

# MGM University

## Vision

- To ensure sustainable human development which encourages self-reliant and self-content society.
- To promote activities related to community services, social welfare and also Indian heritage and culture.
- To inculcate the culture of non-violence and truthfulness through vipassanna meditation and Gandhian Philosophy.
- To develop the culture of simple living and high thinking

## Mission

- To impart state of art education and technical expertise to students and give necessary training to teachers to create self-reliant society for future.
- To encourage students to participate in Indian and International activities in sports, literature, etc. so that future generation becomes base for free and liberal society
- To educate students in areas like Management, Finance, Human relations to inculcate philosophy of simple living and high thinking value of simple economic society.
- To inculcate culture of non-violence and truthfulness through Vipassana.

To sustain activities of Indian culture (viz. classical dance, music and fine arts) through establishing institutes like Mahagami, Naturopathy, etc.

## विद्यापीठ गीत

अत्त दिप भव भव प्रदिप भव,  
स्वरूप रूप भव हो  
ज्ञान सब्ब विज्ञान सब्ब भव,  
सब्ब दिप भव हो  
अत्ताहि अत्त नो नाथो,  
अत्ताहि अत्त नो गति  
अत्त मार्गपर अप्रमादसे है तुझे चलना  
सब्ब का कल्याण हो,  
वो कार्यकुशल करना  
सब्ब का उत्तम मंगल, पथप्रदर्शक हो  
अत्त दिप भव भव प्रदिप भव,  
स्वरूप रूप भव हो  
ज्ञान सब्ब विज्ञान सब्ब भव,  
सब्ब दिप भव हो  
बुद्धमं शरनं गच्छामि :  
धम्मं शरनं गच्छामि :  
संघं शरनं गच्छामि :

# **Dr. G. Y. Pathrikar College of Computer Science & Information Technology**

MGM college of Computer Science and Information Technology was established in 2001 offering undergraduate and postgraduate degree program in Computer Science and Information Technology. College was renamed as Dr.G.Y.Pathrikar College of Computer Science and Information Technology in 2003 in memory of great educationalist, one of the founder member and Ex-Secretary MGM, Dr.G.Y.Pathrikar Sir.

It is first self-financed ISO certified institution offering program dedicated to Computer science and Information technology in Maharashtra and has achieved status of 2f/12b. Ours was the only and first college to be re-accredited as A+ grade with NAAC in the year 2017. Experienced and qualified faculty with Ph.D is strength of our college. Starting with 77 student's College has crossed total students strength of 10,000 passing out. Student are doing well in various MNCs like Infosys, Tech-Mahindra, Wipro, Capgemini, Cognizant etc. Many have their own Startups. Some of the students have completed their Masters and Ph.D. program from foreign countries like US, UK, Australia. Now we are constituent college of MGM University, Chhatrapati Sambhajanagar.

## **Vision**

To be an academic institution in dynamic equilibrium in social, ecological and economical environment striving continuously for excellence in total quality education, research and technological service to the nation.

## **Mission**

- To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, and economical issues.
- To upgrade our students in all respect with the help of latest infrastructure in the area of Computer Science and Information Technology in order to build the National Capabilities.
- To understand the culture of Non-violance, truth, peace through Gandhian Philosophy.

**Programs offered at Dr. G. Y. Pathrikar College of Computer Science & Information Technology**

<b>Undergraduate Programmes</b>	<b>Postgraduate Programmes</b>	<b>PhD Programmes</b>
B.Sc. (Computer Science) Honours / Honours with Research	M.Sc(Computer Science)	Ph.D. in Computer Science and Information Technology
B.Sc(Information Technology) Honours/ Honours with Research	M.Sc(Information Technology)	
BCA(Science) Honours / Honours with Research	M.Sc(Data Science)	
B.Sc(Animation) Honours / Honours with Research	M.Sc(Animation)	
Integrated M.Sc. Data Science		
BCA(Digital Marketing) Honours		
B.Sc(Robotics) Honours		

MGMUNIVERSITY

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**Name of Program** – Integrated M.Sc. (Data Science)

**Duration** – Five Years

**Eligibility -**

- He / She Must have passed the Higher Secondary (Multipurpose) Examination conducted by H.S.C. Board Government of Maharashtra with Science / Technical Subjects or an Examination of any statutory University and Board recognized as equivalent thereto.

