

## **SYLLABUS OF THE NEW ELECTIVES ADDED**

- a. 21-37A-0B91: Data Science using R and Python
- b. 21-37A-0B92: Artificial Intelligence for Business
- c. 21-37A-0B93: Data Visualization Techniques
- d. 21-37A-0B94: Text Mining and Analytics
- e. 21-37A-0B64: Agile Project Management

1-37A-0B91: Data Science using R and Python

Semester	Course Code	Course Title	Credit	CC/EC	Marks	
					Internal	External
<b>For School of Management Studies, CUSAT</b>						
		<b>Data Science Using R and Python</b>	<b>3</b>	<b>EC</b>	<b>50</b>	<b>50</b>
<b>For Recognized Colleges, CUSAT</b>						
		<b>Data Science Using R and Python</b>	<b>3</b>	<b>EC</b>	<b>40</b>	<b>60</b>

**Course Outcomes:** On successful completion of the course the student will be able to :

Course Outcomes	Cognitive Abilities	Course Outcomes
CO1	Remembering	Ability to recall the various discipline that contribute to a successful data science effort.
CO2	Understanding	Understand the processes of data science identifying the problem to be solved, data collection, preparation, modelling, evaluation and visualization.
CO3	Applying	Develop skills to use R and Python to do the exploratory data analysis on real time datasets
CO4	Analyzing	Impart skills to analyze real time problems using R and Python
CO5	Evaluating	Make the students capable to evaluate the problem of knowledge extraction as combinations of data filtration, analysis and exploration methods.
CO6	Creating	Create an open and safe environment by encouraging conversation and experimentation, in order to surface problems and impediments that are slowing the team down or preventing its ability to deliver value.

**CO-PSO Mapping**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	2	3	3	3	3			2		2		2
CO2		2	3	2	3				2			
CO3	3					2				3	3	3
CO4				3			3	3	3			
CO5	2	3	3	3		3						
CO6			3		3				3	3	3	3

## Module I

Introduction to Data Science ▪ Data Science in various fields ▪ Data analytics Life cycle ▪ Data scientist ▪ Data science team ▪ Types of data ▪ Classification of digital data ▪ Source of data

## Module II

Exploratory Data Analysis ▪ Data Preprocessing ▪ Data Transformation ▪ Data reduction Feature extraction ▪ Univariate and multivariate analysis

## Module III

Mathematics for DS ▪ Probability ▪ Statistics ▪ Linear algebra ▪ Calculus for DS ▪ ANOVA and Hypothesis testing

## Module IV

Introduction to R ▪ Basic Operations in R ▪ Math Operations in R ▪ Control structures ▪ Functions in R ▪ Import and Export files in R ▪ Joins ▪ One way and Two way tables, Matrices. R-Package for ML

## Module V

Introduction to Python ▪ Operations in Python ▪ Packages ▪ Data types ▪ Functions ▪ Error Handling ▪ Data Analytics ▪ Visualization in Python ▪ ML and AI Libraries

## References:

1. Chantal D. Larose, Daniel T. Larose, Data Science Using Python and R ,Wiley,2019.
2. B,UmaMaheswari, R.Sujatha, Introduction to Data Science : Practical Approach with R and Python, 2021,Wiley.
3. WesMcKinney, Python for data analysis ,2018,OReilly.
4. Paul Barry,Head First Python, 2016, O'Reilly,.

21-37A-0B92: Artificial Intelligence for Business

Semester	Course Code	Course Title	Credit	CC/EC	Marks	
					Internal	External
For School of Management Studies, CUSAT						
		Artificial Intelligence for Business	3	EC	50	50
For Recognized Colleges, CUSAT						
		Artificial Intelligence for Business	3	EC	40	60

**Course Outcomes:** On successful completion of the course the student will be able to :

Course Outcomes	Cognitive Abilities	Course Outcomes
CO1	Remembering	Recall concepts of Artificial Intelligence and Machine Learning.
CO2	Understanding	Enable the incumbents to understand the AI and the areas of its application
CO3	Applying	Develop skills to apply the fundamental concepts of extraction, clustering, prediction, as well as search and planning techniques
CO4	Analyzing	Analyze the organizational use of AI and organizational challenges related to the management of AI in businesses.
CO5	Evaluating	Make the students capable to evaluate the impact AI,ML and DL in Business on both operational and strategic levels
CO6	Creating	Discuss, Design and Create applications that use AI and Machine learning

