



Re-Accredited B++ 2.86 CGPA by NAAC

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.


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-:પરિપત્ર:-

યુનિવર્સિટી સંલગ્ન વાણિજ્ય વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, વાણિજ્ય વિદ્યાશાખાની તા.૦૧/૦૪/૨૦૨૫ ની સભાના ઠરાવ ક્રમાંક:૩૩ અંતર્ગત B.Com. Data Science નો અભ્યાસક્રમ તૈયાર કરવા નિમણૂક કરેલ પેટાસમિતિની તા.૦૪/૦૪/૨૦૨૬ની સભા દ્વારા NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૬ - ૨૭ થી અમલમાં આવનાર B.Com. Data Science (Honours) Sem.-7 & 8 નો તૈયાર કરવામાં આવેલ અભ્યાસક્રમ મંજૂર કરવા વાણિજ્ય વિદ્યાશાખાને કરેલ ભલામણ વાણિજ્ય વિદ્યાશાખાની તા.૦૮/૦૬/૨૦૨૬ની સભાના ઠરાવ ક્રમાંક:૧૫થી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૮/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૩૮ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક:ઓથો./પરિપત્ર/૧૩૭૬૫/૨૦૨૬
તા.૨૩/૦૬/૨૦૨૬


કુલસચિવ

પ્રતિ,

- (૧) યુનિવર્સિટી સંલગ્ન વાણિજ્ય વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારું.
- (૨) ડીનશ્રી, વાણિજ્ય વિદ્યાશાખા.
- (૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ.ગુ.યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારું.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
PROGRAM TITLE

Name of Program	Bachelor of Commerce with Honors in Data Science
Program Abbreviation	B.Com. Data Science (Honors)
Duration	4th Year, Semester wise (7 th & 8 th semester)
Eligibility Criteria	Completion of Undergraduate Program (Sem 1-6) Data Science Basic knowledge of Python, Statistics, and Mathematics recommended
Pre-requisite	The core objective of bachelor's degree in BCom Data Science will, enable students to gain a basic understanding of the economy, demand ,for everything, and how to manage the prices of all the things we buy as we go through life. The scope of this field is so broad.
Medium of Instruction	English
Objective of Program	The core objective of bachelor's degree in BCom Data Science will, enable students to gain a basic understanding of the economy, demand ,for everything, and how to manage the prices of all the things we buy as we go through life. The scope of this field is so broad.
Program Outcome (PO)	<p>PO1: Knowledge of Computing Students will gain strong theoretical and practical knowledge in AI, ML, Cloud Computing, and Data Analytics. They will understand modern tools and technologies used in the data science field.</p> <p>PO2: Problem Analysis Students will be able to analyze complex real-world problems and identify appropriate computational and analytical solutions using data-driven approaches.</p> <p>PO3: Design & Development Students will design and develop intelligent systems, predictive models, and applications using programming, machine learning, and data processing techniques.</p> <p>PO4: Modern Tool Usage Students will effectively use modern tools like Python, Tableau, Cloud platforms, and ML libraries to build scalable and efficient solutions.</p> <p>PO5: Professional & Ethical Responsibility Students will understand ethical issues related to AI, data privacy, and security, and apply professional responsibility in developing solutions.</p>
Program Specific Outcomes (PSO)	<p>PSO1: AI & Machine Learning Expertise Students will gain expertise in implementing AI and ML algorithms for solving real-world problems such as prediction, classification, and clustering.</p> <p>PSO2: Data Analytics Skills Students will be able to perform data preprocessing, visualization, and analysis using tools like Python, Pandas, and Tableau.</p> <p>PSO3: Software Development using Python Students will develop applications using advanced Python concepts including OOP, GUI, and file handling.</p> <p>PSO4: Cloud & Security Understanding Students will understand cloud infrastructure, deployment models, and security mechanisms for modern IT systems.</p> <p>PSO5: Industry-Oriented Project Skills Students will gain hands-on experience through projects/OJT, enabling them to apply data science techniques in real-world scenarios.</p>

Mapping between Pos and PSOs		PS01	PS02	PS03	PS04	PS05	
	P01	✓	✓	✓	✓	✓	
	P02	✓	✓		✓	✓	
	P03	✓	✓	✓		✓	
	P04	✓	✓	✓	✓	✓	
	P05	✓		✓	✓	✓	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Programme Name :- B.Com. Data Science (Honors)

As Per NEP 2020

About programme :- Fourth Year (Semester-7)

Teaching & Evaluation Scheme:- As per NEP 2020

Course Category	Course Code	Course Title	Mark sheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	BCDS7MJ1	1.Artificial Intelligence	1. Artificial Intelligence	6	3	2	1.5 Hr.	30 Mu	3	1	35	15	35	15	70	30
	BCDS7MJ2	2.Predictive Analytics	2. Predictive Analytics	6	2	4	1 Hr.	1 Hr.	2	2	25	25	25	25	50	50
	BCDS7MJ3	3.Cloud Technology	3. Cloud Technology	6	4	-	2 Hr.	-	4	-	50	-	50	-	100	-
MINOR	BCDS7MI1	1.Tableau (Data Visualization) OR	1.Tableau (Data Visualization) OR	6	2	4	1 Hr.	1 Hr.	2	2	25	25	25	25	50	50
	BCDS7MI1	1.Business Analytics Fundamentals OR	1.Business Analytics Fundamentals OR	6	3	2	1.5 Hr.	30 Mu	3	1	35	15	35	15	70	30
	BCDS7MI1	1. Mathematics	1. Mathematics	6	4	-	2 Hr.	-	4	-	50	-	50	-	100	-
RP/OJT	BCDS7OJT	OJT	OJT	6	-	-	-	-	6		50		50		100	

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	NIL					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MJ1					
Course Level	6					
Course Title	Artificial Intelligence (Theory)					
Credit	Theory:	3	Practical:	1	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand AI concepts and applications. CO2: Explain neural network architecture and learning process. CO3: Apply NLP techniques and preprocessing methods. CO4: Use word embedding techniques for NLP problems. CO5: Identify real world AI solutions.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓		
	CO3	✓	✓	✓	✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content (Theory)	Chapter 1 – Fundamentals of Artificial Intelligence <ul style="list-style-type: none"> ● Introduction to Artificial Intelligence Definition of AI, History of AI, Types of AI, Narrow AI, General AI, Super AI ● Future of Artificial Intelligence Emerging Trends (Automation, Generative AI, Smart Systems), Opportunities and Risks ● AI Ethics and Limitations Ethical Issues (Bias, Privacy, Job Displacement), Limitations of AI ● Areas of Artificial Intelligence Expert Systems Natural Language Processing (NLP) Neural Networks (Basic Concept), Robotics, Fuzzy Logic Systems ● Applications of AI Healthcare, Finance, Manufacturing, Education Chapter 2 – Neural Networks Fundamentals <ul style="list-style-type: none"> ● Introduction to Neural Networks Biological Neuron Artificial Neuron (Structure and Function) ● Activation Functions 					