**OR**

- Candidates having offered prescribed vocational courses, (MCVC) with Computer Techniques / Information Technology / Electronics.

**OR**

- Three Years Course in Diploma Engineering conducted by the Board of Technical Education, Maharashtra State. He / She must have passed at qualifying examination.

MGMUNIVERSITY

**Name of Faculty:** Basic and Applied Science

**Name of the College/Institute/Department/School:** Dr. G. Y. Pathrikar College of Computer Science and Information Technology

**Name of the Programme:** Integrated M.Sc. Data Science

**Programme Type (UG/PG):** PG

**Duration:** Five Years

**List of Options to select from Bucket of Courses provided in various categories:**

<b>Major</b>	
<b>Data Science</b>	
<b>Core Major</b>	<b>Core Elective</b>

<b>Minor options for basic and applied science Faculty</b>	<b>GYP</b>	<b>IBT</b>	<b>UDBAS</b>
	Cyber Security	Food Technology and Processing	Chemistry
	Robotics	Microbiology	Geo-Informatics
	Data Analytics	Biotechnology	Mathematics
	Block-Chain Technologies	Bioinformatics	Statistics
		Food Nutrition and Dietetics	Material Science

<b>Minor options from Other Faculty</b>	<b>Faculty of Engineering and Technology</b>	<b>Faculty of Social Sciences &amp; Humanities</b>	<b>Faculty of Design</b>	<b>Faculty of Management and Commerce</b>	<b>Interdisciplinary Faculty</b>	<b>Performing Arts</b>
	Data Science	Filmmaking	Product Design	Financial Management	Cosmetic Technology	Theatre Arts
	IoT	Photography	Interior Design	E-Commerce	Education	Dance
	Geo-informatics and Applications	Mass Communication and Journalism	Contemporary Arts	International Business Management	Yog Sciences	Music
	EV Technology	Psychology	Visual Communication	Hospitality Mgmt	Physical Education	Folk Art
	Drone Technology	Economics	Fashion Technology	Travel and Tourism	Home Science	
	Robotics Technology	English		Art of Leadership		
	Chemical Technology	Social Work		Art of Business		
	AI&ML					
	Universal Human Values					
	Energy management					

First Year- Semester I												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	MDI41MML101	Foundation of Data Science	Theory	2	2		30	20	50		8	20
MM	MDI41MML102	Principles of Programming Languages	Theory	2	2		30	20	50		8	20
MM	MDI41MMP101	Practical based on Foundation of Data Science	Practical	1		2	30	20	50		8	20
MM	MDI41MMP102	Practical based on Principles of Programming Languages	Practical	1		2	30	20	50		8	20
MI	MDI41IKT101	Indian Psychology and yoga	Theory	2	2	-	30	20	50		8	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		8	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		8	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		8	20
VSC	MDI41VSP101	Office Automation	Practical	2		4	30	20	50		8	20
SEC	MDI41SEL101	Mathematical Foundation	Theory	2	2	-	30	20	50		8	20
VEC		Basket of VEC From University	Theory	2	2	-	30	20	50		8	20
CC		Basket of CC From University	Practical	2	2	4	30	20	50		8	20
<b>Total</b>				22	18	12	390	260	650			