**CO-PSO Mapping**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	2	3	3	3	3			2		2		2
CO2		3	3	3	3				2			
CO3	3					2				3	3	3
CO4				3			3	3	3			
CO5	2	3	3	3		3						
CO6			2		3				3	3	3	3

## Module I

Introduction to AI ▪ Business Innovation with Big data and AI ▪ Overlapping of AI with other fields ▪ Ethics and privacy issues ▪ AI and predictive analytics ▪ Application areas ▪ Segmentation and Clustering

## Module II

Introduction to ML ▪ ML Workflow ▪ Learning Algorithms ▪ Supervised Learning Algorithms for Forecasting ▪ Supervised Learning Algorithms with Applications in Predictive Analytics. ▪ Unsupervised Learning Algorithms ▪ Decision trees ▪ Neural networks

## Module III

Deep learning ▪ Analyzing big data ▪ DL Models ▪ Applications to Deep learning in Business ▪ Deep learning for e commerce ▪ Recommendation engines ▪ Applications of recommendation engines in business

## Module IV

Natural Language processing ▪ Use case of NLP ▪ Text analytics ▪ Sentimental analytics ▪ Applications of NLP in Business ▪ Customer service ▪ Market intelligence ▪ Sentiment technology in business

## Module V

Employing AI in Business ▪ Analytics Landscape ▪ Application areas ▪ Embedding AI in to Business process ▪ Artificial Intelligence for Growth ▪ AI for customer service ▪ Using AI for marketing Principles and Best Practices ▪ Kanban

## References:

1. Lansiti Marco, Lakhani Karim R, Competing in the age of AI : strategy and leadership when algorithms and networks run the world, Harvard Business Review Press, 2020,
2. Davenport Thomas H, The AI advantage : how to put the artificial intelligence revolution to work, Cambridge, Massachusetts ,The MIT Press,2018,
3. Upadhyay, M. A. Artificial Intelligence for Managers. BPB Publications.2020,

21-37A-0B93: Data Visualization Techniques

Semester	CourseCode	Course Title	Credit	CC/ EC	Marks	
					Internal	External
<b>For School of Management Studies, CUSAT</b>						
	21.37A-##	Data Visualization Techniques	3	EC	50	50
<b>For School of Management Studies, CUSAT</b>						
	21.37A-##	Data Visualization Techniques	3	EC	40	60

**Course Outcomes: On successful completion of the course the student will be able to:**

Course Outcomes	Cognitive Abilities	Course Outcomes
CO1	Remembering	Recall the types of design principles of data visualization
CO2	Understanding	Understand the cognitive elements in visual perception
CO3	Applying	Conduct exploratory data analysis using visualization, Apply data transformations such as aggregation and filtering for visualization.
CO4	Analyzing	Analyze the concepts of perception and cognition to evaluate visualization design alternatives.
CO5	Evaluating	Evaluate the appropriateness of different types of charts and design elements
CO6	Creating	Design and build dashboards for effective communication of insights from data

**CO-PSO Mapping**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	3	3	3	3	3	2		2		3		2
CO2		3	3	3	3	3	3		2			
CO3	3					3	3			2	2	3
CO4				3		2		2	2	3		2
CO5		3	3	3		3	3			3		3
CO6	3		2	3	3	3	3		3	3	2	3

## **Module 1**

Introduction to Data Visualization, Data Foundations: Types of Data, Data Preprocessing, Data sources, Extracting, Transforming and Loading data, Field Operations, Data joining, Working with multiple worksheets, Numeric calculations, Sorting and Filtering.

## **Module 2**

The Visualization Process, Design elements, Applications of Data Visualization, Determine business goals and Identifying your audience, Determine report types and defining user experience requirements, Principles of visual perception.

## **Module 3**

Visualization Techniques for Spatial Data; Exploratory Data Analysis, Common Visualization tools, Bar Chart, Vertical & Horizontal, Pie Chart, Line Chart, Area Chart, Tree maps, Heat Maps, Stacked & Grouped Bar Chart, Stacked Area Chart, Stream graph, Line Chart with Multiple Lines, Scatter plots, Candlestick Charts, Waterfall charts, Bubble Charts, Surface Charts, Map Charts, Infographics.

