Artificial Intelligence and Data Science

(Academic Year: Jan 2024 - Jun 2024)

Course Code: CSC601	
Course Name: Data Analytics and Visualization	
Course Teacher: Aditi Malkar	
Course Outcomes (CO): *At the End of the course students will be able to*	
CO.1	Comprehend basics of data analytics and visualization.
CO.2	Apply various regression models on given data set and perform prediction.
CO.3	Demonstrate advance understanding of Time series concepts and analysis of data using various time series models.
CO.4	Analyze Text data and gain insights
CO.5	Experiment with different analytics techniques and visualization using R.
CO.6	Experiment with different analytics techniques and visualization using Python.

Course Lesson Plan

Sr. No.	Proposed Date	Topics	Delivery Mode	CO	Assessment Tool	Ref. book	Actual Date	Remark
1	9/1/24	Information about syllabus, assessment and course outcomes. Introduction to Data analytics and life cycle.	Lecture	CO1	UT1, Q1	T1		
2	10/1/24	Data Analytics Lifecycle overview: Key Roles for a Successful Analytics, Background and Overview of Data Analytics Lifecycle Project **Phase 1**: Discovery: Learning the Business Domain, Resources Framing the Problem, Identifying Key Stakeholders. Interviewing the Analytics Sponsor, Developing Initial Hypotheses Identifying Potential Data Sources.	Lecture	CO1	UT1, Q1	T1, R1		
3	11/1/24	**Phase 2**: Data Preparation: Preparing the Analytic Sandbox, Performing ETLT, Learning About the Data, Data Conditioning, Survey and visualize, Common Tools for the Data Preparation Phase Phase 3: Model Planning: Data Exploration and Variable Selection, Model Selection ,Common Tools for the Model Planning Phase	Lecture	CO1	UT1, Q1	T1, R1		
4	16/1/24	**P**hase 4: Model Building: Common Tools for the Model Building Phase Phase 5: Communicate Results Phase 6: Operationalize	Lecture	CO1	UT1, Q1	T1, R1		
5	17/1/24	Regression Model : Introduction to simple Linear Regression: The Regression Equation, Fitted Value and Residuals, Least Square	Lecture	CO2	UT1, Q2, A1	T1		
6	18/1/24	Introduction to Multiple Linear Regression: Assessing the Model, Cross-Validation, Model Selection and Stepwise Regression	Lecture	CO2	UT1, Q2, A1	T1		

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7	23/1/24	Prediction Using Regression, Logistic Regression: Logistic Response function and logit	Lecture	CO2	UT1, Q2, A1	T1		
8	25/1/24	Logistic Regression and GLM, Generalized Linear model	Lecture	CO2	UT1, Q2, A1	T1		
9	26/1/24	**Republic Day** (Holiday)						
10	27/1/24	Predicted values from Logistic Regression, Interpreting the coefficients and odds ratios	Lecture	CO2	UT1, Q2, A1	T1		
11	30/1/24	Linear and Logistic Regression: similarities and Differences, Assessing the models	Lecture	CO2	UT1, Q2, A1	T1		
12	1/2/24	Time series: Overview of Time Series Analysis Box-Jenkins Methodology, Components of time series	Lecture	CO3	UT1, Q3, A1	T1		
13	2/2/24	ARIMA Model, Building and Evaluating an ARIMA Model	Lecture	CO3	UT1, Q3, A1	T1		
14	6/2/24	**Unit Test-1**	Lecture	CO1,2,3				
15	8/2/24	Autocorrelation Function (ACF)	Lecture	CO3	UT1, A1	T1		
16	9/2/24	Autoregressive Models, Moving Average Models		CO3	UT1, A1	T1		
17	13/2/24	ARMA and ARIMA Models	Lecture	CO3	UT1, A1	T1		
18	15/2/24	Reasons to Choose and Cautions, Practice problems on calculating time series components	Lecture	CO3	UT1, A1	T1		
19	16/2/24	Text Analytics : History of text mining, Roots of text mining	Lecture	CO4	UT2, Q1, A2	T4		
20	20/2/24	Overview of seven practices of text analytic	Lecture	CO4	UT2, Q1, A2	T4		
21	22/2/24	Application and use cases for Text mining	Lecture	CO4	UT2, Q1, A2	T4		
22	23/2/24	Extracting meaning from unstructured text, Summarizing Text	Lecture	CO4	UT2, Q1, A2	T4		
23	27/2/24	Text Analysis Steps, Collecting Raw Text ,Representing Text	Lecture	CO4	UT2, Q1, A2	T4		

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24	29/2/24	A Text Analysis Example, Term Frequency-Inverse Document Frequency (TFIDF)	Lecture	CO4	UT2, Q1, A2	T4		
25	29/2/24	Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.	Lecture	CO4	UT2, Q1, A2	T4		
26	1/3/24	Data analytics and visualization with R - Introduction to R	Lecture	CO5	UT2, Q1, A2	T3, R2		
27	5/3/24	Data Import and Export, Attribute and Data type	Lecture	CO5	UT2, Q1, A2	T3, R2		
28	7/3/24	Descriptive statistics.	Lecture	CO5	UT2, Q1, A2	T3, R2		
29	7/3/24	Exploratory Data Analysis: Visualization before analysis	Lecture	CO5	UT2, Q1, A2	T3, R2		
30	8/3/24	Mahashivratri (Holiday)						
31	12/3/24	Dirty Data, visualizing single variable, examining Multiple variable	Lecture	CO5	UT2, Q1, A2	T3, R2		
32	14/3/24	Data Exploration versus presentation.	Lecture	CO5	UT2, Q1, A2	T3, R2		
33	15/3/24	Data analytics and Visualization with Python - Essential Data Libraries for data analytics: Pandas, NumPy	Lecture	CO6	UT2, Q1, A2	T2, R3		
34	19/3/24	SciPy, Plotting and visualization with python: Introduction to Matplotlib	Lecture	CO6	UT2, Q1, A2	T2, R3		
35	21/3/24	Basic Plotting with Matplotlib, Create Histogram	Lecture	CO6	UT2, Q1, A2	T2, R3		
36	22/3/24	Bar Chart, Pie chart, Box Plot	Lecture	CO6	UT2, Q1, A2	T2, R3		
37	26/3/24	Violin plot using Matplotlib, Introduction to Seaborn Library	Lecture	CO6	UT2, Q1, A2	T2, R3		
38	28/3/24	Multiple Plots, Regression Plot, regplot.	Lecture	CO6	UT2, Q1, A2	T2, R3		
39	29/3/24	Good Friday (Holiday)						
40	2/4/24	Unit Test-2	Lecture	CO4, 5, 6				
41	3/4/24	Unit Test-2	Lecture	CO4, 5, 6				

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42	4/4/24	**Assignment-2, Course Exit Survey**						
43	5/4/24	Remedial Session						
44	15/5/24	**University ESE Examination**						

Text Books:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education services Wiley Publication
2. Data Analytics using Python: Bharati Motwani, Wiley Publications.
3. Practical Statistics for Data Scientists 50+ Essential Concepts Using R and Python, O'Reilly Publications 2nd edition
4. Practical Text Mining and statistical Analysis for non-structured text data applications, 1st edition, Grey Miner, Thomas Hill.

Reference Books:

1. Data Mining, Concepts and Techniques: 3rd edition, Jiawei Han, Micheline Kamber and Jian Pei
2. Data Analytics using R, Bharati Motwani, Wiley Publications
3. Python for Data Analysis: 3rd Edition, Wes McKinney, Publisher (s): O'Reilly Media, Inc.

Course Instructor: Aditi Malkar