**Note: Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

<b>First Year- Semester II</b>
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Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	MDI41MML103	Design and Analysis of Algorithms	Theory	2	2		30	20	50		8	20
MM	MDI41MML104	Computer Architecture	Theory	2	2		30	20	50		8	20
MM	MDI41MMP103	Practical based on Design and Analysis of Algorithms	Practical	1		2	30	20	50		8	20
Core	MDI41MMP104	Practical based on Computer Architecture	Practical	1		2	30	20	50		8	20
MI		Basket of MI From University	Theory	2	2	-	30	20	50		8	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		8	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		8	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		8	20
VSC	MDI41VSP102	Programming for Data Science	Practical	2		4	30	20	50		8	20
SEC	MDI41SEL102	Statistical Methods	Theory	2	2	-	30	20	50		8	20
VEC		Basket of VEC From University	Theory	2	2	-	30	20	50		8	20
CC		Basket of CC From University	Practical	2	2	4	30	20	50		8	20
<b>Total</b>				22	18	12	390	260	650			

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project



## Syllabus Semester-I

**Course code:** MDI41MML101

**Course name:** Foundation of Data Science

**Course category:** Major Mandatory

**Credits:** 2

**Pre-requisites:** Basics of mathematics and working of Computer System

**Course Objectives:**

1. To impart basic introduction to of data science
2. To identify the Data Sources and its Processing Life Cycle

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** To understand the foundational skills in data Science

**CO2:** Methodology applications and theory in data science

**CO3:** Data science foundations including preparing and working with data abstracting and modelling.

**CO4:** Focusing on mathematical, statistical and computation methods in Data Science

**Contents –**

Unit	Content	Teaching hours
1	<b>Introduction to Data Science Concepts:</b> Basics of Data, Data Types, Data Sources, Data Science Life Cycle, Data Collection, Data Preprocessing: Data cleaning, Data reduction, Data transformation, Data discretization. Visualization and Graphing: Visualizing Categorical Distributions, Visualizing Numerical Distributions, Overlaid Graphs, plots, and summary statistics of exploratory data analysis, Randomness, Probability, Introduction to Statistics, Sampling, Sample Means and Sample Sizes.	10
2	<b>Descriptive Statistics:</b> Central tendency, Dispersion, variance, covariance, kurtosis, five point summary, Distributions, Bayes Theorem, Error Probabilities, Permutation Testing.	10
3	<b>Statistical Inference:</b> Hypothesis Testing, Assessing Models, Decisions and Uncertainty, Comparing Samples, A/B Testing, P-Values. <b>Prediction Foundations:</b> Estimation, Prediction, Confidence Intervals, Inference for Regression, Classification, Graphical Models, Updating Predictions.	10

<b>Text Books:</b> 1. Adi Adhikari and John DeNero ,Computational and Inferential Thinking: The Foundations of Data Science
2. Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr.,Data Mining for Business Analytics: Concepts, Techniques and Applications in R, Wiley India, 2018.
<b>Reference Books:</b> 1. Rachel Schutt & Cathy O’Neil Doing Data Science, O’ Reilly, First Edition, 2013
2. B. Ram Computer Fundamental, BPB Publication
<b>Online Resources:</b> 1. NPTEL / SWAYAM lectures.

## Syllabus Semester-I

**Course code:** MDI41MML102

**Course name:** Principles of Programming Languages

**Course category:** Major Mandatory

**Credits:** 2

**Pre-requisites:** Logical Thinking and Problem Solving Skills

**Course Objectives:** To introduce the foundations of computing, programming and problem- solving using computer Programming and its principles

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** The course aims to provide exposure to problem-solving and principles through programming.

**CO2:** It aims to train the student to the basic concepts of the C programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

**CO3:** Write the C code for a given algorithm.

**CO4:** Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

### Contents –

Unit	Content	Teaching hours
1	<b>Introduction to C Programming:</b> Principles of Programming languages, Importance of C, History of C, Basic structure of C program Constants, Variables, Keywords & Data Types: C Character set, C tokens, Constants, Keywords, Identifiers, Data types, C variable declaration, Assigning values to variables, Compilation and execution, Receiving input from user	10
2	<b>Decision Making with Operators &amp; Expressions:</b> Types of operators: Arithmetic, Relational, logical, Unary operators: Increment & decrement, Assignment and Conditional operator, I/O functions, escape sequence characters, Decision making with if, if...else, nested if...else, else if ladder, switch statement. Loop Control Instruction: While loop, for loop, do...while loop, jumps in loops.	10
3	<b>Arrays:</b> Introduction to array, types of arrays, Declaration and initialization of arrays, character arrays. <b>Functions:</b> Need for user defined function, Definition of function, passing values between functions, Return values and their types, Function Call, nesting of functions, Recursion.	10