	<p>ReLU (Rectified Linear Unit) Sigmoid Function Hyperbolic Tangent (tanh)</p> <ul style="list-style-type: none"> ● Neural Network Architectures <ul style="list-style-type: none"> Single-Layer Feed Forward Network Multi-Layer Feed Forward Network (ANN) Recurrent Neural Network (RNN) ● Learning Process in ANN <ul style="list-style-type: none"> Number of Layers Nodes (Neurons) in Layers Weights and Bias Direction of Signal Flow ● Training Mechanism <ul style="list-style-type: none"> Backpropagation Algorithm (Basic Concept) <p>Chapter 3 – Natural Language Processing</p> <ul style="list-style-type: none"> ● Introduction to NLP <ul style="list-style-type: none"> Definition and History Advantages and Disadvantages ● Components of NLP <ul style="list-style-type: none"> Natural Language Understanding (NLU) Natural Language Generation (NLG) ● Phases of NLP <ul style="list-style-type: none"> Lexical Analysis, Syntactic Analysis, Semantic Analysis Semantic Analysis, Discourse Integration Pragmatic Analysis ● Word Embedding Techniques <ul style="list-style-type: none"> Bag of Words (BoW) TF-IDF Word2Vec GloVe (Pre-trained Embedding) ● Challenges and Applications <ul style="list-style-type: none"> Limitations of BoW and TF-IDF Applications: Sentiment Analysis, Chatbots, Machine Translation, Spam Detection
Reference Books	<ol style="list-style-type: none"> 1. Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig. 2. Speech and Language Processing – Jurafsky & Martin. 3. Natural Language Processing with Python – Steven Bird, O’Reilly. 4. Deep Learning – Ian Goodfellow.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	<p>Internal Assessment : 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	NIL					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MJ1					
Course Level	6					
Course Title	Artificial Intelligence (Practical)					
Credit	Theory:	3	Practical:	1	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand AI concepts and applications. CO2: Explain neural network architecture and learning process. CO3: Apply NLP techniques and preprocessing methods. CO4: Use word embedding techniques for NLP problems. CO5: Identify real world AI solutions.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓		
	CO3	✓	✓	✓	✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – NLP Practical & Text Processing <ul style="list-style-type: none"> ● Data Preprocessing using NLTK <ul style="list-style-type: none"> Tokenization Stop Words Removal Stemming Lemmatization ● Text Analysis Techniques <ul style="list-style-type: none"> Frequency Distribution POS (Parts of Speech) Tagging Named Entity Recognition (NER) WordNet ● Practical Applications <ul style="list-style-type: none"> Text Cleaning using Python Basic Sentiment Analysis Implementation Spam Detection Mini Project Simple Chatbot using NLP ● Types of Ambiguity in NLP <ul style="list-style-type: none"> Lexical Ambiguity Syntactic Ambiguity Semantic Ambiguity 					

Reference Books	<ol style="list-style-type: none">1. Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig.2. Speech and Language Processing – Jurafsky & Martin.3. Natural Language Processing with Python – Steven Bird, O'Reilly.4. Deep Learning – Ian Goodfellow.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	Internal Assessment : 50% Marks External Assessment : 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	NIL					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MJ2					
Course Level	6					
Course Title	Predictive Analytics (Theory)					
Credit	Theory:	2	Practical:	2	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand predictive analytics concepts and applications. CO2: Explain regression and classification techniques. CO3: Apply data preprocessing and visualization methods. CO4: Build and evaluate predictive models. CO5: Develop solutions for real-world problems using predictive analytics.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓		
	CO3	✓	✓		✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 - Introduction to Predictive Analytics <ul style="list-style-type: none"> ● Basics of Predictive Analytics <ul style="list-style-type: none"> Definition and Importance Types of Analytics <ul style="list-style-type: none"> Descriptive Diagnostic Predictive Prescriptive ● Predictive Analytics Process <ul style="list-style-type: none"> Data Collection Data Cleaning Data Exploration Model Building Model Evaluation Deployment ● Data Types and Sources <ul style="list-style-type: none"> Structured Data Unstructured Data Internal vs External Data Sources ● Applications of Predictive Analytics <ul style="list-style-type: none"> Healthcare (Disease Prediction) 					

	<p>Finance (Risk Analysis, Fraud Detection) Marketing (Customer Segmentation) Retail (Demand Forecasting)</p> <p>Unit 2 – Predictive Models and Techniques</p> <ul style="list-style-type: none"> ● Introduction to Predictive Modeling <ul style="list-style-type: none"> Concept of Model Training and Testing Data ● Regression Techniques <ul style="list-style-type: none"> Linear Regression Multiple Linear Regression ● Classification Techniques <ul style="list-style-type: none"> Logistic Regression Decision Tree k-Nearest Neighbors (KNN) ● Model Evaluation Techniques <ul style="list-style-type: none"> Accuracy Precision and Recall Confusion Matrix Mean Squared Error (MSE) ● Overfitting and Underfitting <ul style="list-style-type: none"> Causes Prevention Techniques
Reference Books	<ol style="list-style-type: none"> 1. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die – Eric Siegel 2. An Introduction to Statistical Learning – Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani 3. Data Science for Business – Foster Provost, Tom Fawcett 4. Applied Predictive Modeling – Max Kuhn, Kjell Johnson 5. Coursera – Machine Learning / Predictive Analytics Courses 6. edX – Data Science Programs 7. Kaggle (Datasets and Practice)
Teaching Methodology	<ul style="list-style-type: none"> • Lectures and interactive discussions • Hands-on practical sessions using Python tools • Case study and problem-solving approach • Project-based learning • Use of ICT tools (Jupyter, Colab) • Assignments and group activities
Evaluation Method	<p>Internal Assessment : 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	NIL					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MJ4					
Course Level	6					
Course Title	Predictive Analytics (Practical)					
Credit	Theory:	2	Practical:	2	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand predictive analytics concepts and applications. CO2: Explain regression and classification techniques. CO3: Apply data preprocessing and visualization methods. CO4: Build and evaluate predictive models. CO5: Develop solutions for real-world problems using predictive analytics.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓		
	CO3	✓	✓		✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content (Practical)	Unit 1 – Data Preprocessing and Visualization <ul style="list-style-type: none"> ● Data Preprocessing using Python <ul style="list-style-type: none"> Handling Missing Values, Data Cleaning Data Transformation, Feature Scaling (Normalization, Standardization) ● Data Visualization <ul style="list-style-type: none"> Line Chart, Bar Chart, Histogram, Scatter Plot ● Tools and Libraries <ul style="list-style-type: none"> NumPy, Pandas, Matplotlib ● Practical Tasks <ul style="list-style-type: none"> Load dataset using Pandas Perform data cleaning Visualize dataset Unit 2 – Predictive Model Implementation <ul style="list-style-type: none"> ● Model Building using Python <ul style="list-style-type: none"> Linear Regression using sklearn Logistic Regression Model Decision Tree Implementation ● Model Evaluation <ul style="list-style-type: none"> Accuracy Calculation, Confusion Matrix using sklearn 					

