:
By the end of this course, students will be able to use different object-oriented concepts of information systems development to develop information systems using different methodologies, tools, and techniques.

Course Contents:

Unit 1: Introduction (9 Hrs.)
Introduction; Roles and Skills of Systems Analyst; Systems Development Life Cycle; Systems Development Methodologies – Structured Design, Rapid Application Development, Object-Oriented Systems Analysis and Design, Agile Development, DevOps, Custom Methodologies; Unified Process; Unified Modeling Language; Basic Characteristics of Object-Oriented Systems

Unit 2: Analysis Modeling (18 Hrs.)
Requirements Determination: Introduction; Requirements Determination; Requirements Analysis Approaches; Requirements Gathering Techniques; Text Analysis; Requirements Definition; System Proposal

Business Process and Functional Modeling: Introduction; Business Process Modeling with Use Case Diagrams and Activity Diagrams; Business Process Identification with Use Cases and Use-Case Diagram; Business Process Documentation with Use-Case Descriptions; Verifying and Validating Business Process and Functional Models

Structural Modeling: Introduction; Structural Models; Object Identification; CRC Cards; Class Diagrams; Structural Models using CRC Cards and Class Diagrams; Verifying and Validating Structural Models

Behavioral Modeling: Introduction; Behavioral Models; Interaction Diagrams; CRUDE Analysis; Behavioral State Machines; Verifying and Validating Behavioral Models

Unit 3: Design Modeling (12 Hrs.)
Moving on to Design: Introduction; Verifying and Validating Analysis Models; Evolving Analysis Models into Design Models; Packages and Package Diagrams; Design Criteria and Strategies; Selecting Acquisition Strategy

Class and Method Design: Introduction; Object Design Activities; Constraints and Contracts; Method Specification; Verifying and Validating Class and Method Design

Data Management Layer Design: Introduction; Object Persistence Formats; Mapping Problem Domain Objects to Object Persistence Formats; Designing Data Access and Manipulation Classes; Nonfunctional Requirements and Data Management Layer Design; Verifying and Validating Data Management Layer

Human Computer Interaction Layer Design: Introduction; Principles for User Interface Design; User Interface Design Process; Navigation Design; Input and Output Design; International and Cultural Issues and User Interface Design; Nonfunctional Requirements and Human Computer Interaction Layer

Physical Architecture Layer Design: Introduction; Elements of Physical Architecture layer; Infrastructure Design; Hardware and System Software Specifications; Nonfunctional Requirements and Physical Architecture Layer Design; Verifying and Validating Physical Architecture Layer

Unit 4: Construction, Installation, and Operation (6 Hrs.)

Construction: Introduction; Managing Programming; Developing Documentation; Designing Tests

Installation and Operation: Introduction; Cultural Issues and IT Adoption; Conversion; Change Management; Post Implementation Activities

Laboratory / Project Work: Students will learn to use CASE tools and modeling tools to draw different UML and other related diagrams. They also prepare a project report that includes at least analysis, design, and implementation phases of object-oriented system analysis and design. The project can be completed using any suitable database, programming, and interfacing technologies

References:

1. Alan Dennis, Barbara Haley Wixom, and David Tegarden, Systems Analysis and Design – An Object-Oriented Approach with UML, 6th Edition, Wiley, 2021
2. Raul Sidnei Wazlawick, Object-Oriented Analysis and Design for Information Systems: Modeling with UML, OCL, and IFML, Morgan Kaufmann, 2014
3. Simon Bennett, Steve McRobb and Ray Farmer, Object-Oriented System Analysis and Design using UML, 4th Edition, McGraw-Hill, 2010
4. Joseph S. Valacich and Joey F. George, Modern Systems Analysis and Design, 9th Edition, Pearson

Advanced Database System

Course Title: Advanced Database System
Course No: MIT502
Nature of the Course: Theory + Lab
Semester: I

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:

This course introduces the advanced database concepts. The topics covered include object and object relational database, query processing and query optimization, distributed databases, NOSQL database, big data storage, big data technologies, active, temporal, spatial, multimedia, and deductive databases and information retrieval and web search.

Course Objectives:

The main objective of this course is to make students familiar with the advanced concepts of database systems so that upon completion of the course students will be able to understand and use the advanced concepts to solve problems related to the database systems.

Course Contents:

Unit 1: Object and Object-Relational Databases (5 Hrs.)
Overview of Object-Oriented concepts; Object database extension to SQL; The ODMG object model and the Object Definition Language (ODL); Object Database Conceptual Design; The Object Query Language (OQL)

Unit 2: Query Processing and Optimization (11 Hrs.)
Translating SQL Queries into Relational Algebra and Other Operators; Algorithms for External Sorting; Algorithms for SELECT Operation; Implementing the JOIN Operation; Algorithms for PROJECT and Set Operations; Implementing Aggregate Operations and Different types of JOINs; Combining Operations Using Pipelining; Parallel Algorithms for Query Processing: Operator Level, Intraquery, Interquery
Query Trees and Heuristics for Query Optimization;Choice of Query Execution Plans; Use of Selectivities in Cost-Based Optimization: Cost components for Query Execution, Catalog Information Used in Cost Functions, Histograms;Cost Functions for SELECT Operation;Cost Functions for the JOIN Operation;Additional Issues Related to Query Optimization;Query Optimization in Data Warehouses

Unit 3: Distributed Database Concepts (7 Hrs.)
Distributed Database Concepts; Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design; Overview of Concurrency Control and Recovery in Distributed Databases; Overview of Transaction Management in Distributed Databases; Query Processing and

Optimization in Distributed Databases; Types of Distributed Database Systems; Distributed Database Architectures; Distributed Catalog Management

Unit 4: NOSQL Databases and Big Data Storage Systems (6 Hrs.)

