Master of Engineering - ME (Big Data Analytics)

Course File

Course Name	:	Principles of Data Visualization
Course Code	:	BDA 5132
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.

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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 [BDA 5132]
L-T-P-C	:	3-0-0-3
Contact Hours	:	36 Hours
Pre-requisite	:	Basic Programming with Python
Core/ PE/OE	:	Elective

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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	**Implement** web scrapping techniques to extract data from websites.	12	PO4	3
CO2	**Organize** raw data for analysis using data manipulation techniques**.**	12	PO1	4
CO3	**Use** powerBI for preparation and modelling of data for analysis.	4	PO4	3
CO4	**Interpret** data using various data visualization techniques.	4	PO5	3
CO5	**Report** data for analytics and to manage workspace using Power BI	4	PO3	2

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1.3   Assessment Plan

Components	Internal Test 1	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. Understanding.	Applying; Analyzing; Understanding.
Pattern	Answer all 5 questions of 10 marks each.	**Assignment:** (Solving Use case using scraping and visualization techniques.)	Answer all 10 full questions of 10 marks each.
Schedule	As per academic calendar.	**Assignment submission:** November 2024	As per academic calendar.
Topics covered	Web scraping, Data Analysis, Data Analysis, Data Visualization	Web scraping, Data Analysis and Data Visualization.	Comprehensive examination covering the full syllabus. Students are expected to answer all questions.

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	---
L1	Web scraping: Introduction	CO1
L2	Web scraping models and techniques	CO1
L3	Web scraping models and techniques	CO1
L4	Usecases: BeautifulSoup	CO1
L5	Usecases: Scrapy	CO1
L6	Usecases: Scrapy	CO1
L7	Data Analysis: introduction	CO2
L8	Data structures for analysis: numpy	CO2
L9	Data structures for analysis: numpy	CO2
L10	Data Structures for analysis: Pandas	CO2
L11	Data Structures for analysis: Pandas	CO2
L12	Data Wrangling - Clean, Transform, Merge, Reshape	CO2
L13	Data Wrangling - Clean, Transform, Merge, Reshape	CO2

L14	Data Aggregation and Group Operations	CO2
L15	Power BI Introduction	CO3
L16	Prepare data for analysis using Power BI	CO3
L17	Prepare data for analysis using Power BI	CO3
L18	Model data in Power BI	CO3
IT1	Internal test 1	CO1, CO2, CO3
L19	Data Visualization: Introduction	CO4
L20	Visualization techniques: time series	CO4
L21	Visualization techniques: time series	CO4
L22	Visualization techniques: statistical distributions	CO4
L23	Visualization techniques: statistical distributions	CO4
L24	Visualization techniques: statistical distributions	CO4
L25	Visualization techniques: maps - Data visualization for web.	CO4
L26	Visualization techniques: maps - Data visualization for web.	CO4
L27	Visualization techniques: maps - Data visualization for web.	CO4
L28	Visualize data in Power BI.	CO5
L29	Data analysis in Power BI	CO5
L30	Data analysis in Power BI	CO5
L31	Manage workspaces and datasets in Power BI	CO5
L32	Manage workspaces and datasets in Power BI	CO5

L33	Create and use analytics reports with Power BI	CO5
L34	Create and use analytics reports with Power BI	CO5
L35	Manage workspaces power BI	CO5
L36	Manage workspaces 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/

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

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

2. Journal Articles.

5.2   Course Timetable

1st Semester Big Data Analytics				Room: LG1 LH 8				
	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					

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5.3 Assessment Plan

Cos		Marks & Weightage			
CO No.	CO Name	Mid Semester (Max. 50)	Assignment (Max. 20)	End Semester (Max. 100)	CO wise Weightage
CO1	**Implement** web scrapping techniques to extract data from websites.	20	2	20	**0.2**
CO2	**Organize** raw data for analysis using data manipulation techniques**.**	30	2	30	**0.29**
CO3	**Use** powerBI for preparation and modelling of data for analysis.	-	2	10	**0.15**
CO4	**Interpret** data using various data visualization techniques.	-	2	30	**.25**
CO5	**Report** data for analytics and to manage workspace using Power BI	-	2	10	**.11**
	Marks (weightage)	**0.2**	**0.1**	**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 class participation, assignment work, class tests, mid-term tests, quizzes etc.

- End-semester examination (ESE) for this course is conducted for a maximum of 100 and the same will be scaled down to 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   = (IT1 marks for CO1 / 2.5 + IT2 marks for CO1 / 2.5 + Assignment marks for CO1 + ESE marks for CO1 / 2)/100

= (25/2.5 + 0 + 0 + 20/ 2)/100 = 0.2

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5.4   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	0.4	2	• Performance is measured using internal test attainment level. • Reference: question paper and answer scheme. • Each internal test is assessed for a maximum of 50 marks and scaled down to 40 marks.
2	Assignments	0.1	1	• Performance is measured using assignments/quiz attainment level. • Assignments/quiz are evaluated for a maximum of 10 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 100 marks and scaled down to 50 marks.

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5.5   Course Articulation Matrix

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