	<ul style="list-style-type: none"> ● Mini Projects <ul style="list-style-type: none"> Sales Prediction Customer Churn Prediction House Price Prediction ● Model Improvement <ul style="list-style-type: none"> Cross Validation Feature Selection
Reference Books	<ol style="list-style-type: none"> 1. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die – Eric Siegel 2. An Introduction to Statistical Learning – Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani 3. Data Science for Business – Foster Provost, Tom Fawcett 4. Applied Predictive Modeling – Max Kuhn, Kjell Johnson 5. Coursera – Machine Learning / Predictive Analytics Courses 6. edX – Data Science Programs 7. Kaggle (Datasets and Practice)
Teaching Methodology	<ul style="list-style-type: none"> • Lectures and interactive discussions • Hands-on practical sessions using Python tools • Case study and problem-solving approach • Project-based learning • Use of ICT tools (Jupyter, Colab) • Assignments and group activities
Evaluation Method	<p>Internal Assessment: 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MJ5					
Course Level	6					
Course Title	Cloud Technology					
Credit	Theory:	4	Practical:	-	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand cloud architecture and deployment models. CO2: Explain virtualization and hypervisors. CO3: Describe data center networking and automation. CO4: Apply cloud storage and database concepts. CO5: Analyze cloud security and emerging technologies.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓		✓	
	CO2	✓	✓		✓	
	CO3	✓	✓	✓	✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – Fundamentals of Cloud Computing <ul style="list-style-type: none"> ● Introduction to Cloud Computing <ul style="list-style-type: none"> Defining Cloud Computing, Roots of Cloud Computing Mainframes to Cloud, Grid and Utility Computing Hardware Virtualization ● Cloud Service Models <ul style="list-style-type: none"> Cloud Architecture and Platforms, IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Software as a Service) ● Cloud Deployment Models <ul style="list-style-type: none"> Private Cloud, Public Cloud, Hybrid Cloud ● Features and Applications <ul style="list-style-type: none"> Desired Features of Cloud, Applications of Cloud Computing Advantages and Disadvantages Chapter 2 – Virtualization and Cloud Infrastructure <ul style="list-style-type: none"> ● Introduction to Virtualization <ul style="list-style-type: none"> Cloud Virtualization Basics, Characteristics of Virtualization ● Types of Virtualization <ul style="list-style-type: none"> Hardware Virtualization, Software Virtualization Full, Para, and Partial Virtualization, OS-Level Virtualization ● Advanced Virtualization <ul style="list-style-type: none"> Programming Level Virtualization, Application Level Virtualization 					

	<p>Storage Virtualization, Desktop Virtualization, Network Virtualization</p> <ul style="list-style-type: none"> ● Hypervisors and Virtual Machines Type 1 and Type 2 Hypervisors, Creating and Managing Virtual Machines ● Data Center Virtualization Virtualization of Clusters, Data Center Automation <p>Chapter 3 – Data Center and Cloud Storage Systems</p> <ul style="list-style-type: none"> ● Data Center Fundamentals Evolution of Data Centers, Key Components ● Data Center Networking Network Topologies, Software-Defined Networking (SDN) ● Automation and Scaling Data Center Automation, Infrastructure as Code (IaC) Scalability and Elasticity ● Cloud Storage Object Storage, Block Storage, File Storage, Data Consistency and Durability ● Cloud Databases SQL and NoSQL Databases, Data Scaling and Replication <p>Unit 4 – Cloud Security and Emerging Technologies</p> <ul style="list-style-type: none"> ● Cloud Security Security Challenges Identity and Access Management (IAM) Authentication and Access Control ● Data Security Data Protection Techniques, Securing Private and Public Clouds ● Service Level Agreements SLA Metrics and Monitoring ● Emerging Technologies in Cloud Serverless Computing, Edge and Fog Computing AI and Machine Learning with Cloud, Distributed Ledger Technology (DLT) 5G and Cloud-Native Networking Kubernetes and Containers
Reference Books	<ol style="list-style-type: none"> 1. Cloud Computing – Rajkumar Buyya. 2. Cloud Computing Concepts – Thomas Erl. 3. Mastering Cloud Computing – Rajkumar Buyya. 4. Kubernetes Up & Running – Brendan Burns.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	<p>Internal Assessment : 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MI1					
Course Level	6					
Course Title	Tableau (Data Visualization) (Theory)					
Credit	Theory:	2	Practical:	2	Total: 4	
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand concepts of data visualization and Tableau environment CO2: Create various charts and visualizations using Tableau CO3: Apply data processing techniques like filtering, grouping, and joining CO4: Design interactive dashboards and stories CO5: Perform data analysis and solve real-world problems using Tableau					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓		✓	
	CO2	✓		✓	✓	
	CO3	✓	✓	✓	✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – Fundamentals of Data Visualization & Tableau <ul style="list-style-type: none"> ● Introduction to Data Visualization <ul style="list-style-type: none"> Definition and Importance Data Types (Categorical, Numerical) Principles of Effective Visualization Types of Charts <ul style="list-style-type: none"> Line Chart, Bar Chart, Pie Chart Histogram, Scatter Plot ● Introduction to Tableau <ul style="list-style-type: none"> Overview of Tableau Tableau Products (Desktop, Public, Server) Tableau Interface and Components ● Data Handling Basics <ul style="list-style-type: none"> Data Sources (CSV, Excel, Database) Connecting to Data Data Types in Tableau Dimensions and Measures Data Filtering and Sorting ● Basic Visualization Concepts <ul style="list-style-type: none"> Creating Worksheets Marks Card (Color, Size, Label, Detail) Formatting and Customization Unit 2 – Advanced Concepts & Analytical Techniques <ul style="list-style-type: none"> ● Advanced Visualization Concepts 					

	<p>Dual Axis Charts, Tree Maps and Highlight Tables Heat Maps and Geographic Maps, Hierarchies and Drill-down Hierarchies and Drill-down</p> <ul style="list-style-type: none"> ● Data Processing Techniques Data Blending and Data Joining, Union of Data, Data Extraction ● Analytical Techniques Clustering Concepts Trend Lines and Forecasting Introduction to Regression ● Data Organization Sets and Groups, Parameters and Calculated Fields Filters (Context, Top N, Conditional)
Reference Books	<ol style="list-style-type: none"> 1. Tableau Your Data! – Daniel G. Murray 2. Learning Tableau – Joshua N. Milligan 3. Storytelling with Data – Cole Nussbaumer Knaflic 4. Tableau Cookbook – Lorna Brown 5. The Big Book of Dashboards – Steve Wexler, Jeffrey Shaffer, Andy Cotgreave 6. Data Visualization: A Practical Introduction – Kieran Healy
Teaching Methodology	<p>Lectures and concept explanation, Hands-on practice using Tableau, Demonstration of dashboards and case studies, Problem-solving and data analysis tasks, Project-based learning, Assignments and group activities</p>
Evaluation Method	<p>Internal Assessment: 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Minors					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MI1					
Course Level	6					
Course Title	Tableau (Data Visualization) (Practical)					
Credit	Theory:	2	Practical:	2	Total: 4	
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand concepts of data visualization and Tableau environment CO2: Create various charts and visualizations using Tableau CO3: Apply data processing techniques like filtering, grouping, and joining CO4: Design interactive dashboards and stories CO5: Perform data analysis and solve real-world problems using Tableau					
Mapping between Cos and PSOs		PS01	PS02	PS03	PS04	PS05
	CO1	✓	✓		✓	
	CO2	✓		✓	✓	
	CO3	✓	✓	✓	✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content (Practical)	Unit 1- Tableau Visualization & Dashboard Creation <ul style="list-style-type: none"> ● Chart Creation <ul style="list-style-type: none"> Creating Line, Bar, Pie Charts Scatter Plots and Histograms Creating Maps and Geographic Visualizations ● Dashboard Development <ul style="list-style-type: none"> Creating Dashboards Adding Sheets to Dashboard Using Filters and Actions Dashboard Layout and Formatting ● Storytelling in Tableau <ul style="list-style-type: none"> Creating Stories, Adding Story Points Interactive Data Presentation ● Hands-on Tasks <ul style="list-style-type: none"> Build Sales Dashboard Customer Analysis Dashboard Unit 2- Data Analysis & Real-Time Implementation <ul style="list-style-type: none"> ● Data Preparation <ul style="list-style-type: none"> Data Cleaning and Formatting, Handling Missing Values Data Transformation 					