Introduction to NOSQL Systems; Characteristics of NOSQL System, Categories of NOSQL Systems, The CAP Theorem; Document-Based NOSQL Systems and MongoDB; NOSQL Key-Value Stores; Column-Based or Wide Column NOSQL Systems; NOSQL Graph Databases and Neo4j

Unit 5: Big Data Technologies Based on MapReduce and Hadoop (5 Hrs.)

Introduction to Big Data; Introduction to MapReduce and Hadoop; Hadoop Distributed File System (HDFS); MapReduce Runtime; Joins in MapReduce, Apache Hive, YARN

Unit 6: Enhanced Data Models: Introduction to Active, Temporal, Spatial, Multimedia, and Deductive Databases (5 Hrs.)

Active Database Concepts and Triggers; Temporal Database Concepts; Spatial Database Concepts; Multimedia Database Concepts; Introduction to Deductive Databases

Unit 7: Introduction to Information Retrieval and Web Search (6 Hrs.)

Information Retrieval Concepts; Retrieval Models, Types of Queries in Information Retrieval Systems; Text Preprocessing; Inverted Indexing; Evaluation Measures of Search Relevance; Web Search and Analysis; Trends in Information Retrievals

Laboratory Works

Laboratory works include implementing the concepts in above mentioned chapters using appropriate platforms.

References:

1. Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education, 7th Edition
2. Korth, Silberchatz, Sudarshan , Database System Concepts, McGraw-Hill, 7th Edition
3. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill
4. Peter Rob and Coronel, Database Systems, Design, Implementation and Management,Thomson Learning.
5. C.J. Date & Longman, Introduction to Database Systems, Pearson Education

Enterprise Application

Course Title: Enterprise Application
Course No: MIT503
Nature of the Course: Theory + Practical
Semester: I

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:
This course provides a general introduction to the concept of enterprise architecture and other relevant topics. It covers the meaning of enterprise architecture, the place and role of enterprise architecture in the overall organizational context, key constituting elements and core mechanisms of an EA practice, as well as the business value and benefits of using enterprise architecture in organizations. It focuses specifically on EA artifacts as the core elements of an EA practice.

Course Objectives:
The main objective of this course is to give an overall and complete understanding of Enterprise architecture and its best practices.

Course Contents:

Unit 1: Introduction (4 Hrs.)
The Role of Information Technology in Modern Organizations, Benefits and threats of IT in organization, Business Value of IT, Business and IT alignment problem and solutions

Unit 2: Enterprise Application Architecture (10 Hrs.)
Concepts of enterprise architecture, Roles and practice of enterprise architecture, Architecture Functions in Organizations, Historical origin and best modern practices, Enterprise Architecture Practice as City Planning, Enterprise Architecture Artifacts, The CSVLOD Model

Unit 3: Process of Enterprise Architecture (10 Hrs.)
The Dialog between Business and IT, Enterprise Architecture Uncertainty Principle, Processes Constituting Enterprise Architecture Practice, A High-Level Process View of Enterprise Architecture Practice

Unit 4: The CSVLOD Model of Enterprise Architecture (15 Hrs.)
Dimensions for Classifying Enterprise Architecture Artifacts, Considerations as a General Type of Enterprise Architecture Artifacts, Standards as a General Type of Enterprise Architecture Artifacts, Visions as a General Type of Enterprise Architecture Artifacts, Landscapes as a General Type of Enterprise Architecture Artifacts, Outlines as a General Type of Enterprise Architecture Artifacts, Designs as a General Type of Enterprise Architecture Artifacts, Continuous Nature of the CSVLOD Taxonomy for EA Artifacts

Unit 5: Enterprise Architecture Practices (6 Hrs.)
Architects in Enterprise Architecture Practice, Roles and Structure of Architecture Functions in Organizations, Modeling Languages for Enterprise Architecture, Establishing Enterprise Architecture Practices in Organizations, Maturity of Enterprise Architecture Practice

Laboratory Works:
Students are required to prepare a case study for any of the recent enterprise application framework used in an organization.

References:
1. Svyatoslav Kotusev - The Practice of Enterprise Architecture, A Modern Approach to Business and IT Alignment-SK Publishing (2021)

Information Security

Course Title: Information Security
Course No: MIT504
Nature of the Course: Theory + Lab
Semester: I

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:

This course introduces the concepts of information security. The topics covered include information security, cryptosystem, message authentication, digital signature, database and data center security, denial of service attack, intrusion detection, security administration, and digital forensics.

Course Objectives:

The main objective of this course is to make students familiar with the concepts of information security so that upon completion of the course students will be able to understand and use the best practices for securing information and computer systems.

Course Contents:

Unit 1: Information Systems Security (4 Hrs.)

Information Systems Security, Tenets of Information Systems Security, Domains of IT Infrastructures, IT Security Policy Framework, Data Classification Standards

Unit 2: Private and Public Cryptosystem (8 Hrs.)

Block Ciphers, AES, IDEA, Stream Ciphers, RC4, Stream Cipher using Feedback Shift Registers, ElGamal, Elliptic Curve Cryptography, Format Preserving Encryption, Overview of Homomorphic Encryption, Lightweight Cryptography and Post Quantum Cryptography

Unit 3: Message Authentication Codes and Digital Signature (8 Hrs.)

Message Authentication Code, HMAC, Data Authentication Algorithm, Cipher Based MAC, Digital Signature, ElGamal Digital Signature Scheme, Schnorr Digital Signature Scheme, Digital Signarture Algorithm, Elliptic Curve Digital Signature Algorithm, RSA-PSS Digital Signature Algorithm

Unit 4: Database and Data Center Security (4 Hrs.)

Database Security, SQL Injection Attacks, Database Access Control, Inference, Database Encryption, Data Center Security

Unit 5: Denial of Service Attacks (6 Hrs.)