## **Module 4**

Visualization Techniques for Multivariate Data; Data Analysis Expressions, Aggregate functions and Calculated fields, Designing Effective Visualizations, Structures for Evaluating Visualizations.

## **Module 5**

Forecasting and Trend lines, Text Analysis and Visualization, Word clouds, Word trees and Tag clouds, Comparing and Evaluating Visualization Techniques; Dashboards and Reports, Building Dashboards, Slicers, Dynamic dashboards. Hands on training using visualization tools such as Tableau and Power BI and Neo4j.

## **References**

1. Aakash Gohil, (2022), Data Visualization & Storytelling for Business Analysts: Tips, Techniques, Best Practices and the Mindset, Publisher: Notion Press
2. Alexander Loth, (2019), Visual Analytics using Tableau, Wiley Publishers
3. Andy Kirk, (2012), Data Visualization: a successful design process, Packt Publishing Limited
4. Claus O. Wilke, (2019), Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, Publisher: Shroff/O'Reilly
5. Colin Ware, (2008), Visual Thinking for Design, Publisher: Morgan Kaufmann
6. Nathan Yau, (2011), Visualize This- The FlowingData Guide to Design, Visualization, and Statistics, Wiley.
7. Scott Murray, (2013), Interactive Data Visualization for the Web, O'Reilly
8. Tamara Munzner, (2014), Visualization Analysis and Design, CRC Press

### 21.37A-0B94: TEXT MINING AND ANALYTICS

Semester	Course Code	Course Title	Credit	CC/ EC	Marks	
					Internal	External
<b>For School of Management Studies, CUSAT</b>						
	21.37A-0B94	Text Mining and Analytics	3	EC	50	50
<b>For School of Management Studies, CUSAT</b>						
	21.37A-0B94	Text Mining and Analytics	3	EC	40	60

**Course Outcomes: On successful completion of the course the student will be able to:**

Course Outcomes	Cognitive Abilities	Course Outcomes
CO1	Remembering	Recollect the important terminologies like stemming, lemmatization and Bag of words
CO2	Understanding	Understand the fundamental concepts of information retrieval and natural language processing
CO3	Applying	Apply the concepts of text analytics in business scenarios and gain meaningful insights.
CO4	Analyzing	Analyze the various techniques and methodologies used for text analytics
CO5	Evaluating	Compare different approaches to gaining insights from textual data, evaluate the appropriateness of different tools in different contexts.
CO6	Creating	Prepare a detailed plan and design strategy to unearth valuable insights from raw textual data

### CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	3	2	2	3	2	2			3	3		2
CO2		2	3	3	2	3	3		3	3		
CO3	3						3	2			2	3
CO4				3		2		2	3	3	3	3
CO5	3	2	2	2		2	3		3	2		3
CO6	3		2	3	2	3	3		3	3	2	3



## **Module 1**

Introduction and Basic Text Processing; Introductory overview of Text Mining, Data Mining vs. Text Mining, Text Mining and Text Characteristics, Predictive Text Analytics, Text Mining Real time case analysis of business scenarios

## **Module 2**

Extracting meaning from text, Language Modeling, Part-of-speech (POS) tagging, Tokenization, N-grams: individual words vs. multi-word phrases and context

## **Module 3**

Text mining modelling ,Text Corpus, Sentence Tokenization, Word Tokenization, Removing special Characters, Removing Stopwords, Stemming & lemmatization, Part of Speech Tagging, Feature Extraction, Bag of words model, Text classification problem

## **Module 4**

Web scraping, Concepts and tools, Inspecting the HTML tree, The scraping workflow, Crawling, Parsing and Transforming, Single webpage scraping, Pagination, Scraping images, Legal issues in web scraping, Real time web scraping using DataMiner

## **Module 5**

Sentiment Analysis and Opinion Mining, Defining sentiment and polarity, Business Applications, Tools and techniques, Text Analytics using Microsoft Azure, Text Summarization and Text Classification using MonkeyLearn.

