

**Computer Science paper-IV
Data Analytics
[Discipline Specific Course]**

Semester: VI

Credits: 02

Subject Code: BS62204

Lectures: 36

Course Outcomes:

At the end of this course, the learner will be able to:

- Apply appropriate analytic techniques and tools to analyze data, create models, and identify insights that can lead to actionable results.
- Develop understanding of key technologies in data analytics.
- Use various data mining patterns to access the data .
- Analyze various sources of text data and explain the text and social media analytics.

Unit 1: Introduction to Data Analytics

06

- Concept of data analytics
- Data analysis vs Data analytics
- Types of analytics
- Diagnostic Analytics, Predictive Analytics , Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis
- Mathematical models - Concept Model evaluation: metrics for evaluating classifiers - Class imbalance - AUC, ROC (Receiver-Operator Characteristic) curves, Evaluating value prediction models

Unit 2: Machine Learning Overview

10

- Introduction to Machine Learning, deep learning, Artificial intelligence
- Applications for machine learning in data science
- The modeling process
 - Engineering features and selecting a model, Training the model, Validating the model, Predicting new observations
 - Types of machine learning Supervised learning, Unsupervised learning, Semi-supervised learning, ensemble techniques
- Regression models
 - Linear Regression, Polynomial Regression, Logistic Regression
- Concept of classification, clustering and reinforcement learning.

Unit 3: Mining Frequent Patterns, Associations, and Correlations

10

- What kind of patterns can be mined
 - Class/Concept Description: Characterization and Discrimination, Mining Frequent Patterns, Associations, and Correlations, Classification and Regression for Predictive Analysis, Cluster Analysis, Outlier Analysis
- Mining frequent patterns - Market Basket Analysis.
- Frequent Itemsets, Closed Itemsets, and Association Rules
- Frequent Itemset Mining Methods
 - Apriori Algorithm
 - Generating Association Rules from Frequent Itemsets .
 - Improving efficiency of apriori algorithm

Board of Studies	Name	Signature
Chairperson (HoD)	Ms. Ashwini Kulkarni	



- Frequent pattern growth (FP-growth) algorithm

Unit 4: Social Media and Text Analytics	10
<ul style="list-style-type: none"> ● Overview of social media analytics ● Social Media Analytics Process, ● Seven layers of social media analytics, accessing social media data ● Key social media analytics methods <ul style="list-style-type: none"> ○ Social network analysis Link prediction, Community detection, Influence maximization, Expert finding, Prediction of trust and distrust among individuals ● Introduction to Natural Language Processing <ul style="list-style-type: none"> ○ Text Analytics : Tokenization, Bag of words, Word weighting : TF-IDF, n-Grams, stop words, Stemming and lemmatization, synonyms and parts of speech tagging ● Sentiment Analysis ● Document or text summarization ● Trend analytics Challenges to social media analytics 	

Recommended Reference Books:

- Cathy O'Neil and Rachel Schutt , “*Doing Data Science*”, O'Reilly, 2015.
- Chirag Shah , *A Hands-On Introduction to Data Science*, Washington Cambridge University Press
- Field Cady, John Wiley & Sons , *The Data Science Handbook*, Inc, 2017
- Gypsy Nandi, Rupam Sharma , *Data Science Fundamentals and Practical Approaches*, BPB Publications, 2020

Journals:

- Springer.com

Websites:

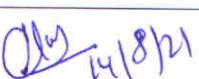
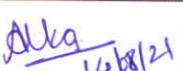
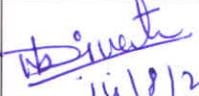
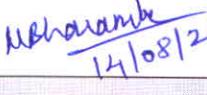
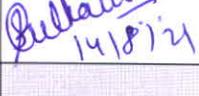
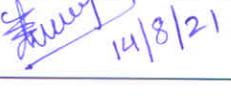
- Github
- Kaggle.com
- <https://www.analyticsvidhya.com/>

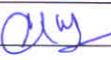
E-resources:

- **MOOCS -Data camp, Swayam etc..**

Board of Studies	Name	Signature
Chairperson (HoD)	Ms. Ashwini Kulkarni	



Board of Studies	Name	Signature (in white cell)
Chairperson (HoD)	Ms. Ashwini Kulkarni	 14/8/21
Faculty	Ms. Ashwini Kulkarni	 14/8/21
Faculty	Ms. Alka Kalhapure	 14/8/21
Subject Expert (Outside SPPU)	Prof. Mr. Aniket Nagane	 14/8/21
Subject Expert (Outside SPPU)	Dr. Manisha Divate	 14/8/21
VC Nominee	Dr. Manisha Bharambe	 14/8/21
Industry Expert	Ms. Snehal Biyala	 14/8/21
Alumni	Ms. Mamta Choudhary	 14/8/21

Board of Studies	Name	Signature
Chairperson (HoD)	Ms. Ashwini Kulkarni	 14/8/21