Denial Service Attacks, Flooding Attacks, Distributed Denial Service Attacks, Application Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defensing Against Denial Service Attacks, Responding to Denial Service Attacks

Unit 6: Intrusion Detection and Prevention (6 Hrs.)

Intruders, Intrusion Detection, Intrusion Detection Analysis Approaches, Host-Based Intrusion Detection, Network-Based Intrusion Detection, Hybrid Intrusion Detection, Intrusion Detection Exchange Format, Honeypots, Intrusion Prevention System

Unit 7: Security Operations and Administrations (5 Hrs.)

Security Administration, Compliance, Professional Ethics, Infrastructure for IT Security Policy, Data Classification Standards, Configuration Management, Change Management Process, Application Software Security, Software Development and Security

Unit 8: Digital Forensics (4 Hrs.)

Digital Forensics, Computer Crime, Forensic Methods and Lab, Collecting, Seizing and Protecting Evidence, Recovering Data, Operating System Forensics, Mobile Forensics

Laboratory Works:

Laboratory works include implementing and simulating the concepts in above mentioned chapters using appropriate platforms and tools

References:

1. David Kim, Michael G. Solomon, Fundamentals of Information Systems Security, 4th Edition, Jones & Bartlett Learning
2. William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson
3. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, 4th Edition, Pearson

Programming Language

Course Title: Programming Language
Course No: MIT505
Nature of the Course: Theory + Practical
Semester: I

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:
This course covers basics and of procedural and object oriented aspects of python programming language and also covers detailed discussion on using various libraries their applications in various data processing tasks.

Course Objectives:
The main objective of this course is to provide knowledge of procedural and object oriented programming using python programming and apply it in data processing tasks.

Course Contents:

Unit 1: Procedural Python (12 Hrs.)
Tokens, Reserved Words, Identifier, Data types, variables and Constants, Literals, Operators, Operator Precedence, Escape sequences, Numbers, Comments, Control Flow: Conditional statements, Ternary operator, Loops, Jump statements. Functions: Defining and Calling Functions, Passing Arguments, Returning values, Global and Local variables, Recursive functions, anonymous functions, Lambda expressions. Strings: String Functions, String Concatenation, String operations, String slicing, string formatters; Working with Lists, Tuples, Sets, and Dictionaries; Functions, methods, and operations of each data structure

Unit 2: Object Oriented Python (10 Hrs.)
Class, Object, constrictors, access modifiers, static methods, method overloading, operator overloading, inheritance, method overriding, abstract classes; Enumerations, Exception Handling, File Handling, Regular Expressions

Unit 3: Libraries (10 Hrs.)
NumPy: NumPy Basics, Array and vectorized processing, operations between arrays and scalars, slicing and indexing, multi-dimensional array, data processing with arrays, array object, array functions, File input and output with arrays, Linear Algebra with arrays, random number generation; Pandas: Pandas Data structure, Essential Functionalities, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing; Matplotlib: Introduction, Plotting Functions in pandas, Plotting Maps, Python Visualization Tool Ecosystem

Unit 4: Data Processing (13 Hrs.)
Data Loading, Storage, and File Formats: Reading and Writing Data in Text Format, Reading and Writing Data in Text Format, Binary Data Formats, Interacting with HTML and Web APIs, Interacting with Databases; Data Wrangling: Combining and Merging Data Sets, Reshaping and Pivoting, Data Transformation; Data Aggregation and Group Operations: GroupBy Mechanics, Data Aggregation, Group-wise operations and Transformations, Pivot Tables and Cross-Tabulation
Laboratory Works:

Students need to write python programs using procedural as well as object oriented approach. Besides, they need to use various libraries discussed in the class and solve various data processing problems

References:

1. AMZ Press, Python Programming for Beginners: The Ultimate Guide for Beginners to Learn Python Programming: Crash Course on Python Programming for Beginners, Independently published, First Edition, 2022
2. Abhishek Singh, Master Python Programming: Learn Python like Never Before, independently published, First Edition, 2022
3. William McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2 ,Reilly Media'O nd Edition, 2017
4. Daniel Zingaro, Learn to Code by Solving Problems: A Python Programming Primer, No Starch Press, First Edition, 2021
5. Codeone Publishing, Python Programming for Beginners: The #1 Python Programming Crash Course to Learn Python Coding Well and Fast (with Hands-On Exercises), First Edition, 2022

Distributed and Cloud Computing

Course Title: Distributed and Cloud Computing **Full Marks:** 45+30
Course No: MIT551 **Pass Marks:** 22.5+15
Nature of the Course: Theory + Lab **Credit Hrs:** 3
Semester: II

Course Description:
The course introduces the concepts of distributed and cloud computing including cloud computing, cloud service models, parallel and distributed computing, cloud networks, cloud resource management and scheduling, concurrency in cloud and emerging concepts in cloud.

Course Objectives:
The main objective of this course is to make students familiar with the concepts of distributed and cloud computing so that upon completion of the course students will be able to use and develop the distributed and cloud computing models.