## **References**

1. Dipanjan Sarkar, (2016), Text Analytics with Python: A Practical Real-World Approach to Gaining Actionable Insights from Your Data, Publisher: Apress; 1st ed. Edition, ISBN-10: 148422387X
2. Gabe Ignatow and Rada Mihalcea, (2017), Text Mining: A Guidebook for the Social Sciences, SAGE Publications, Inc
3. Goutam Chakraborty, Murali Pagolu, and Satish Garla , (2013) Text Mining and Analysis: Practical Methods, Examples, and Case Studies Using SAS, Publisher : SAS Institute; ISBN-10: 161290551X

4. James Sanger and Ronen Feldman, (2006), The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data, Publisher: Cambridge University Press; ISBN-10: 0521836573
5. Jens Albrecht, Sidharth Ramachandran and Christian Winkler, (2020), Blueprints for Text Analysis Using Python: Machine Learning-Based Solutions for Common Real World (NLP) Applications, Shroff/O'Reilly Publisher
6. Sholom M. Weiss, Nitin Indurkha, & Tong Zhang (2015) Fundamentals of Predictive Text Mining, Springer Publications
7. Wes McKinney (2017) Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, Publisher : O'Reilly

## 21-37A-0B64: Agile Project Management

Semester	Course Code	Course Title	Credit	CC/EC	Marks	
					Internal	External
For School of Management Studies, CUSAT						
		Agile Project Management	3	EC	50	50
For Recognized Colleges, CUSAT						
		Agile Project Management	3	EC	40	60

**Course Outcomes:** On successful completion of the course the student will be able to :

Course Outcomes	Cognitive Abilities	Course Outcomes
CO1	Remembering	Ability to recall the basic concepts of projects in all areas of modern business.
CO2	Understanding	Enable the incumbents to understand the concepts delivered at the remembrance level to make them cognitively fit for application. They should be able to understand the philosophy and principles of Agile.
CO3	Applying	Develop skills to apply various agile and modern project management methodologies.
CO4	Analyzing	Impart skills to analyze, assess, plan, deliver, confirm, and track agile project value
CO5	Evaluating	Make the students capable to evaluate the impact of scrum and other agile methods
CO6	Creating	Create an open and safe environment by encouraging conversation and experimentation, in order to surface problems and impediments that are slowing the team down or preventing its ability to deliver value.

### CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
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CO2		3	2	3	3				3			
CO3	3					2				3	3	3
CO4				3			3	3	3			
CO5	2	3	3	3		3						
CO6			2		3				3	3	3	3

## Module I

Core Agile Concepts Overview ▪ Traditional Project Management Methodologies ▪ Drawbacks of Waterfall Methodologies ▪ Agile Approach ▪ Agile and Traditional Project Management ▪ Choice of Methodologies/Frameworks ▪ Importance of All Stakeholders Sharing an Agile Perspective

## Module II

The Agile Manifesto Overview ▪ Manifesto Contributors ▪ Manifesto Values ▪ Manifesto Principles ▪ Value driven delivery ▪ Common Agile roles ▪ Agile Leadership

## Module III

Stakeholder Engagement ▪ Team Performance ▪ Agile Estimation ▪ Prioritization ▪ Agile Communication methods ▪ Interpersonal Skills ▪ Continuous Improvement

## Module IV

Scrum Methodology Elements and Terminology Overview ▪ Scrum Planning ▪ Scrum Sprint Planning and Executing ▪ Scrum Master/Coach ▪ Product Owner/Customer ▪ Team Members/Developers ▪ Develop Epics and Stories ▪ Create Stories ▪ Create Product Backlog

Iterations/Sprints Overview ▪ Iteration Planning Meeting ▪ Daily Standup Meetings ▪ Sprint Reviews ▪ Closing: Sprint, Release, and Product Retrospectives

## Module V

Other Agile principles and best practices ▪ XP Principles ▪ Dynamic Systems Development Method ▪ Lean Software Development Principles and Best Practices ▪ Kanban

## References:

1. Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison-Wesley Professional, 2021.
2. Ken Schwaber and Mike Beedle, Agile Software Development with SCRUM, Prentice-Hall, 2015.
3. Wysocki, Effective Project Management, Traditional, Agile and XP ,Wiley Publishers,2014.