**Text Books:** 1. Y.P. Kanetkar Let us C, BPB publication

**Reference Books:** 1. E. Balaburuswamy Programming in C, Tata Macgraw Hill

**Online Resources:** 1. NPTEL / SWAYAM lectures.

**Semester-I****Course code:** MDI41MMP101**Course name:** Practical based on Foundation of Data Science**Course category:** Major Mandatory**Credits:** 1**Pre-requisites:** Basics of mathematics and working of Computer System**Course Objectives:**

3. To impart basic introduction to of data science

4. To identify the Data Sources and its Processing Life Cycle

**Course Outcomes:** At the end of the course, the students will be able to -**CO1:** To understand the foundational skills in data Science**CO2:** Methodology applications and theory in data science**CO3:** Data science foundations including preparing and working with data abstracting and modelling.**CO4:** Focusing on mathematical, statistical and computation methods in Data Science**Contents –**

Unit	Content	Teaching hours
1	Creating data in Excel using various data formats	1
2	Reading Data in to Excel using various formats	1
3	Data Preprocessing using Excel	1
4	Basic Spreadsheet Operations	1
5	Basic Spreadsheet functions	1
6	Advanced Spreadsheet functions to organize data	1
7	Data filtering capabilities of Excel	1
8	Construction of Visualizing Numerical Distributions using Excel	1
9	Understanding and constructing advanced graphing and Charting	1
10	Statistical operations using Excel	1

**Text Books:** 1. Adi Adhikari and John DeNero ,Computational and Inferential Thinking: The Foundations of Data Science

2. Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr.,Data Mining for Business Analytics: Concepts, Techniques and Applications in R, Wiley India, 2018.

**Reference Books:** 1. Rachel Schutt & Cathy O'Neil Doing Data Science, O' Reilly, First Edition, 2013

2. B. Ram Computer Fundamental, BPB Publication

**Online Resources:** 1. NPTEL / SWAYAM lectures.

### Semester-I

**Course code:** MDI41MMP102 **Course name:** Practical based on Principles of Programming Languages

**Course category:** Major Mandatory **Credits:** 1

**Pre-requisites:** Basics of mathematics and working of Computer System

**Course Objectives:**

To introduce the foundations of computing, programming and problem- solving using computer Programming and its principles

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** The course aims to provide exposure to problem-solving and principles through programming.

**CO2:** It aims to train the student to the basic concepts of the C programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

**CO3:** Write the C code for a given algorithm.

**CO4:** Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

**Contents –**

Unit	Content	Teaching hours
1	Write a Program to convert temperature from degree Centigrade to Fahrenheit	1
2	Write a Program to find whether given number is Even or Odd	1
3	Write a Program to find greatest of Three numbers	1
4	Write a Program to using switch statement to display Monday to Sunday	1
5	Write a Program to display first Ten Natural Numbers and their sum	1
6	Write a Program to find Multiplication of Two Matrices	1
7	Write a Program to find the maximum number in Array using pointer.	1
8	Write a Program to reverse a number using pointer.	1
9	Write a Program to solve Quadratic Equation using functions	1
10	Write a Program to find factorial of a number using Recursion	1

**Text Books:** 1. Y.P. Kanetkar Let us C, BPB publication

**Reference Books:** 1. E. Balaburuswamy Programming in C, Tata Macgraw Hill

**Online Resources:** 1. NPTEL / SWAYAM lectures.

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**Semester-I****Course code:** MDI41VSP101**Course name:** Office Automation**Course category:** Vocational Skill Course**Credits:** 2**Pre-requisites:** Introduction to Computer System**Course Objectives:** To understand and learn Office automation tools**Course Outcomes:** At the end of the course, the students will be able to -**CO1:** The course aims to provide exposure to work with Text Processing techniques**CO2:** The course aims to provide exposure to work with PowerPoint Presentation Techniques**CO3:** The course aims to provide exposure to work with Data accessing techniques**CO4:** The course aims to provide exposure to work with Excel Data Handling Techniques**Contents –**