Course Contents:

Unit 1: Introduction (4 Hrs.)
Cloud Computing, Impact of Cloud Computing, Ethical Issues in Cloud Computing, Factors affecting Cloud Computing Service Availability, Network Centric Computing and Network Centric Content, Virtualization and Cloud Computing, Types of Virtualization

Unit 2: Cloud Ecosystem (6 Hrs.)
Cloud Computing Delivery Models and Services, AWS, Google Clouds, Azure, IBM Clouds, Cloud Storage Diversity and Vendor Lock-In, Cloud Interoperability, Service and Compliance Level Agreements, User Challenges and Experience, Challenges in Cloud Computing

Unit 3: Parallel and Distributed Computing (5 Hrs.)
Introduction to Parallel and Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing

Unit 4: Cloud Access and Cloud Interconnection Networks (9 Hrs.)
Packet Switched Network and Internet, TCP Congestion Control, Content Centric Network, Software Defined Networks, Interconnection Networks for Computer Clouds, Multistage Interconnection Networks, Storage Area Networks and Fiber Channel, Scalable Data Center Communication Architectures, Network Resource Management Algorithms (Fair Queuing, Class-Based Queuing), Content Delivery Networks, Vehicular Ad Hoc Networks

Unit 5: Cloud Resource Management and Scheduling (10 Hrs.)
Policies and Mechanisms for Resource Management, Scheduling Algorithms for Computer Clouds, Delay Scheduling, Data-Aware Scheduling, Apache Capacity Scheduler, Start-Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Resource Bundling and Combinatorial Auctions for Cloud Resources, Resource Management and Dynamic Application Scaling, Control Theory and Optimal Resource Management, Two Level Resource Allocation

Architecture, Feedback Control on Dynamic Thresholds, Autonomic Performance Managers, Utility Model for Cloud-Based Web Services

Unit 6: Concurrency and Cloud Computing (8 Hrs.)
Concurrency, Communication and Concurrency, Computational Models, Communicating Sequential Processes, Bulk Synchronous Parallel Model, Model for Multicore Computing, Modeling Concurrency with Petri Nets, Process State, Communication Protocols and Process Coordination, Logical Clocks and Message Delivery Rules, Runs and Cuts, Threads and Activity Coordination, Critical Sections, Locks, Deadlocks, Atomic Actions, Consensus Protocol, Load Balancing

Unit 7: Emerging Clouds (3 Hrs.)
Machine Learning on Clouds, Quantum Computing on Clouds, Vehicular Clouds

Laboratory Works:
The laboratory work should include the implementation and simulation of the concepts in above mentioned units using appropriate platforms and tools.

References:

1. Dan C. Marinescu, Cloud Computing Theory and Practice, 3rd Edition, Morgan Kaufmann Publishers, 2022
2. Raj Kumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing Foundations and Applications Programming, Morgan Kaufmann Publishers

Digital Marketing

Course Title: Digital Marketing
Course No: MIT552
Nature of the Course: Theory + Practical
Semester: II

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:
This course introduces the concepts of digital marketing. The course contains concepts and structures of digital marketing types, tools and analytical aspect digital marketing. This course also highlights various types different digital marketing metrics.

Course Objectives:
Upon completion of the course, students should be able to:

1. Understand concepts of digital marketing and differentiate it from traditional marketing
2. Plan and execute digital marketing strategies in real world scenarios
3. Use various method of digital marketing effectively for real world scenarios
4. Understand concept of lead generation and lead funnel

Course Contents:

Unit 1: Introduction to Digital Marketing (2 Hrs.)
Defining digital marketing, traditional marketing vs. digital marketing, relevance of digital marketing, the 3i principle

Unit 2: Search Engine Marketing and Optimization (12 Hrs.)
Techniques to generate website traffic, Techniques used to increase the visibility of webpage on Google search resultpage (SERP), Positioning in SERP, On-page optimization, Off-page optimization, Pay per click, Google AdWords

Unit 3: Social Media Marketing (10 Hrs.)
Types, forms and stakeholders of SMM, Understanding the right fit, various SMM Strategies, Analysis of social media

Unit 4: Web Analytics (6 Hrs.)
Analyzing the behavior of visitors to a website through reports based on traffic sources, referring sites, page views, and conversion rates of that website, Google Analytics concept, setup, monitoring and analyzing

Unit 5: Email Marketing (4 Hrs.)
Email marketing process, Design and contents, Delivery and Discovery of email marketing

Unit 6: Strategy and Planning (4 Hrs.)
Digital marketing plan and structure, Identification of tools and audience, defining objectives and activities, Analysis and ROI

Unit 8: Content Marketing (5 Hrs.)
Definition, history, and need of content marketing, Business model and cases of content marketing, Epic content marketing

Unit 7: Affiliate Marketing (2 Hrs.)
Concepts and examples of affiliate marketing

Laboratory Works:
Lab works includes on page and off page optimization of a particular website using various tools, hands on sessions of social media marketing with lead generation and ppc and google analytics setup, monitoring and analysis.

References:

1. Ian Dodson - The art of digital marketing the definitive guide to creating strategic, targeted and measurable online campaigns (2016), Wiley
2. Russ Henneberry& Ryan Deiss, Digital Marketing for Dummies, 2nd Edition, John Wiley & Sons, Inc.
3. Pulizzi, Joe, Epic content marketinghow to tell a different story, break through the clutter, and win more customers by marketing less-McGraw-Hill Education (2014)

IT Project Management

Course Title: IT Project Management
Course No: MIT553
Nature of the Course: Theory + Lab
Semester: II

Full Marks: 45 + 30
Pass Marks: 22.5 + 15
Credit Hrs: 3

Course Description:
This course familiarizes students with the concepts of managing IT projects in a systemic manner using various project management concepts. This course focuses on evaluation, estimation, planning, risk management, managing people, managing contract and quality.

Course Objectives:
By the end of this course, students will be able to use various project management skills while developing IT projects. They will also be able to manage stakeholders and maintain quality of the project.

