

# Manipal School of Information Sciences (MSIS) \*\*Manipal Academy of Higher Education, Manipal

Master of Engineering - ME (Big Data Analytics)\*\*

# \*\*Course File\*\*

Course Name : Algorithm and Data Structures for Big Data Lab

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Course Code : BDA 5151

Academic Year : 2024 - 2025

Semester : I

Name of the Course Coordinator : Mr. DEEPAK RAO B

Name of the Program Coordinator : Dr. PRATHVIRAJ N

Signature of Program Coordinator    Signature of Course Coordinator

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with Date    with Date

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#### # Program Education Objectives (PEOs)

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for \*\*ME (Big Data Analytics)\*\*\*, program are as follows.

PEO No. Education Objective

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PEO 1 Develop in depth understanding of the key technologies in data engineering, data science and business analytics.

PEO 2 Practice problem analysis and decision-making using machine learning techniques.

PEO 3 Gain practical, hands-on experience with statistics, programming languages and big data tools through coursework and applied research experiences.

#### # Program Outcomes (POs)

By the end of the postgraduate program in Big Data Analytics, graduates will be able to:

PO1 Independently carry out research /investigation and development work to solve practical problems.

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PO2 Write and present a substantial technical report/document.

PO3 Demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level

higher than the requirements in the appropriate bachelor program.

PO4 Develop and implement big data analysis strategies based on theoretical principles, ethical considerations, and detailed

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knowledge of the underlying data.

PO5 Demonstrate knowledge of the underlying principles and evaluation methods for analyzing data for decision-making.

# 1. Course Plan

### 1.1 Primary Information

Course Name : Algorithms and Data Structures for Big Data Lab

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L-T-P-C : 0-0-3-1

Contact Hours : 36 Hours

Pre-requisite : Programming with Python or C

#### 1.2 Course Outcomes (COs)

CO At the end of this course, the student should be able No. of Contact Program Outcomes BL

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to: Hours (PO's)

Design programs for implementation of linked lists, stack

CO1 and queues. 15 PO4 5

Design programs for implementation of binary search

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CO2 tree, sorting and searching, dictionary and Hash Table 12 PO4 5

Design programs for graphs and shortest path techniques.

CO3 9 PO4 5

#### #### 1.3 Assessment Plan

Components Lab Test Flexible Assessments End semester/ Makeup

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(5- 6 in number) examination

Duration 90 minutes To be decided by the faculty. 180 minutes

Weightage 0.3 0.2 0.5

Typology of Applying; Analyzing. Applying; Analyzing. Applying; Analyzing; Evaluating.

questions Evaluating.

Pattern Answer all the Assignment: develop applications using Answer all the questions.

Maximum

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questions. Maximum various data structures and different marks 50.

marks 30. design techniques

Schedule As per academic Assignment submission: November As per academic calendar.

calendar. 2024

Topics covered Linked List, Stack,

Queue, Trees, Searching Comprehensive examination

& Sorting, Hash tables, covering the full syllabus.

Graphs

#### #### 1.4 Lesson Plan

L. No. TOPICS Course Outcome Addressed

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L0 Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO

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mapping, reference books

Lab1 Linked List: Implementing Single Linked List CO1

Lab2 Linked List: Implementing Double Linked List CO1

Lab3 Linked List: Application development using linked lists CO1

Lab4 Stack: Implementation and applications of Stack CO1

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Lab5 Queue: Implementation and applications of Queue CO1

Lab6 Tree: Implementation and applications of Tree CO2

IT1 Internal lab test CO1, CO2

Lab7 Applications using different search and sorting techniques. CO2

Lab8 Applications using different search and sorting techniques. CO2

Lab9 Application using Hash Table CO2

Lab10 Graph representation using list and matrix method CO3

Lab11 Graph traversal CO3

Lab12 Graph: Shortest path technique CO3

#### # 1.5 References

- 1. Introduction to Algorithms Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest. MIT Press.
- 2. Data Structures and Algorithms Aho, Hopcroft and Ullmann. Pearson Publishers.
- 3. Data Structures and Algorithms in Python Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser. John Wiley & Sons.
- 4. Data Streams: Algorithms and Applications S. Muthukrishnan. Foundations and Trends in Theoretical Computer Science archive, Volume 1 Issue 2, August 2005, Pages 117 - 236

#### ### 1.6 Other Resources (Online, Text, Multimedia, etc.)

- 1. Web Resources: Blog, Online tools and cloud resources.
- 2. Journal Articles.

#### #### 1.7 Course Timetable

st 1 Semester Big Data Analytics Room: LG1 LH 3 Lab: Data Science Lab

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9-10 10-11 11-12 12-1 1-2 2-3 3-4 4-5

MON

TUE

WED

THU

FRI ADS LAB

SAT

### 1.8 Assessment Plan

COs Marks & weightage

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CO No.	CO Name	Lab Test (Max. 30)	Assignment (Max. 20)	End Semester (Max. 50)	CO wise Weightage
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	Design programs for implementation of linked lists, stack	15	10	25	
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CO1	and queues.	0.5			
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CO2	Design programs for implementation of binary search	10	6	15	0.31
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	tree, sorting and searching, dictionary and Hash Table				
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CO3	Design programs for graphs and shortest path techniques.	5	4	10	0.19
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Marks (weightage)	0.3	0.2	0.5	1.0	
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- In-semester Assessment is considered as the Internal Assessment (IA) in each subject for 50 marks, which includes the performances in class / tutorial participation, assignment work, lab work, class tests, mid-term tests, quizzes etc.

- End-semester examination (ESE) for each lab subject is conducted for a maximum of 50.

- End-semester mark for a maximum of 50 and IA marks for a maximum of 50 are added for a maximum of 100 marks to decide upon the grade in a subject.

### #### 1.9 Assessment Details

The assessment tools to be used for the Current Academic Year (CAY) are as follows:

Sl.	Tools (TLP)	Weightage	Frequency	Details of Measurement (Weightage/Rubrics/Duration, etc.)
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No.       -

1	Sessional	0.3	2	- Performance is measured using sessional attainment level. Reference: question paper and answer scheme.
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- Each sessional is assessed for a maximum of 30 marks.

2	Assignments	0.2	-	- Performance is measured using assignments/quiz attainment level.
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- Assignments/quiz are evaluated for a maximum of 20 marks.

3	ESE	0.5	1	- - Performance is measured using ESE attainment level. Reference: question paper and answer scheme.
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- ESE is assessed for a maximum of 50 mark.

### ### 1.10 Course Articulation Matrix

CO1	Y
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CO	CO2	PO1	PO2	PO3	PO4	Y	PO5
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CO3	Y
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Average Articulation Level \* \* \*