Unit	Content	Teaching hours
1	Generate equations, sample calculations, and basic diagrams in Microsoft Word	1
2	Perform calculations in Microsoft Excel using both manually inputting formulas and built-in functions	1
3	Create Graph and Tables and Integrate both graphs and tables created in Microsoft Excel into a report file in Microsoft Word.	1
4	To Create a PowerPoint Presentation include Audio, Video and animation effect using PowerPoint.	1
5	To create any document Using Word Processing Tool and different styles.	1
6	To create any document Using Presentation Tool	1
7	To Create a graph of any numeric data in Microsoft office and give appropriate Label.	1
8	To draw any digital electronic circuit diagram using Microsoft word	1
9	Introduction to MS Access	1
10	Create & edit Database & tables in Access	1

**Text Books:** Bittu Kumar · 2017, Mastering MS Office ISBN 9789350578780, V&S Publishers**Reference Books:** Dr. S.S. Srivastava MS-Office**Online Resources:** 1. NPTEL / SWAYAM lectures.<https://www.rgyesm.org/uploads/books/MICROSOFT-OFFICE-BOOK.pdf>

## Syllabus Semester-I

**Course code:** MDI41SEL101

**Course name:** Mathematical Foundation

**Course category:** Skill Enhancement course

**Credits:** 2

**Pre-requisites:** Basics of Mathematical Concepts

**Course Objectives:** Towards the end of the course, we will also cover a subset of topics from graph theory. Part of the course is also devoted to understanding what goes into mathematics.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Principles and processes of Set Theory

**CO2:** Operations of Set Theory

**CO3:** Provides students with essential mathematical skills

**CO4:** Learn Graph, Tree, Relations and functions

**Contents –**

Unit	Content	Teaching hours
1	<b>Set Theory and Operations:</b> Types of Set: Finite, Infinite, Singleton, Empty, Subset, Proper Subset, Universal Set, Power Set, Venn Diagram, Operations on Set: Union of Sets, Intersection of Sets, Complement of Set, Cartesian Product, Difference and Symmetric Difference of Set, Principal of Inclusion and Exclusion. Introduction to Matrices: Types of Matrices, Matrix, Operations, Adjoint and Inverse of a Matrix, Rank of a Matrix and Special Matrices.	10
2	<b>Graph Theory and Tree:</b> Introduction to Graph, Application of Graph, Finite and Infinite Graph, Incidence and Degree, Null Graph, Isolated and Pendent Vertex, Isomorphism, Subgraph, Walks, Path and Circuit, Union and Intersection Operation. Graph, Planner Graph, Trees, Pendant Vertices on Tree, Binary Tree, Spanning Tree.	10
3	<b>Relation and Function:</b> Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations. Functions: Objective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.	10

**Text Books:** 1. Narsingh Deo Graph Theory With Applications To Engineering And Computer Science, Prentice – Hall

2. J. L. Mott, A.Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India, 2<sup>nd</sup> Edition

**Reference Books:** 1. BernandKolman, Robert C. Busby, Sharon Cutler Ross, Discrete Mathematical Structures, PHI

**Online Resources:** 1. NPTEL / SWAYAM lectures.

## Syllabus Semester-II

**Course code:** MDI41MML103

**Course name:** Design and Analysis of Algorithms

**Course category:** Major Mandatory

**Credits:** 2

**Pre-requisites:** Basic understanding of Data and its applications

**Course Objectives:** Student get familiar with basic concepts about stacks, queues, lists, trees and graphs Student can implement practically searching and sorting techniques.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Student can analyze algorithms and the correctness of algorithm, can summarize searching and sorting techniques and describe stack, queue and linked list operation with knowledge of tree and graphs concepts.