Course Contents:

Unit 1: Introduction to Software Project Management (4 Hrs.)
Introduction; Why is Software Project Management Important; What is a Project; Software Projects versus Other Types of Project; Contract Management and Technical Project Management; Activities Covered by Software Project Management; Plans, Methods and Methodologies; Some Ways of Categorizing Software Projects; Stakeholders; Setting Objectives; Project Success and Failure; What is Management; Management Control; Traditional versus Modern Project Management Practices

Unit 2: Project Evaluation and Program Management (5Hrs.)
Introduction; Project Portfolio Management; Evaluation of Individual Projects; Cost–benefit Evaluation Techniques; Risk Evaluation; Program Management; Managing the Allocation of Resources within Program; Strategic Program Management

Unit 3: An Overview of Project Planning and modern project approaches (3 Hrs.)
Introduction; Detail steps of Project Planning; Agile Methods; Extreme Programming (XP); Scrum; Managing Iterative Processes

Unit 4: Software Effort Estimation (5 Hrs.)
Introduction; Where are Estimates Done; Problems with Over- and Under-Estimates; the Basis for Software Estimating; Software Effort Estimation Techniques; Bottom-up Estimating; The Top-down Approach and Parametric Models; Expert Judgement; Estimating by Analogy; Function Points Mark II; COSMIC Full Function Points; COCOMO II: A Parametric Productivity Model; Cost Estimation

Unit 5: Activity Planning (5 Hrs.)
Introduction; Planning Objectives and timing; Project Schedules; Projects and Activities; Sequencing and Scheduling Activities; Network Planning Models; Formulating a Network Model; Adding the Time Dimension; The Forward Pass; The Backward Pass; Identifying the Critical Path;

Activity Float; Shortening the Project Duration; Identifying Critical Activities; Activity-on-Arrow Networks

Unit 6: Risk Management (5 Hrs.)
Introduction; Categories of Risk; A Framework for Dealing with Risk; Risk Identification; Risk Assessment; Risk Planning; Risk Management; Evaluating Risks to the Schedule; Applying the PERT Technique; Monte Carlo Simulation; Critical Chain Concepts

Unit 7: Resource Allocation (4 Hrs.)
Introduction; Identifying and Scheduling Resources; Publishing the Resource Schedule; The Scheduling Sequence

Unit 8: Monitoring and Control (4 Hrs.)
Introduction; Creating the Framework; Collecting the Data; Visualizing Progress; Earned Value Analysis ; Change Control; Software Configuration Management

Unit 9: Managing Contracts (3 Hrs.)
Introduction; Types of Contract; Stages in Contract Placement; Typical Terms of a Contract; Contract Management

Unit 10: Managing People in Software Environments and working in teams (4 Hrs.)
Introduction; The Oldham–Hackman Job Characteristics Model; Becoming a Team; Decision Making; Organization and Team Structures; Coordination Dependencies; Dispersed and Virtual Teams; Communication Genres; Communication Plans; Leadership

Unit 11: Software Quality (3 Hrs.)
Introduction; The Place and importance of Software Quality; Product and Process Metrics with respect to project management; Quality Management Systems; Process Capability Models

Laboratory / Project Work:
Students should be able to use different CASE tools regarding project management focusing on work breakdown structure, resource break down structure, estimation, software configuration management. The students should prepare a report on a case study focusing on cost benefit analysis, earned value analysis, risk analysis

References:

1. Software Project Management 5 edition; Tata McGraw Hill Education Private Limited; Bob Hughes, Mike Cotterell, Rajib Mall
2. Introduction to Software Project Management & Quality Assurance, Darrel Ince, I. Sharp, M. Woodman, Tata McGraw Hill
3. Software Project Management: A Unified Framework, Walker Royce, Addison-Wesley, An Imprint of Pearson Education

Intelligent Computing

Course Title: Intelligent Computing
Course No: MIT 554
Nature of the Course: Theory + Lab
Semester: II

Full Marks: 45 + 30
Pass Marks: 22.5 + 15
Credit Hrs: 3

Course Description:
This course covers different concepts related with computational linguistics that can be applied for machine learning. The course will focus on the main computational intelligence approaches and methodologies, namely artificial neural networks, genetic algorithms, swarm optimization, and fuzzy systems.

Course Objectives:
The main objective of this course is to provide fundamental knowledge on the concept of computational intelligence.

Unit 1: Introduction to Computational Intelligence (2 Hrs.)
Intelligent System, Computational Intelligence, Computational Intelligence Paradigms (ANN, Evolutionary Computation, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems)

Unit 2: Neural Network (5Hrs.)
Single Layer Neural Network: Introduction to neural network, Rosenblatt's neuron, Perceptron training algorithm, Perceptron convergence algorithm, Activation functions; Multi-Layer Neural Network and Backpropagation: Universal approximation theory, Backpropagation training algorithm, Batch learning and online learning, Cross – validation and generalization; Radial Basis Function Networks: Definition and examples, Radial basis function, The interpolation problem, Training algorithm, Radial basis function network variations, Kernel regression

Unit 3: Fuzzy Logic (10 Hrs.)
Basic Fuzzy Set Theory: Introduction, Natural language and formal models, Fuzzy sets, Interpretation of Fuzzy sets, Representation of Fuzzy sets, Fuzzy logic, Operations on Fuzzy sets, Alpha cuts, The decomposition theory, The extension principle, Compensatory operators; Fuzzy Relations: Introduction, Fuzzy relation and propositions, Crisp relations, Fuzzy logic inference, Fuzzy logic for real valued inputs; Fuzzy Data Analysis: Fuzzy methods in data analysis, Fuzzy clustering (Fuzzy c-Means), Fuzzy classifiers (Fuzzy k-Nearest neighbors); Fuzzy Measures and Fuzzy Integrals: Fuzzy measures, Fuzzy integrals, Training the fuzzy integrals

Unit 4: Evolutionary Computation (8 Hrs.)
Introduction to Evolutionary Computation: Generic evolutionary algorithms, Biological evolution, Simulated evolution, Representation – The chromosome, Initial population, Fitness function, Selection (Selective pressure, Random selection, Proportional selection, Tournament selection, Rank based selection, Boltzmann selection, Elitism, Hall of fame), Reproduction operators, Stopping conditions; Evolutionary Optimization: Global numerical optimization, Combinatorial optimization, Constraint handling approaches, Multi objective optimization, Dynamic and noisy environments, Niching, Strategy parameters and Self-adaptation; Elements of Evolutionary

Algorithms: Encoding of solution candidates (Hamming cliffs, Epistasis, Closedness of the search space), Genetic operators

Unit 5: Computational Swarm Intelligence (9 Hrs.)