	<ul style="list-style-type: none"> ● Advanced Features <ul style="list-style-type: none"> Table Calculations Level of Detail (LOD) Expressions Calculated Fields ● Advanced Analytics <ul style="list-style-type: none"> Correlation Analysis Regression Analysis Forecasting Techniques ● Excel Integration <ul style="list-style-type: none"> Pivot Tables and Charts Data Validation What-if Analysis ● Real-Time Projects <ul style="list-style-type: none"> Banking Analytics (Loan Prediction) HR Analytics (Attrition Analysis) Sales and Marketing Analysis
Reference Books	<ol style="list-style-type: none"> 1. Tableau Your Data! – Daniel G. Murray 2. Learning Tableau – Joshua N. Milligan 3. Storytelling with Data – Cole Nussbaumer Knaflic 4. Tableau Cookbook – Lorna Brown 5. The Big Book of Dashboards – Steve Wexler, Jeffrey Shaffer, Andy Cotgreave 6. Data Visualization: A Practical Introduction – Kieran Healy
Teaching Methodology	<p>Lectures and concept explanation, Hands-on practice using Tableau, Demonstration of dashboards and case studies, Problem-solving and data analysis tasks, Project-based learning, Assignments and group activities</p>
Evaluation Method	<p>Internal Assessment: 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MI1					
Course Level	6					
Course Title	Business Analytics Fundamentals (Theory)					
Credit	Theory:	3	Practical:	1	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand business analytics concepts and applications CO2: Apply data preprocessing and statistical techniques CO3: Use analytical models for business decision-making CO4: Create visualizations and reports using analytics tools CO5: Solve real-world business problems using data-driven approaches					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	C01	✓	✓			
	C02	✓	✓	✓	✓	
	C03	✓	✓	✓		
	C04	✓		✓	✓	
	C05	✓	✓	✓	✓	✓
Course Content	Unit 1 – Introduction to Business Analytics <ul style="list-style-type: none"> ● Basics of Business Analytics <ul style="list-style-type: none"> Definition and Importance Evolution of Business Analytics Types of Analytics Descriptive Analytics, Diagnostic Analytics Predictive Analytics, Prescriptive Analytics ● Role of Analytics in Business <ul style="list-style-type: none"> Decision Making Process Data-Driven Organizations Business Intelligence vs Business Analytics ● Applications of Business Analytics <ul style="list-style-type: none"> Marketing Analytics, Financial Analytics, HR Analytics, Supply Chain Analytics Unit 2 – Data Management and Statistical Foundations <ul style="list-style-type: none"> ● Data Collection and Sources <ul style="list-style-type: none"> Internal and External Data Structured and Unstructured Data ● Data Preprocessing <ul style="list-style-type: none"> Data Cleaning 					

	<p>Handling Missing Values Data Transformation</p> <ul style="list-style-type: none"> ● Descriptive Statistics Mean, Median, Mode, Variance and Standard Deviation, Data Distribution ● Data Visualization Basics Charts (Bar, Line, Pie), Dashboards and Reports <p>Unit 3 – Analytical Techniques and Models</p> <ul style="list-style-type: none"> ● Introduction to Analytical Models Concept of Modeling Training and Testing Data ● Regression Analysis Linear Regression Multiple Regression ● Classification Techniques Logistic Regression Decision Tree k-Nearest Neighbors (KNN) ● Forecasting Techniques Time Series Basics ● Model Evaluation Accuracy Confusion Matrix Error Measurement
Reference Books	<ol style="list-style-type: none"> 1. Business Analytics – James Evans; Data Science for Business – Foster Provost 2. Business Analytics: Data Analysis and Decision Making – Albright & Winston 3. Competing on Analytics – Thomas Davenport; Practical Business Analytics Using Excel 4. Online: Coursera, edX, Kaggle, Microsoft Learn 5. Journals/Websites: Harvard Business Review, Analytics Vidhya, IEEE Xplore
Teaching Methodology	Lectures, hands-on practice, case studies, and project-based learning with assignments.
Evaluation Method	Internal Assessment: 50% Marks External Assessment : 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MI1					
Course Level	6					
Course Title	Business Analytics Fundamentals (Practical)					
Credit	Theory:	3	Practical:	1	Total:	4
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand business analytics concepts and applications CO2: Apply data preprocessing and statistical techniques CO3: Use analytical models for business decision-making CO4: Create visualizations and reports using analytics tools CO5: Solve real-world business problems using data-driven approaches					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓	✓	
	CO3	✓	✓	✓		
	CO4	✓		✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Chapter 4 – Practical Applications of Business Analytics (Practical) <ul style="list-style-type: none"> ● Tools and Technologies <ul style="list-style-type: none"> MS Excel Python (Basic) Tableau / Power BI (Overview) ● Hands-on Data Analysis <ul style="list-style-type: none"> Data Cleaning using Excel/Python Creating Charts and Dashboards ● Practical Tasks <ul style="list-style-type: none"> Sales Data Analysis Customer Segmentation Profit and Loss Analysis ● Mini Projects <ul style="list-style-type: none"> Sales Forecasting Customer Behavior Analysis Business Performance Dashboard 					
Reference Books	1. Business Analytics – James Evans; Data Science for Business – Foster Provost					

	<ol style="list-style-type: none"> 2. Business Analytics: Data Analysis and Decision Making – Albright & Winston 3. Competing on Analytics – Thomas Davenport; Practical Business Analytics Using Excel 4. Online: Coursera, edX, Kaggle, Microsoft Learn 5. Journals/Websites: Harvard Business Review, Analytics Vidhya, IEEE Xplore
Teaching Methodology	Lectures, hands-on practice, case studies, and project-based learning with assignments.
Evaluation Method	<p>Internal Assessment: 50% Marks</p> <p>External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7MI1					
Course Level	6					
Course Title	Mathematics					
Credit	Theory:	-	Practical:	-	Total:	4
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Apply linear algebra concepts in data science problems. CO2: Understand calculus and optimization basics. CO3: Analyze probability distributions and random variables. CO4: Perform descriptive and inferential statistical analysis. CO5: Apply hypothesis testing techniques in real-world scenarios.					
Mapping between Cos and PSOs		PS01	PS02	PS03	PS04	PS05
	CO1	✓	✓	✓		
	CO2	✓	✓	✓		
	CO3	✓	✓		✓	
	CO4	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – Linear Algebra Foundations Scalars, Vectors and Matrices Matrix Operations (Addition, Multiplication, Transpose) Determinant and Inverse of Matrix Systems of Linear Equations Eigenvalues and Eigenvectors (basic idea) Vector Spaces and Linear Transformations Applications in Data Science and Machine Learning Unit 2 – Calculus for Data Science Functions and Limits Continuity and Differentiability Partial Derivatives Gradient and Optimization basics Chain Rule concept Introduction to Integration Role of Calculus in Optimization Algorithms Unit 3 – Numerical Methods & Optimization Techniques Introduction to Numerical Computation Errors in Computation (Absolute & Relative Error)					