**CO2:** Students demonstrate an ability to apply knowledge of computing and mathematics appropriate to the discipline including computer science theory.

**CO3:** Students get competent in applying design and development principles in the development of software systems of varying complexity

**CO4:** Students will implement various sorting, searching, and hashing algorithms. Students will build a substantial, complex data structure

**Contents –**

Unit	Content	Teaching hours
1	<b>Introduction to Algorithms:</b> Introduction to Algorithm, Analysis of algorithm, Designing of algorithm, the Correctness of Algorithms and the Complexity of Algorithms	10
2	<b>Linear Data Structure:</b> Stack, Queue, Array, Linked list, Priority Queue, Deque, Doubly linked list, circular linked list Searching and sorting Techniques.	10
3	<b>Non Linear Data Structure:</b> Graphs: Introduction to Graph Theory, Graph isomorphism, Graph data structures: Adjacency lists, Adjacency matrices Elementary graph Algorithms: BFS, DFS, Topological sort, strongly connected components. Trees: Introduction to Trees, Tree Operations, Tree traversals (preorder, inorder and postorder), Binary trees.	10

<b>Text Books:</b> 1. Seymour Lipschutz, Data Structures, Tata McGraw Hill Publication.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithm, PHI Publication
<b>Reference Books:</b> 1. Jean Paul Tremblay and Pal G. Soresion, An Introduction to Data Structure And application, McGraw Hill Publication
2. Tannenbaum, Data Structure, PHI Publication
<b>Online Resources:</b> 1. NPTEL / SWAYAM lectures.



## Syllabus Semester-II

**Course code:** MDI41MML104

**Course name:** Computer Architecture

**Course category:** Major Mandatory

**Credits:** 2

**Pre-requisites:** Basic Knowledge of Digital Electronics and Computer System architecture

**Course Objectives:** Basic introduction of computer system architecture, the structure of computer, working of Gates and its functionality.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Student understands of the basic structure and operation of a digital computer.

**CO2:** To learn the architecture and assembly language Programming of microprocessor.

**CO3:** Learn Arithmetic Circuits Structures

**CO4:** To study the different Processors.

**Contents –**

Unit	Content	Teaching hours
1	<b>Computer Arithmetic:</b> Number System: Decimal System Binary Number System, Hexadecimal Number System. Octal Number System, Number Conversion: Decimal to Other, Binary to Other, Octal to Other, Hexadecimal to Other, BCD Numbers, ASCII Code, Computer Arithmetic: Addition, Subtraction. Logic Gates & Boolean Algebra Positive & Negative Logic, Truth Table, Logic Gates: AND, OR, NOT, NAND, NOR and Exclusive- Universal Gates. Postulates & Theorems of Boolean Algebra (Idempotent, Complementation, Commutative, Associative, Distributive, De-Morgan's Theorem)	10
2	<b>Arithmetic Circuits:</b> Combinational Circuits, Implementing Combinational logic. Arithmetic Circuits: Half-Adder, Full-Adder, Half-Sub tractor, Full-Sub tractor. Fundamentals of Microprocessors: Comparison of 8-bit, 16-bit and 32-bit microprocessor. 8086 Pin Configuration 8086 Internal Architectures Execution Unit & Bus Interface Flag Registers, Introduction to Addressing Modes.	10
3	<b>8086 Interrupt and Interrupt Applications:</b> Interrupts of 8086 Hardware Interrupts, Software Interrupts, Latest Trends in Microprocessor: RISC and CISC Architectures, Design: Multicore Processor and Multicore Processing, Multicore Technology and Intel, Dual Core and Core Duo Processors Core i3, i5, Mobile Processors.	10

**Text Books:** 1. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, Wiley Publication

2. Lyla B Das Microprocessors & Multi core systems, Pearson Publication

**Reference Books:** 1. Douglas V Hall, Microprocessor and Interfacing, Tata McGraw Hill

2. M. Morris Mano, Microprocessor and Interfacing



## Semester-II

**Course code:** MDI41MMP103      **Course name:** Practical based on Design and Analysis of Algorithms

**Course category:** Major Mandatory      **Credits:** 1

**Pre-requisites:** Basic understanding of Data and its applications

**Course Objectives:** Student get familiar with basic concepts about stacks, queues, lists, trees and graphs  
Student can implement practically searching and sorting techniques.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Student can analyze algorithms and the correctness of algorithm, can summarize searching and sorting techniques and describe stack, queue and linked list operation with knowledge of tree and graphs concepts.