5.1Particle Swarm Optimization: Basic principles of computational swarm intelligence, Particle swarm optimization (Influence of the parameters, Turbulence factor, Boundary handling, Global best and local best PSO), Social network structures, Basic variations (Velocity clamping, Inertia weight, Construction coefficient, Synchronous vs. Asynchronous updates, Velocity models)

5.2 Single Solution Particle Swarm Optimization: Guaranteed convergence PSO, Social based PSO, Hybrid algorithm, Sub swarm based PSO, Multi start PSO algorithm, Repelling models, Binary PSO, Multi-objective PSO

Unit 6: Deep Learning (11Hrs.)

Basic Idea: Introduction to Deep Learning, Common architectural principles of Deep Networks (Parameters, Layers, Activation functions, Loss functions, Optimization algorithm, Hyper parameters); Major Architectures of Deep Networks: Generative Adversarial Networks, Convolutional Neural Network (CNN Architecture, Input layers, Convolution layers, Pooling layers, Fully connected layers), Recurrent Neural Network (RNN architecture, Modeling the time dimension, LSTM networks); Transformers: Encoder decoder architecture, Issues with RNN encoder decoder, Attention mechanism

Laboratory Works:

Students should implement different concepts of computational intelligence models studied in each unit of the course during lab time and should submit a small model at the end of the course.

References:

1. Andries P. Engelbrecht, Computational Intelligence, An Introduction, Second Edition, WILEY, 2007
2. James M. Keller, Derong Liu, David B. Fogel, Fundamentals of Computational Intelligence, WILEY, 2016
3. Rudolf Kruse, Christian Borgelt, Christian Braune, Sanaz Mostaghim, Matthias Steinbrecher, Computational Intelligence, A Methodological Introduction, Second Edition, Springer, 2016
4. Deep Learning: A Practitioner's Approach, O'Reilly, Josh Patterson and Adam Gibson, 2017

Internet of Things

Course Title: Internet of Thing
Course No: MIT 556
Nature of the Course: Theory + Lab
Semester: II

Full Marks: 45 + 30
Pass Marks: 22.5 + 15
Credit Hrs: 3

Course Description:
This course covers the state of the art in communication, networking and data collection technologies for the IoT. This course focuses on the design of IoT-based solutions for multi-discipline challenges. The course consists of lectures on the fundamental building blocks and protocols in IoT.

Course Objectives:
The main objective of this course is to provide the students with the advanced competitive skills required to contribute to the development of the IoT.

Course Contents:

Unit 1: Introduction to Internet of Things (8 Hrs.)
Introduction, Definition and characteristics of IoT, Physical design of IoT (Things in IoT, IoT Protocols), Logical design of IoT (IoT functional blocks, IoT communication models, IoT communication APIs), IoT enabling technologies, IoT levels and deployment templates

Unit 2: IoT Design Methodology (8 Hrs.)
Purpose and requirement specification, Process specification, Domain model specification, Information model specification, Service specification, IoT level specification, Functional view specification, Operational view specification, Device and system integration, Application development,

Unit 3: IoT Sensing and Actuation (9 Hrs.)
Sensors, Characteristics of sensor, Sensors deviations, Sensing types (Scalar, multimedia, hybrid, virtual), Actuators, Actuator types (Hydraulic, Pneumatic, Electric, Thermal, Mechanical, Soft), Actuator characteristics

Unit 4: IoT Processing Topologies and Types (7 Hrs.)
Data format, Processing topologies, IoT Device design and selection considerations, processing offloading (Offload location, Offload decision making, Offloading considerations), IoT connectivity technologies

Unit 5: IoT Communication Technologies (6 Hrs.)
Introduction, Infrastructure protocols, Discovery protocols, Data protocols, Identification protocol, Device management, Semantics protocols

Unit 6: IoT Analytics (7 Hrs.)
Introduction, KNN, Decision tree, Random forest, K-Means, Agglomerative clustering, DBSCAN, Performance metrics

References:

1. Internet of Things: A Hands-On Approach, Arshadeep Bahga, Vijay Madisetti, 2014
2. Introduction to IoT, Cambridge University Press, Sudip Mishra, Anandarup Mukherjee, Arijit Roy, 2021

Data Structure and Algorithms Analysis

Course Title: Data Structure and Algorithms Analysis
Course No: MIT557
Nature of the Course: Theory + Lab
Semester: II

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:
This course includes the basic foundations in of data structures and algorithms with its analysis. This course covers the review of various data structures like stack, queue, list, tree, graphs. Moreover, it focuses on analysis of the algorithm as well as different optimization paradigms and parallel algorithm.

Course Objectives:
The purpose of this course is to give basic concept of data structure and present the depth in optimization paradigms. Some advance algorithm design techniques and moderate level understanding in computational complexity theory.