	<p>Solving Non-linear Equations (Bisection Method, Newton-Raphson Method – basic idea)</p> <p>Numerical Differentiation and Integration (basic concept)</p> <p>Optimization Techniques</p> <p>Gradient Descent (basic idea)</p> <p>Learning Rate Concept</p> <p>Convex and Non-Convex Functions (basic understanding)</p> <p>Applications in Machine Learning Optimization</p> <p>Unit 4 – Discrete Mathematics & Mathematical Foundations for Computing</p> <p>Sets, Relations, and Functions</p> <p>Logic and Propositional Calculus</p> <p>Truth Tables and Logical Reasoning</p> <p>Basic Combinatorics</p> <p>Permutations and Combinations</p> <p>Graph Theory Basics</p> <p>Types of Graphs</p> <p>Degree of Vertex</p> <p>Shortest Path Concept (basic idea)</p> <p>Matrices in Graph Representation (Adjacency Matrix)</p> <p>Applications in Computer Science & Data Science</p>
Reference Books	<p>1. Introduction to Linear Algebra – Gilbert Strang.</p> <p>2. Statistics for Data Science – James D. Miller.</p>
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	<p>Internal Assessment: 50% Marks</p> <p>External Assessment: 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	7					
NCrF Credit Level	6 Credit					
Course Type	RP/OJT					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS7OJT					
Course Level	6					
Course Title	OJT					
Credit	Theory:	-	Practical:	-	Total:	6
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Understand real-world working environments. CO2: Apply theoretical knowledge to practical tasks. CO3: Use tools and technologies effectively. CO4: Develop teamwork and communication skills. CO5: Document and present learning outcomes.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓	✓	✓	✓
	CO2	✓	✓	✓		✓
	CO3	✓	✓	✓	✓	✓
	CO4					✓
	CO5		✓			✓
Course Content	1. Objective To understand real working environments To work on real-time projects To improve teamwork and communication To develop practical knowledge 2. Suggested OJT Domains <ul style="list-style-type: none"> • IT / Software Data Analysis • Business / Management Marketing Analysis Sales Operations Customer Relationship Management • Finance Accounting Work Financial Analysis • Other Fields Human Resource Activities Operations Management 3. Tools & Technologies Programming Languages (Python / Web Technologies)					

	<p>MS Excel / Google Sheets Company-specific software tools Communication tools (Email, Slack, etc.)</p> <p>4. OJT Steps</p> <p>Step 1 – Company Selection Select a company or organization for training/internship</p> <p>Step 2 – Training Plan Define role, responsibilities, and objectives</p> <p>Step 3 – Work Execution Perform assigned tasks and work on real projects</p> <p>Step 4 – Learning & Documentation Maintain daily logs and record learning outcomes</p> <p>Step 5 – Report Preparation Prepare a detailed report of work done</p> <p>Step 6 – Final Evaluation Assessment based on company feedback and viva</p> <p>5. Deliverables (What to Submit)</p> <p>OJT Report Daily Log / Work Diary Training Completion Certificate Presentation (PPT)</p> <p>6. Report Structure</p> <ol style="list-style-type: none"> 1. Introduction (Company Profile) 2. Objectives of Training 3. Work Done / Tasks Performed 4. Tools & Technologies Used 5. Learning Outcomes 6. Challenges Faced 7. Conclusion 8. Future Scope 																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: left;">7. Evaluation Scheme (100 Marks)</th> </tr> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: center;">Marks</th> </tr> </thead> <tbody> <tr> <td>Company Performance / Feedback</td> <td style="text-align: center;">25</td> </tr> <tr> <td>Work Diary / Log Book</td> <td style="text-align: center;">15</td> </tr> <tr> <td>Report Writing</td> <td style="text-align: center;">20</td> </tr> <tr> <td>Presentation</td> <td style="text-align: center;">15</td> </tr> <tr> <td>Viva / Interview</td> <td style="text-align: center;">15</td> </tr> <tr> <td>Attendance / Discipline</td> <td style="text-align: center;">10</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>	7. Evaluation Scheme (100 Marks)		Criteria	Marks	Company Performance / Feedback	25	Work Diary / Log Book	15	Report Writing	20	Presentation	15	Viva / Interview	15	Attendance / Discipline	10	Total	100
7. Evaluation Scheme (100 Marks)																			
Criteria	Marks																		
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Presentation	15																		
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Attendance / Discipline	10																		
Total	100																		
Reference Books	-																		
Teaching Methodology	-																		
Evaluation Method	-																		

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Programme Name :- B.Com. Data Science (Honors)

As Per NEP 2020

About programme :- Fourth Year (Semester-8)

Teaching & Evaluation Scheme:- As per NEP 2020

Course Category	Course Code	Course Title	Mark sheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	BCDS8MJ1	1. Machine Learning	1. Machine Learning	6	3	2	1.5 Hr.	30 Mu	3	1	35	15	35	15	70	30
	BCDS8MJ2	2. Advance Python Programming	2. Advance Python Programming	6	2	4	1 Hr.	1 Hr.	2	2	25	25	25	25	50	50
	BCDS8MJ3	3. Basics of information Security	3. Basics of information Security	6	4	-	2 Hr.	-	4	-	50	-	50	-	100	-
MINOR	BCDS8MI1	1. Corporate Governance and Business Ethics OR	1. Corporate Governance and Business Ethics OR	6	4	-	2 Hr.	-	4	-	50	-	50	-	100	-
	BCDS8MI1	1. International Business	1. International Business	6	4	-	2 Hr.	-	4	-	50	-	50	-	100	-
RP/OJT	BCDS8RP	RP	RP	6	-	-	-	-	6		50		50		100	

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MJ1					
Course Level	6					
Course Title	Machine Learning (Theory)					
Credit	Theory:	3	Practical:	1	Total: 4	
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand ML workflow and types of learning. CO2: Apply regression and classification algorithms. CO3: Perform clustering and unsupervised learning tasks. CO4: Use PCA and model optimization techniques. CO5: Evaluate ML models using performance metrics.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓	✓	
	CO3	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	
	CO5	✓	✓		✓	✓
Course Content (Theory)	Unit 1 - Introduction to Machine Learning <ul style="list-style-type: none"> ● Basics of Machine Learning <ul style="list-style-type: none"> What is Machine Learning Types of Machine Learning Supervised Learning Unsupervised Learning ● Machine Learning Workflow <ul style="list-style-type: none"> Data Collection Data Preprocessing Model Training Model Evaluation ● Model Concepts <ul style="list-style-type: none"> Training vs Testing Data Overfitting and Underfitting Bias-Variance Tradeoff ● Applications <ul style="list-style-type: none"> Applications of ML in Data Science Unit 2 - Supervised Learning Techniques <ul style="list-style-type: none"> ● Regression Techniques <ul style="list-style-type: none"> Simple Linear Regression, Multiple Linear Regression, Polynomial Regression (basic idea) ● Classification Techniques <ul style="list-style-type: none"> Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees, Naive Bayes (basic idea) 					