**CO2:** Students demonstrate an ability to apply knowledge of computing and mathematics appropriate to the discipline including computer science theory.

**CO3:** Students get competent in applying design and development principles in the development of software systems of varying complexity

**CO4:** Students will implement various sorting, searching, and hashing algorithms. Students will build a substantial, complex data structure

**Contents –**

Unit	Content	Teaching hours
1	Write and execute programs for insertion and deletion of n item from the Queues	1
2	Implement a program to display a Linked List.	1
3	Implement a program for Circular Doubly Linked List	1
4	Write and execute a program for binary search algorithm	1
5	Write and execute BFS and DFS Traversing	1
6	Write and execute Tree traversals	1
7	Write and execute a program for Bubble sort Algorithm	1
8	Write and execute programs for traversing of n item from the linked list	1
9	Write and execute a program for implementation of insertion sort	1
10	Write and execute a program for demonstration of merge sort	1

<b>Text Books:</b> 1. Seymour Lipschutz, Data Structures, Tata McGraw Hill Publication.
Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithm, PHI Publication
<b>Reference Books:</b> 1. Jean Paul Tremblay and Pal G. Soresion, An Introduction to Data Structure And application, McGraw Hill Publication
2. Tannenbaum, Data Structure, PHI Publication
<b>Online Resources:</b> 1. NPTEL / SWAYAM lectures.

## Semester-II

**Course code:** MDI41MMP104

**Course name:** Practical based on Computer Architecture

**Course category:** Major Mandatory

**Credits:** 1

**Pre-requisites:** Basic Knowledge of Digital Electronics and Computer System architecture

**Course Objectives:** Basic introduction of computer system architecture, the structure of computer, working of Gates and its functionality.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Student understands of the basic structure and operation of a digital computer.

**CO2:** To learn the architecture and assembly language Programming of microprocessor.

**CO3:** Learn Arithmetic Circuits Structures

**CO4:** To study the different Processors.

**Contents –**

Unit	Content	Teaching hours
1	To Perform Number systems Conversations	1
2	To Perform Binary Arithmetic operations	1
3	To Verify the truth table of Basic Logic Gates	1
4	To Verify the truth table of Universal Logic Gates	1
5	To Verify the truth table of Special Purpose Logic Gates	1
6	State and Prove Demorgan's Theorem	1
7	To Study and Verify Combinational Logic Circuits (Half adder)	1
8	To Study and Verify Combinational Logic Circuits (Full adder)	1
9	To Study General Purpose Registers of 8086 Microprocessor	1
10	To Study Special Purpose Registers of 8086 Microprocessor	1

**Text Books:** 1. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, Wiley Publication

Lyla B Das Microprocessors & Multi core systems, Pearson Publication

**Reference Books:** 1. Douglas V Hall, Microprocessor and Interfacing, Tata McGraw Hill

2. M. Morris Mano, Microprocessor and Interfacing

**Online Resources:** 1. NPTEL / SWAYAM lectures.

## Semester-II

**Course code:** MDI41VSP102

**Course name:** Programming for Data Science

**Course category:** Vocational skill course

**Credits:** 1

**Pre-requisites:** Understanding of C Programming

**Course Objectives:** To develop an in-depth understanding of functional, logic, and object-oriented programming paradigms, implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing, and Implement several programs in languages other than the one emphasized in the core curriculum C++.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Student understands of the basic of Object Oriented Programming