Course Contents:

Unit 1: Data Structure (4 Hrs.)
Elementary Data Structure: Abstract data type, Basic operation on stack, queue and linked list; Height Balanced Tree: AVL trees, Red – Black trees

Unit 2: Foundation of Algorithm Analysis (5 Hrs.)
Algorithm and its properties**:** RAM model, Time and Space Complexity, detailed analysis of algorithms (Like factorial algorithm), Concept of Aggregate Analysis; Asymptotic Notations: Big-O, Big-Ω and Big-Θ Notations their Geometrical Interpretation and Examples; Recurrences: Recursive Algorithms and Recurrence Relations, Solving Recurrences (Recursion Tree Method, Substitution Method, Application of Masters Theorem)

Unit 3: Iterative Algorithms (3 Hrs.)
Searching Algorithms: Sequential Search and its analysis; Sorting Algorithms: Bubble, Selection, and Insertion Sort and their Analysis

Unit 4: Divide and Conquer Algorithms (6 Hrs.)
Searching Algorithms: Binary Search, Min-Max Finding and their Analysis; Sorting Algorithms: Merge Sort and Analysis, Quick Sort and Analysis (Best Case, Worst Case and Average Case), Heap Sort (Heapify, Build Heap and Heap Sort Algorithms and their Analysis), Randomized Quick sort and its Analysis; Multiplication of Large integers

Unit 5: Greedy Paradigm (7 Hrs.)
Optimization Problems and Optimal Solution**,** Introduction of Greedy Algorithms, Elements of Greedy Strategy, Fractional Knapsack, Job sequencing with Deadlines, Kruskal's Algorithm, Prims Algorithm, Dijkstra's Algorithm and their Analysis, Huffman Coding: Purpose of Huffman Coding, Prefix Codes, Huffman Coding Algorithm and its Analysis

Unit 6: Dynamic Paradigm (7 Hrs.)

Greedy Algorithms vs Dynamic Programming, DP Algorithms: Computing binomial coefficient, Matrix Chain Multiplication, String Editing, Zero-One Knapsack Problem, Optimal binary search tree, Floyd Warshshall Algorithm, Travelling Salesman Problem and their Analysis

Unit 7: Backtracking (2 Hrs.)

Concept of Backtracking, Recursion vs Backtracking, Backtracking Algorithms: Subset-sum Problem, Zero-one Knapsack Problem, N-queen Problem and their Analysis

Unit 8: Branch and Bound (2 Hrs.)

Assignment problem, Knapsack problem, Travelling salesman problem

Unit 9: Introduction to Parallel Algorithms (8 Hrs.)

Parallel processing paradigms: Semantics of concurrent programming (Axiomatic, Denotational, Operational); PRAM models: PRAM Algorithms (Computing prefix sum, Parallel sorting algorithm); Parallel graph algorithms: Tree graph algorithm (computing post order numbering, computing the number of descendants, level computation, Lowest Common Ancestor computation

Unit 10: NP Completeness (2 Hrs.)

Complexity classes (P, NP, NP Complete, NP Hard), Problem reducibility, Approximation algorithm: Vertex cover algorithm

Laboratory Works:

Students should implement the algorithms and analyze their behavior, with respect to time as well as memory.

References:

1 Y. Langsam, M. J. Augenstein and A. M Tenenbaum, "Data Structures using C and C++", PHI, 2nd Edition

2 T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, "Introduction to Algorithms", PHI, 3rd Edition

E-Commerce and E-Business

Course Title: E-Commerce and E-Business **Full Marks:** 45+30
Course No: MIT558 **Pass Marks:** 22.5+15
Nature of the Course: Theory + Practical **Credit Hrs:** 3
Semester: II

Course Description:
The course introduces the fundamentals and infrastructure of e-Commerce and e-Business to familiarize students with related new technology development. The tentative topics include but are not limited to Internet business models, e-commerce infrastructure, e-Payment system, e-SCM, e-CRM, and e-Procurement

Course Objectives:
Students are expected to understand recent developments in e-Business and be able to employ e-Business strategically to enhance business processes. Students will be able apply skills and knowledge in planning, designing and restructuring of business using digital tools

Course Contents:

Unit 1: Introduction to digital business and e-commerce (6 Hrs.)
Introduction, The impact of electronic communications on traditional businesses, difference between digital business and e-commerce, Digital business opportunities, Risks and barriers to digital business adoption, Barriers to consumer Internet adoption

Unit 2: Marketplace analysis for e-commerce (5 Hrs.)
Introduction, Business and revenue models for e-commerce, online marketplace analysis, Location of trading in the marketplace, Business models for e-commerce, online start-up companies.

Unit 3: Managing digital business infrastructure (6 Hrs.)
Introduction, Digital business infrastructure components, introduction to Internet technology, Management issues in creating a new customer-facing digital service, Focus on Web services, SaaS, cloud computing and service-oriented architecture (SOA), Managing internal digital communications through intranets and extranets, Web presentation and data exchange standards, Internet governance

Unit 4: E-environment (4 Hrs.)
Introduction, Social and legal factors, Environmental and green issues related to Internet usage, E-government, Technological innovation and technology assessment

Unit 5: Digital business strategy (6 Hrs.)
Introduction, digital business strategy, Strategic analysis, Strategic objectives, Strategy definition, Strategy implementation, Aligning and impacting digital business strategies

Unit 6: Supply chain management (6 Hrs.)
Introduction, Supply Chain management, Value chain, Options for restructuring the supply chain, Using digital business to restructure the supply chain, Supply chain management implementation, Goal-setting and performance management for e-SCM

Unit 7: E-procurement (6 Hrs.)
Introduction, e-procurement, drivers of e-procurement, Estimating e-procurement costs, Barriers and risks of e-procurement adoption, Implementing e-procurement, B2B marketplaces, future of e-procurement

Unit 8: Customer relationship management (6 Hrs.)
Introduction, e-CRM, Conversion marketing, Online buying process, Customer acquisition management, Marketing communications for customer acquisition including search engine marketing, online PR, online partnerships, interactive advertising, email marketing, and social media marketing, Social media and social CRM strategy, Customer retention management, Excelling in e-commerce service quality, Customer extension, Technology solutions for CRM

Laboratory Works:
Student should design and construct e-Commerce and e-Business applications and mobile applications using tools of their interest

References:

1. Dave Chaffey, Tanya Hemphill, David Edmundson-Bird, Digital Business and E-Commerce Management, Pearson; 7th edition, 2019.
2. Kenneth Laudon and Jane Laudon, E-Commerce 2019: Business, Technology and Society, Pearson Education, 15th Edition, 2019.
3. Schneider, Gary, Electronic Commerce, 12thEdition, Cengage Learning, 2016.
4. Strauss, Judy and Frost, Raymond D., E-Marketing, 8th Edition, Routledge, 2018.Turban, E., Outland, J., King, D., Lee, J. K., Liang, T. P., and Turban, D. C., Electronic Commerce 2018: A Managerial and Social Networks Perspective, 9th Edition, Springer,2018.