	<ul style="list-style-type: none"> ● Model Evaluation Metrics MAE, MSE, RMSE, R² Score, Confusion Matrix, Accuracy, Precision, Recall, F1-Score, ROC Curve and AUC (basic idea) ● Practical Use Cases Regression and Classification Applications <p>Unit 3 – Unsupervised Learning & Model Improvement</p> <ul style="list-style-type: none"> ▣ Clustering Techniques Introduction to Unsupervised Learning K-Means Clustering, Hierarchical Clustering, DBSCAN (basic idea) ● Distance Measures Euclidean Distance Manhattan Distance ● Dimensionality Reduction Curse of Dimensionality Feature Selection vs Feature Extraction Principal Component Analysis (PCA) t-SNE (conceptual) ● Model Improvement Cross Validation Hyperparameter Tuning Model Optimization Techniques Introduction to ML Pipelines
Reference Books	<ol style="list-style-type: none"> 1. Hands-On Machine Learning – Aurélien Géron. 2. Pattern Recognition and Machine Learning – Christopher Bishop. 3. Introduction to Machine Learning with Python – Andreas Müller. 4. Machine Learning – Tom Mitchell.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	<p>Internal Assessment: 50% Marks External Assessment : 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MJ1					
Course Level	6					
Course Title	Machine Learning (Practical)					
Credit	Theory:	3	Practical:	1	Total:	4
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Understand ML workflow and types of learning. CO2: Apply regression and classification algorithms. CO3: Perform clustering and unsupervised learning tasks. CO4: Use PCA and model optimization techniques. CO5: Evaluate ML models using performance metrics.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓	✓	✓	
	CO3	✓	✓	✓	✓	✓
	CO4	✓	✓	✓	✓	
	CO5	✓	✓		✓	✓
Course Content	Unit –1 Machine Learning Practical & Implementation <ul style="list-style-type: none"> ● Data Preparation <ul style="list-style-type: none"> Data Collection and Preprocessing Handling Missing Values Feature Selection ● Model Implementation <ul style="list-style-type: none"> Linear Regression using Python Logistic Regression KNN and Decision Tree Models K-Means Clustering ● Model Evaluation <ul style="list-style-type: none"> Calculating Accuracy, Precision, Recall Confusion Matrix Implementation ● Practical Tasks / Mini Projects <ul style="list-style-type: none"> House Price Prediction (Regression) Spam Detection (Classification) Customer Segmentation (Clustering) 					
Reference Books	1. Hands-On Machine Learning – Aurélien Géron. 2. Pattern Recognition and Machine Learning – Christopher Bishop. 3. Introduction to Machine Learning with Python – Andreas Müller. 4. Machine Learning – Tom Mitchell.					

Teaching Methodology	Class Work, Discussion, Self-Study, Seminars or Presentation and Assignments
Evaluation Method	Internal Assessment: 50% Marks External Assessment : 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MJ2					
Course Level	6					
Course Title	Advance Python Programming (Theory)					
Credit	Theory:	2	Practical:	2	Total: 4	
Effective From	Academic Year : 2026-27					
Course Outcomes	CO1: Understand and use Python modules, packages, and exception handling. CO2: Apply object-oriented concepts like inheritance, polymorphism, and encapsulation. CO3: Read and write data using file handling in Python. CO4: Save and load objects using the Pickle module. CO5: Create GUI applications using Tkinter.					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓		✓	
	CO2	✓	✓	✓		✓
	CO3	✓	✓	✓	✓	
	CO4	✓	✓		✓	
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – Python Modules, Packages & Exception Handling <ul style="list-style-type: none"> ● Modules in Python <ul style="list-style-type: none"> Introduction to Modules Creating User Defined Module Importing Modules Normal Import From Import From Import with * Module Search Path ● Packages in Python <ul style="list-style-type: none"> Introduction to Packages Creating User Defined Package Importing Packages Normal Import From Import From Import with * Intra-package References Installing and Uninstalling Packages ● Exception Handling <ul style="list-style-type: none"> Introduction to Exceptions Types of Exceptions Built-in Exceptions User Defined Exceptions 					

	<p>Raising Exceptions Handling Exceptions try, except, finally</p> <p>Unit 2 – OOP Concepts in Python</p> <ul style="list-style-type: none"> ● Inheritance <ul style="list-style-type: none"> Single Inheritance Multilevel Inheritance Hierarchical Inheritance Multiple Inheritance ● OOP Principles <ul style="list-style-type: none"> Polymorphism Encapsulation Access Modifiers <ul style="list-style-type: none"> Public Private Protected ● Advanced OOP Concepts <ul style="list-style-type: none"> Decorators Abstract Base Classes (ABC) Operator Overloading-add, eq
Reference Books	<ol style="list-style-type: none"> 1. Python for Data Analysis – Wes McKinney, O’Reilly Media. 2. Learning Python – Mark Lutz, O’Reilly Media. 3. Core Python Programming – Wesley J. Chun. 4. Python Crash Course – Eric Matthes. 5. Fluent Python – Luciano Ramalho, O’Reilly Media.
Teaching Methodology	Classroom Teaching, Practical Demonstrations, Assignments, Self-Study and Presentations
Evaluation Method	<p>Internal Assessment: 50% Marks</p> <p>External Assessment: 50% Marks</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MJ2					
Course Level	6					
Course Title	Advance Python Programming (Practical)					
Credit	Theory:	2	Practical:	2	Total: 4	
Effective From	Academic Year: 2026-27					
Course Outcomes	<p>CO1: Understand and use Python modules, packages, and exception handling. CO2: Apply object-oriented concepts like inheritance, polymorphism, and encapsulation. CO3: Read and write data using file handling in Python. CO4: Save and load objects using the Pickle module. CO5: Create GUI applications using Tkinter.</p>					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓		✓	
	CO2	✓	✓	✓		✓
	CO3	✓	✓	✓	✓	
	CO4	✓	✓		✓	
	CO5	✓	✓	✓	✓	✓
Course Content	<p>Unit 1 – File Handling & Serialization</p> <ul style="list-style-type: none"> ● File Handling <ul style="list-style-type: none"> Introduction to Files Types of Files Text Files, Binary Files Opening and Closing Files Reading and Writing Files File Pointer and Offsets ● Object Serialization <ul style="list-style-type: none"> Pickle Module, Saving and Loading Objects ● Practical Tasks <ul style="list-style-type: none"> Read/Write File Programs Binary File Handling Serialization using Pickle <p>Unit 2 – GUI Programming using Tkinter</p> <ul style="list-style-type: none"> ● Introduction to Tkinter <ul style="list-style-type: none"> Creating First GUI Application Tk() and mainloop() ● Tkinter Widgets <ul style="list-style-type: none"> Label, Button, Entry 					

