MANIPAL SCHOOL OF INFORMATION SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

Master of Engineering - ME (Big Data Analytics)

Course File

Course Name	:	Principles of Data Visualization Lab
Course Code	:	BDA 5182
Academic Year	:	2024 - 25
Semester	:	I
Name of the Course Coordinator	:	SATYANARAYAN SHENOY
Name of the Program Coordinator	:	Dr. PRATHVIRAJ N

Signature of Program Coordinator with Date	**Signature of Course Coordinator 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
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 **ME (Big Data Analytics)**, graduates will be able to:

PO1	Independently carry out research /investigation and development work to solve practical problems.
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 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	**:**	Principles of Data Visualization Lab [BDA 5132]
L-T-P-C	**:**	0-0-3-1
Contact Hours	**:**	36 Hours
Pre-requisite	**:**	Programming with Python, Power BI
Core/ PE/OE	**:**	Elective

1.2 Course Outcomes (COs), Program outcomes (POs) and Bloom's Taxonomy Mapping

CO	At the end of this course, the student should be able to:	No. of Contact Hours	Program Outcomes (PO's)	BL
CO1	**Experiment** web scrapping techniques to extract data from websites.	9	PO4	4
CO2	**Implement** NumPy and Pandas for data science operations with examples.	6	PO3	3
CO3	**Organize** data for visualization using data manipulation techniques.	6	PO4	4
CO4	**Experiment** different visualization techniques	6	PO4	4
CO5	**Use** power BI for analytics and to manage workspace.	9	PO5	3

1.3 Assessment Plan

Components	Lab Test	Flexible Assessments (2 – 3 in number)	End semester/ Makeup examination
Duration	90 minutes	To be decided by the faculty.	180 minutes
Weightage	0.3	0.2	0.5
Typology of questions	Applying; Analyzing.	Applying; Analyzing.	Applying; Analyzing.
Pattern	Answer all the questions. Maximum marks 30.	**Assignment:** (Solving Use case using scraping and visualization techniques.)	Answer all the questions. Maximum marks 50
Schedule	As per academic calendar.	**Assignment submission:** November 2024	As per academic calendar.
Topics covered	Scraping tools, NumPy, Pandas, PowerBI		Comprehensive examination covering the full syllabus.

1.4 Lesson Plan

L. No.	TOPICS	Course Outcome Addressed
L0	Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO mapping, reference books	---
Lab 1	Web scraping using Beautiful soups	CO1
Lab 2	Web scraping using Scrapy framework	CO1
Lab 3	Web scraping using Scrapy framework	CO1
Lab 4	Panda, NumPy: Implement NumPy and Pandas for data science operations with examples.	CO2
Lab 5	Panda, NumPy: Implement NumPy and Pandas for data science operations with examples.	CO2
Lab 6	Data Wrangling - Clean, Transform, Merge, Reshape	CO3
IT1	IT1 Internal lab test	CO1, CO2, CO3
Lab 7	Data Aggregation and Group Operations.	CO3
Lab 8	Visualization techniques: time series, statistical distributions.	CO4
Lab 9	Visualization techniques: maps - Data visualization for web.	CO4
Lab 10	Visualize data and analysis in Power BI	CO5
Lab 11	Manage workspaces and datasets in Power BI.	CO5
Lab 12	Create and use analytics reports with Power BI.	CO5

1.5 References

1. Website Scraping with Python: Using BeautifulSoup and Scrapy, Gábor & Hajba, APRESS Publications, 1st Edition, 2018.
2. Web Scraping with Python: Collecting More Data from the Modern Web, Ryan Mitchell Shroff, O'Reilly, 2nd Edition, 2018.
3. Designing Data Visualizations, Julie Steele and Noah Iliinsky; O'Reilly Media; 1st Edition, 2011.
4. Python for Data Analysis, Wes McKinney; Shroff; O'Reilly; 2nd Edition, 2018.
5. https://learn.microsoft.com/en-us/certifications/exams/pl-300/

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

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

1.7 Course Timetable

1st Semester Big Data Analytics				Room: LG1 LH 8	Lab: Data Science Lab			
	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
MON								
TUE								PDV
WED								
THU		PDV LAB						PDV
FRI								
SAT			PDV					

1.8 Assessment Plan

Cos		**Marks & Weightage**			
CO No.	CO Name	Mid Semester (Max. 50)	Assignment (Max. 20)	End Semester (Max. 100)	CO wise Weightage
CO1	**Experiment** web scrapping techniques to extract data from websites.	10	4	20	**0.34**
CO2	**Implement** NumPy and Pandas for data science operations with examples.	10	4	-	**0.14**
CO3	**Organize** data for visualization using data manipulation techniques.	-	4	20	**0.24**
CO4	**Experiment** different visualization techniques.	10	4	-	**0.14**
CO5	**Use** power BI for analytics and to manage workspace.	-	4	10	**0.14**
	Marks (weightage)	**0.3**	**0.2**	**0.5**	**1.0**

Note:

- In-semester Assessment is considered as the Internal Assessment (IA) in this course for 50 marks, which includes the performances in lab participation, assignment work, lab work, lab tests, quizzes etc.
- End-semester examination (ESE) for this course is conducted for a maximum of 50.
- End-semester marks 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 this course.

Weightage for CO1 = (Lab Test marks for CO1 + Assignment marks for CO1 + ESE marks for CO1) /100
= (5 + 2 +5)/100 = 0.12

1.9 Assessment Details

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

SI. No.	Tools	Weightage	Frequency	Details of Measurement (Weightage/Rubrics/Duration, etc.)
1	Internal Test	0.3	1	• Performance is measured using lab internal test attainment level. • Reference: question paper and answer scheme. • Lab internal test is assessed for a maximum of 30 marks.
2	Assignments	0.2	1	• Performance is measured using assignments attainment level. • Assignment is 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. • ESE is assessed for a maximum of 50 marks.

1.10 Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5
CO1				**Y**	
CO2			**Y**		
CO3				**Y**	
CO4				**Y**	
CO5					**Y**
Average Articulation Level			*	*	*