GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Industry Led Minor/Hons.

Level: UG

Branch: Data Science

Course / Subject Code : BE04IAR011

Course / Subject Name: Introduction to Data Science

w. e. f. Academic Year:	2025-2026
Semester:	4th
Category of the Course:	Core Courses

Prerequisite:	Basic knowledge of computer.
Rationale:	This syllabus builds foundational skills necessary for roles in data science, programming, and professional communication.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Gain hands-on experience in cutting-edge technologies.	A
02	Understand the fundamentals of data science, including its significance in contemporary business landscapes.	U
03	Learn Python basics for problem-solving.	U
04	Explore Linear Algebra's role in data science.	U
05	Master essential tools and techniques for data analysis.	C
06	Apply Python for data manipulation and analysis.	A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours/week)			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	100	0	0	0	100

*Total Lecture Hrs. (L) =45	Total Practical Hrs. (PR) =30.	Total Hours =75 Hrs

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Course Content:

Unit No.	Content	No. of Hours	% of Weigh tage
1.	**Embracing Next Gen Technologies-** Introduction to Cloud Computing, Introduction to Big Data, Introduction to AI and ML, Introduction to IoT and Mixed, Introduction to Cyber security.	10	10
2.	**Introduction to Data Science** - Why Data Science? What is Data Science? Overview of Data Science, Components of Data Science, Probability and Statistics, Linear Algebra, Machine Learning, Computer Science, Data Science in Action, Data Science Process & Architecture, Data Science Project Life cycle, Data Science Top 10 Real World Use Cases, Data Science Ecosystems **Basics of Python** - Why Python? Datatypes and Variables, Variables and Operators, Programming Constructs and Collections, Selection Construct Iteration Construct Collections Part 1 Collections Part 2, Introduction to Algorithms, Pseudo Algorithm & its Representation, Basics of Algorithms, Pseudo Variables & Operators, Decision Constructs, Iteration Constructs.	10	20
3.	**Programming Fundamentals :** Variables, Datatypes & Operators in Python, What is a programming language?, Datatypes, Variables, Variables & Datatypes, Operators, Implicit & Explicit Type Conversion, Variables & Datatypes, Coding Standards & Formatting Output, Formatting Output Activity, Introduction to Functions, Basics of Functions, Basics of Functions Exercise, Flow of Execution in Functions, 'return' in Function, Function Invocation, Selection Control Structures, Nested Selection Control Structure, Iteration Control Structures Syntax, 'while', 'for' with 'in', Iteration Control Structures 'for' with 'range', 'for' with 'range', Iteration Control Structures Nested Loops, Nested Loops, Nested Loops of Different Types, Iteration Control Structures 'break' & 'continue', 'break' & 'continue', Iteration Control Structures Testing Loops Quiz, Exercise on Iteration in Python.	15	20
4.	**Programming Fundamentals:** Eclipse Plugin, Introduction to Eclipse Plugin, Configuring Eclipse Plugin, Eclipse Input Tip to Handle Infinite Loop, Collections and List in Python, List, List Iteration, List Searching, List Slice, List of Lists, List Functions, Tuple in Python, Tuple, String in Python, String, String Functions, Choosing Between List, Tuple and String, Debugging, Eclipse Debugger.	10	15
5.	**Programming Fundamentals:** Dictionary in Python, Dictionary, Set in Python, Set, Libraries & Functions in Python, Random Library, Math Library, Date & Time Functions. **Introduction to Linear Algebra** - Why Linear Algebra? What is Linear Algebra? Applications of Linear Algebra, Scalar, Vector, and Matrix, Scalar Vector Matrix, Types of Matrices, Diagonal Matrix, Identity Matrix, Symmetric Matrix, Triangular Matrix, Operations over Vectors and Matrices, Introduction - Operations over Vectors	15	20

	and Matrices, Vector Addition, Matrix Addition, Multiplication Of Vector by a Scalar, Scalar Matrix Multiplication, Inner Product, Angle between Vectors, Cauchy - Schwarz Inequality, Matrix - Vector Multiplication, Matrix Multiplication, Permutation Matrix, Determinants, Matrix Inversion, Orthogonal Matrix, Linear Dependence, Rank of a Matrix, Linear Transformation, Introduction - Linear Transformations, Stretching, Reflection, Rotation, Projection, Linear Equations, Introduction - Linear Equations, Solving a System of Linear Equations, Techniques to solve system of Linear Equations, Finding Inverse, Cramer's Rule, Solving a system of Linear Equations when m not equal to n.		
6.	**Basics of Business Communication:** Basics of Business communication, Mechanism of communication, Effective Articulation **Business English**: INTRODUCTION, Introduction to Parts of Speech, NOUNS and PRONOUNS, Parts of Speech- Noun, Parts of Speech -Pronoun, VERBS and ADVERBS, Parts of Speech-Verbs, Parts of Speech- Auxiliary Verbs, Parts of Speech-Adverbs, Adjectives, PREPOSITION, Preposition of Time, Preposition of Place and Direction, Conjunctions and Interjections, Conjunctions and Interjections-Quiz, Tenses-Introduction, Tenses- Past Tense, Tenses-Present Tense, Tenses- Future Tense **Articulation Skills:** Articulation Skills, Body Language - Change how people see you, Active Listening Skills, Barriers to Effective Listening, Email Etiquette, Basics of Email Writing, Email Writing: Things to keep in mind, Basics of Telephone Etiquette, Essential Telephone Skills and Telephone Etiquette	15	15
	Total	**75**	**100**

Suggested Specification Table with Marks: Given here tentative, which may vary as per Author and Course.

Distribution of Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10%	**25%**	**24%**	**16%**	**11%**	**25%**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

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Skill & Practical Activities to be carried out during Semester						
Sr. No.	**Category of Engagement**	**Describe the activities to be carried out by students in brief**	**Expected Frequency & Duration**	**Mode of Delivery (Online / Offline / Hybrid)**	**Tools / Platforms / Equipment / Machinery to be Used**	**Expected major Learning Outcomes**
1	Tutorials / Guided Technical Sessions	Complete the lectures	Twice a week	Online	Infosys Springboard platform/app	Understand Python syntax; Implement basic algorithms
2	Master Classes / Expert Lectures by Industry Professionals	Attend the live class, ask doubt and complete practical	15 Hours	Online	Zoom / MS Teams	Gain industry insights; Learn practical use cases
3	Quizzes / Competency-Based Evaluation	Complete quizzes on portal	After each module	online	Infosys springboard platform/app	Better understanding about topic

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