	<p> CheckButton, RadioButton Listbox, Scrollbar, Menu, ComboBox Scale, Message, Progressbar, SpinBox Text, Canvas ● Layout Management pack() grid() place() ● Event Handling Events and Bindings Keyboard and Mouse Events ● Practical Tasks Create Forms using Tkinter Event-based GUI Applications </p>
Reference Books	<ol style="list-style-type: none"> 1. Python for Data Analysis – Wes McKinney, O’Reilly Media. 2. Learning Python – Mark Lutz, O’Reilly Media. 3. Core Python Programming – Wesley J. Chun. 4. Python Crash Course – Eric Matthes. 5. Fluent Python – Luciano Ramalho, O’Reilly Media.
Teaching Methodology	Classroom Teaching, Practical Demonstrations, Assignments, Self-Study and Presentations
Evaluation Method	<p> Internal Assessment: 50% Marks External Assessment: 50% Marks </p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MJ3					
Course Level	6					
Course Title	Basics of information Security					
Credit	Theory:	4	Practical:	-	Total: 4	
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Understand basic concepts of information security and security attacks CO2: Apply cryptographic techniques for data encryption and decryption CO3: Explain public key cryptography and digital security mechanisms CO4: Analyze network security methods like firewalls and IDS CO5: Identify cyber threats and implement security measures					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			✓
	CO2	✓	✓	✓	✓	✓
	CO3	✓	✓	✓		✓
	CO4	✓	✓	✓	✓	✓
	CO5	✓	✓	✓	✓	✓
Course Content	Unit 1 – Introduction to Information Security <ul style="list-style-type: none"> ● Basics of Information Security <ul style="list-style-type: none"> Introduction to Information Security Need for Security Security Basics-Confidentiality, Integrity, Availability (CIA Triad) ● Security Attacks <ul style="list-style-type: none"> Types of Security Attacks, Active Attacks, Passive Attacks, Denial of Service (DoS) Unit 2 – Cryptography Techniques <ul style="list-style-type: none"> ● Basics of Cryptography <ul style="list-style-type: none"> Plain Text, Cipher Text, Cryptography, Cryptanalysis, Cryptology Encryption and Decryption ● Classical Cryptography Techniques <ul style="list-style-type: none"> Substitution Techniques Caesar Cipher, Monoalphabetic Cipher, Polyalphabetic Cipher Playfair Cipher, Hill Cipher Transposition Techniques Rail Fence Cipher, One-Time Pad ● Steganography <ul style="list-style-type: none"> Introduction, Types of Steganography ● Symmetric Cryptography 					

	<p>Data Encryption Standard (DES), Structure of DES Advantages and Disadvantages</p> <p>Unit 3 – Public Key Cryptography & PKI</p> <ul style="list-style-type: none"> ● Public Key Cryptography <ul style="list-style-type: none"> Principles of Public-Key Systems Applications ● RSA Algorithm <ul style="list-style-type: none"> Working of RSA,Computational Aspects,Security of RSA ● Digital Signatures & PKI <ul style="list-style-type: none"> Digital Signatures,Digital Certificates Certificate Authorities (CA),Registration Authorities (RA) Steps for Obtaining Certificate,Verification of Certificate <p>Unit 4 – Network Security & Cyber Security</p> <ul style="list-style-type: none"> ● Network Security Concepts <ul style="list-style-type: none"> Security Topologies Security Zones, DMZ Internet, Intranet, VLAN,Tunneling ● Firewalls <ul style="list-style-type: none"> Need and Working of Firewall Types of Firewall Packet Filtering, Stateful Inspection,Application Level Gateway Circuit-Level Gateway,Next-Generation Firewall ● Intrusion Detection Systems (IDS) <ul style="list-style-type: none"> Intruders and Components,Host-Based IDS (HIDS) Network-Based IDS (NIDS),Advantages and Disadvantages ● Cyber Security <ul style="list-style-type: none"> Introduction and Cyber Threats, Types of Cyber Attacks Malware Virus, Worms, Trojan, Spyware, Adware Network Attacks IP Spoofing, ARP Spoofing, Session Hijacking ● Cyber Crime <ul style="list-style-type: none"> Types of Cybercrime,Hacking and Attack Vectors,Issues in Computer Crime
Reference Books	<ol style="list-style-type: none"> 1. Cryptography and Network Security – William Stallings 2. Information Security: Principles and Practice – Mark Stamp 3. Computer Security: Principles and Practice – Stallings & Brown 4. Online: NPTEL, Coursera, OWASP resources
Teaching Methodology	Lectures, case studies, practical demonstrations, and assignments for understanding security concepts.
Evaluation Method	Internal Assessment: 50% Marks External Assessment : 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MI1					
Course Level	6					
Course Title	Corporate Governance and Business Ethics					
Credit	Theory:	4	Practical:	-	Total:	4
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Understand concepts and principles of corporate governance CO2: Explain business ethics and ethical theories CO3: Analyze corporate governance practices and issues CO4: Apply ethical decision-making in business situations CO5: Understand CSR, sustainability, and global governance practices					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓		✓	✓
	CO2	✓	✓			✓
	CO3	✓	✓	✓	✓	✓
	CO4	✓	✓	✓		✓
	CO5	✓	✓			✓
Course Content	Unit 1 – Fundamentals of Corporate Governance <ul style="list-style-type: none"> ● Introduction to Corporate Governance <ul style="list-style-type: none"> Definition and Importance Objectives of Corporate Governance Principles of Good Governance ● Governance Framework <ul style="list-style-type: none"> Stakeholders and Shareholders, Role of Board of Directors Role of Management ● Corporate Governance Models <ul style="list-style-type: none"> Anglo-American Model, German Model, Japanese Model ● Corporate Governance in India <ul style="list-style-type: none"> SEBI Guidelines Companies Act Provisions Unit 2 – Business Ethics and Ethical Principles <ul style="list-style-type: none"> ● Introduction to Business Ethics <ul style="list-style-type: none"> Meaning and Importance Ethics vs Law ● Ethical Theories <ul style="list-style-type: none"> Utilitarianism, Deontology, Virtue Ethics ● Ethical Decision Making <ul style="list-style-type: none"> Ethical Dilemmas 					