**CO2:** To learn the Object and Classes declaration

**CO3:** Learn C++ Programming tool

**CO4:** To study Object Oriented Concepts and write the code in C++

**Contents –**

Unit	Content	Teaching hours
1	Write a C++ program to find the sum of individual digits of a positive integer	1
2	Write a C++ program to generate the first n terms of the sequence	1
3	Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.	1
4	Write a C++ program to sort a list of numbers in ascending order.	1
5	Write a program Illustrating Class Declarations, Definition, and Accessing Class Members	1
6	Program to illustrate default constructor, parameterized constructor and copy constructors	1
7	Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.	1
8	Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.	1
9	Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.	1
10	Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.	1

**Text Books:** E Balagurusamy Object-Oriented Programming with C++ | 8th Edition

**Reference Books:** 1. Yashavant P. Kanetkar Object Oriented Programming with C++

**Online Resources:** 1. NPTEL / SWAYAM lectures.

[https://www.w3schools.com/cpp/cpp\\_oop.asp](https://www.w3schools.com/cpp/cpp_oop.asp)

## Semester-II

**Course code:** MDI41SEL102

**Course name:** Statistical Methods

**Course category:** Skill Enhancement Course

**Credits:** 2

**Pre-requisites:** Basic Knowledge of Mathematical Foundation

**Course Objectives:** The emphasis of course is on descriptive statistics. It gives an idea about the various statistical methods, measures of central tendency, measure of dispersion and correlation. Statistics is matter of science and logic. It mainly indulge on mathematics and logic.

**Course Outcomes:** At the end of the course, the students will be able to -

**CO1:** Understand the elementary statistical methods.

**CO2:** Apply the measures of central tendency, measure of dispersion and co-relation to solve our day-today life problem.

**CO3:** Analyze the data to represent it graphically or tabulate and interpret it to generate information.

**CO4:** Compare data to tabulate statistical information given in descriptive form.

**Contents –**

Unit	Content	Teaching hours
1	<p><b>Statistical Methods:</b>            Definition, scope and importance of Statistics, concepts of statistical population and sample. Data &amp; Types of data: Primary and Secondary data, qualitative &amp; quantitative data, Numerical (discrete, continuous), Categorical and Ordinal. Cross-section, time series, failure, industrial, directional data. Attributes, variables, Processing of Data: Completeness, Consistency, Accuracy and Editing. Accuracy of Measurement. Classification, Tabulation and Graphical.            Representation: Preparation of Tables, Presentation of Data: Variable, Random Variable, Frequency, And Frequency Distribution. Diagrammatic representation of Measures of Skewness and Kurtosis: Data: Line and Bar Diagram, Histogram, Component Bar diagram, Pie Chart, Line Graph, Frequency polygon and Ogive.</p>	10
2	<p><b>Measures of Central Tendency:</b>            Characteristics of Good measure of Central Tendency. Concept of central tendency- for Group and Ungroup data. Mean: Arithmetic mean (A.M.): simple and weighted Merits and demerits.            Geometric mean (G.M.): computation for G M, Merits demerits and applications of G.M. Harmonic Mean (H.M.): computation for frequency, non-frequency data, merits and demerits of H.M., Median: Definition, Median for grouped and nongrouped data, Properties and Merits &amp; demerits, Mode: Definition, Mode for grouped &amp; Non-grouped data, Graphical Method for finding mode, Merits and demerits.</p>	10
3	<p><b>Measures of Dispersions:</b>            Purposes of Measure of Dispersion, Properties of Good measures of Dispersion. Range, Quartile Deviation &amp; Mean Deviation: Variance: Standard Deviation: Coefficient of Variation: Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression.</p>	10

**Text Books:** 1. B.L. Agarwal, Basic Statistics, New Age International (P) Limited.

2. S. C. Gupta & V. K. Kapoor Fundamental of Mathematical Statistics, Sultan Chand & Sons

**Reference Books:** 1. S. C. Gupta Fundamental of Statistics

2. Kapoor J. N & Saxena S. C. Mathematical Statistics

**Online Resources:** 1. NPTEL / SWAYAM lectures.