Advanced Programming

Course Title: Advanced Programming
Course No: MIT559
Nature of the Course: Theory + Practical
Semester: II

Full Marks: 45+30
Pass Marks: 22.5+15
Credit Hrs: 3

Course Description:
This course covers data processing, inferential statistics, data visualization, machine learning, text mining, and big data processing using with python.

Course Objectives:
The main objective of this course is to enable student to write python programs related to data science and data visualization.

Course Contents:

Unit 1: Data Processing and Inferential Statistics (12 Hrs.)
Review of NumPy Arrays, data analysis with Pandas, Data Cleansing, Data Operations, Various forms of distribution, z-score, p-value, One-tailed and two-tailed tests, Type 1 and Type 2 errors, confidence interval, Correlation, Z-test vs T-test, F distribution, chi-square distribution,Chi-square for the goodness of fit, The chi-square test of independence, ANOVA

Unit 2: Data Mining and Data Visualization (10 Hrs.)
Data mining, Presenting an analysis, Studying the Titanic, Controlling the line properties of a chart, Creating multiple plots, Playing with text, Styling your plots, Box plots, Heatmaps, Scatter plots with histograms, scatter plot matrix, Area plots, Bubble charts, Hexagon bin plots, Trellis plots, 3D plot of a surface

Unit 3: Python for Intelligence (14 Hrs.)
Different types of machine learning, Decision trees, Linear regression, Logistic regression, naive Bayes classifier, k-means clustering, Hierarchical clustering, Performing Predictions with a Linear Regression, Estimating the Likelihood of Events using Logistic regression, Generating Recommendations withCollaborative Filtering, Making Prediction with Ensemble Methods, Applying Segmentation with k-means Clustering

Unit 4: Python for Text Mining and Big Data (9 Hrs.)
Preprocessing data, Creating a wordcloud, Word and sentence tokenization, Parts of speech tagging, Stemming and lemmatization, The Stanford Named Entity Recognizer, Performing sentiment analysis on world leaders using Twitter, Hadoop, Python MapReduce, File handling with Hadoopy, Pig, Python with Apache Spark

Laboratory Works:
Students need to write python programs to illustrate inferential statistics, data visualization, machine learning algorithms, text mining, and big data processing

References:

1. Samir Madhavan, Mastering Python for Data Science: Explore the world of data science through Python and learn how to make sense of data, Ingram short title, First Edition, 2015
2. Sebastian Raschka Vahid Mirjalili, Python Machine Learning: Machine Learning and Deep Learning with Python, Ingram short title, Second Edition, 2017
3. Alberto Artasanchez and Prateek Joshi, Artificial Intelligence with Python: Your complete guide to building intelligent apps using Python 3.x, Packt Publishing Limited, Second Edition 2020

Seminar

Course Title: Seminar
Course No: MIT555
Nature of the Course: Seminar
Semester: II

Full Marks: 25
Pass Marks: 12.5
Credit Hrs: 1

Course Description: The seminar is of full marks 25 offered in the curriculum of the MIT first year first semester. A student pursuing the seminar prepares a seminar report and presents the seminar in the department. Once accepted by the department, the students have to submit the final copy of the report.

Introduction:
Each student is required to write a comprehensive report about the seminar. The report should consist of 5 to 10 pages describing the topic selected. Students can choose the seminar topics of their relevant subject area. The students are suggested to select the research oriented topics rather than just informative ones. The report should be in the format as described below;

Arrangement of Contents:
The sequence in which the seminar report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Abstract
3. Chapters:
    a. Introduction
    b. Previous Works, Discussions and Findings
    c. Conclusion
4. References

Format of References
1. References

A list of all publications (articles, texts, monographs, etc.) must be supplied as the last section of the paper. Each article or paper used must be listed alphabetically by last name of the author and the list must be numbered sequentially. The following are examples of the format for various types of entries in the list.

Journal: Stalling, W., RSA and its computational aspects, *Infoworld*, 12, 28 (Jul. 2012)**,** 42-49.

Book: Bishop, M. and Boneh, D., *Elements of Computer Security*, Pearson Education., 2009.

Proceedings: Shamir, A., Controlling attacks on public key cryptography. *Proceedings of OOPSLA 86* (Sept. 1986., Portland), 405-416.

Articles Which Have Established Citation Pages at ACM (Electronically published articles): Smith, J., An algorithm for the traveling salesman problem, *Journal of the ACM* 54 (June 2011), 234-245. (http://www.acm.org/jacm/2011/SmithtspAlgo/)

2. Citations

Whenever material from a publication is used in the paper it must be followed by a citation which is simply the number of the reference in the list of references enclosed in square brackets (for example, a reference to the third article listed in the list of references would contain the citation [3].) Multiple citation numbers can be incorporated within one citation when required (for example, references to the fourth, eighth, and eleventh entries in the reference list would appear as [4, 8, 11]).

Text of the seminar paper format:

1. The paper can be prepared using a word processor or LATEX. The students are highly recommended to use LATEX.
2. Margins - All margins must be one inch.
3. The text must be spaced by 1.5.
4. The text must be typed in 12 point font. The text must be typed in Times New Roman font.