	<p>Framework for Ethical Decision</p> <ul style="list-style-type: none"> ● Corporate Social Responsibility (CSR) <ul style="list-style-type: none"> Meaning and Scope CSR Activities and Policies <p>Unit 3 – Corporate Governance Practices and Issues</p> <ul style="list-style-type: none"> ● Corporate Governance Mechanisms <ul style="list-style-type: none"> Internal Mechanisms External Mechanisms ● Transparency and Disclosure <ul style="list-style-type: none"> Financial Reporting Accountability ● Corporate Scandals <ul style="list-style-type: none"> Case Studies (e.g., Satyam Scam) Lessons Learned ● Risk Management <ul style="list-style-type: none"> Types of Risks, Risk Mitigation Strategies <p>Unit 4 – Ethics in Business Environment and Global Perspective</p> <ul style="list-style-type: none"> ● Ethical Issues in Business <ul style="list-style-type: none"> Corruption and Fraud, Insider Trading, Whistleblowing ● Corporate Culture and Ethics <ul style="list-style-type: none"> Code of Conduct, Ethical Leadership ● Global Corporate Governance <ul style="list-style-type: none"> International Practices, OECD Guidelines ● Sustainability and Business Ethics <ul style="list-style-type: none"> Environmental Responsibility Sustainable Development
Reference Books	<ol style="list-style-type: none"> 1. Corporate Governance – K. V. Bhanu Murthy 2. Business Ethics – Andrew Crane & Dirk Matten 3. Corporate Governance and Ethics – Zabihollah Rezaee 4. Online: NPTEL, Coursera Business Ethics Courses 5. Journals/Websites: Harvard Business Review, OECD, SEBI Guidelines
Teaching Methodology	Lectures, case studies, group discussions, and assignments to develop ethical and governance understanding.
Evaluation Method	Internal Assessment: 50% Marks External Assessment: 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	4 Credit					
Course Type	Minor					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8MI1					
Course Level	6					
Course Title	International Business					
Credit	Theory:	4	Practical:	-	Total:	4
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: Understand concepts of international business and global trade CO2: Explain theories of international trade CO3: Identify modes of entry into international markets CO4: Analyze international marketing and financial practices CO5: Evaluate challenges and risks in international business					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			
	CO2	✓	✓			✓
	CO3	✓	✓	✓		
	CO4	✓	✓	✓	✓	
	CO5	✓	✓			✓
Course Content	Unit 1 – Fundamentals of International Business <ul style="list-style-type: none"> ● Introduction to International Business <ul style="list-style-type: none"> Definition and Scope Importance of International Business Differences between Domestic and International Business ● Theories of International Trade <ul style="list-style-type: none"> Absolute Advantage Theory Comparative Advantage Theory Heckscher-Ohlin Theory ● Global Business Environment <ul style="list-style-type: none"> Economic Environment Political and Legal Environment Cultural Environment ● International Trade Organizations <ul style="list-style-type: none"> WTO (World Trade Organization) IMF (International Monetary Fund) World Bank Unit 2 – International Trade Practices and Strategies <ul style="list-style-type: none"> ● Modes of Entry into International Business <ul style="list-style-type: none"> Exporting Licensing and Franchising 					

	<ul style="list-style-type: none"> Joint Ventures Foreign Direct Investment (FDI) ● International Marketing <ul style="list-style-type: none"> Global Marketing Strategies Product and Pricing Strategies ● Foreign Exchange and Trade Finance <ul style="list-style-type: none"> Exchange Rate Balance of Payments Trade Financing Methods ● Challenges in International Business <ul style="list-style-type: none"> Trade Barriers Tariffs and Non-Tariff Barriers Risks in International Business <p>Unit 3 – International Business Operations and Logistics</p> <ul style="list-style-type: none"> ● Global Supply Chain Management <ul style="list-style-type: none"> Meaning and Importance Components of Supply Chain Global vs Domestic Supply Chain ● International Logistics <ul style="list-style-type: none"> Transportation Modes (Air, Sea, Land) Warehousing and Inventory Management Role of Logistics in Global Trade ● Import and Export Procedures <ul style="list-style-type: none"> Documentation (Invoice, Bill of Lading, etc.) Customs Procedures Role of Freight Forwarders ● Trade Agreements and Regional Integration <ul style="list-style-type: none"> Free Trade Agreements (FTA) Regional Trade Blocs (EU, ASEAN, etc.) Impact on International Business <p>Unit 4 – Emerging Trends and Ethics in International Business</p> <ul style="list-style-type: none"> ● Digital Transformation in International Business <ul style="list-style-type: none"> E-commerce and Global Trade Role of Technology (AI, Blockchain – basic idea) Digital Payment Systems ● Sustainability and Corporate Social Responsibility (CSR) <ul style="list-style-type: none"> Importance of CSR Environmental and Social Responsibility Sustainable Business Practices ● Business Ethics in Global Context <ul style="list-style-type: none"> Ethical Issues in International Business Corruption and Fair Trade Practices Ethical Decision Making ● Future Trends in International Business <ul style="list-style-type: none"> Globalization vs Localization Impact of Political Changes Future Opportunities and Challenges
Reference Books	<ol style="list-style-type: none"> 1. International Business – Charles W. L. Hill 2. International Business: Environment and Operations – John D. Daniels 3. Global Business Today – Charles W. L. Hill 4. Online: WTO, IMF, World Bank official websites

	5. Journals/Websites: Harvard Business Review, UNCTAD, OECD
Teaching Methodology	Lectures, case studies, group discussions, and assignments to understand global business practices.
Evaluation Method	Internal Assessment: 50% Marks External Assessment: 50% Marks

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Com. Data Science (Honors)					
Semester	8					
NCrF Credit Level	6 Credit					
Course Type	RP/OJT					
Course Subtype	Nil					
Subject Type	Discipline Specific / Intra-disciplinary / Emerging Technology / Vocational Education etc. (Specify the relevant Subject Type)					
Course Code	BCDS8RP					
Course Level	6					
Course Title	Research Project					
Credit	Theory:	-	Practical:	-	Total:	6
Effective From	Academic Year: 2026-27					
Course Outcomes	CO1: To understand real-world problems using data analysis CO2: To collect, clean, and process datasets CO3: To apply analytical and visualization techniques CO4: To develop dashboards and interpret results CO5: To present insights for data-driven decision-making					
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	✓	✓			✓
	CO2		✓	✓		✓
	CO3	✓	✓			✓
	CO4		✓	✓	✓	✓
	CO5	✓	✓			✓
Course Content	1. Objective To analyze real-world datasets and extract meaningful insights To apply tools like Python, Excel, and Tableau To support decision-making using data analysis 2. Suggested Project Topics <ul style="list-style-type: none"> ● Business & Sales <ul style="list-style-type: none"> Sales Performance Analysis Customer Segmentation Product Demand Analysis ● Finance <ul style="list-style-type: none"> Stock Market Analysis Loan Risk Analysis Expense Analysis ● HR Analytics <ul style="list-style-type: none"> Employee Attrition Analysis Employee Performance Analysis ● Public / Social Data <ul style="list-style-type: none"> COVID-19 Data Analysis Crime Data Analysis 					

Education Data Analysis

3. Tools & Technologies

Python (Pandas, NumPy, Matplotlib)

MS Excel (Pivot Tables, Charts)

Tableau / Power BI (Dashboards)

4. Project Steps

- Step 1 – Problem Definition
Define clear objective (e.g., analyze sales trends)
- Step 2 – Data Collection
Collect dataset (Kaggle, CSV, Government data)
- Step 3 – Data Cleaning
Handle missing values
Remove duplicates
- Step 4 – Data Analysis
Apply statistical techniques
Identify patterns and trends
- Step 5 – Visualization
Create charts, graphs, dashboards
- Step 6 – Conclusion
Provide insights and recommendations

5. Deliverables (What to Submit)

Project Report

Code / Excel File

Dashboard (Tableau / Power BI)

Dataset

Presentation (PPT)

6. Report Structure

1. Introduction
2. Problem Statement
3. Dataset Description
4. Data Cleaning
5. Analysis & Visualization
6. Findings
7. Conclusion
8. Future Scope

7. Evaluation Scheme (100 Marks)

Criteria	Marks
Problem & Dataset Selection	15
Data Cleaning & Processing	20
Analysis & Visualization	25
Insights & Conclusion	15
Report Writing	15
Presentation & Viva	10
Total	100 Marks

Reference Books

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Teaching Methodology

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Evaluation Method	-
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