GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: BE-Minor/Hons.

Level :UG

Branch: Artificial Intelligence and Machine Learning

Course / Subject Code : BE07IAN011

Course / Subject Name : Applications of AI & ML using Python

w. e. f. Academic Year:	2024-2025
Semester:	7th
Category of the Course:	**Core Course**

Prerequisite:	• **Basic understanding of Python programming** • **Familiarity with mathematics and statistics (probability, linear algebra).** • **Introduction to data science concepts such as data manipulation and visualization**
Rationale:	The course "Applications of AI & ML using Python" is designed to equip students with practical knowledge in Artificial Intelligence (AI) and Machine Learning (ML) applications using Python, a widely used programming language in the field. This course offers hands-on experience with core algorithms like classification, regression, clustering, and neural networks. Additionally, students will develop robust programming skills by learning best practices in software development, file handling, and debugging. Through a mix of theoretical concepts and practical assignments, the course aims to prepare students for real-world applications in AI and ML, addressing current industry demands.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Identify various types of machine learning problems and apply appropriate solutions to specific use cases.	A
02	Demonstrate the implementation of classification, regression, and clustering algorithms for problem-solving.	A
03	Explore and evaluate validation techniques for assessing machine learning models.	E
04	Understand the basics of Artificial Neural Networks and their application in machine learning.	U
05	Build robust Python code for data handling, file management, and organization of complex programs.	C

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme: (Not applicable, self-paced course)

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
5	0	0	5	100	0	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to machine learning,** The world of machine learning, ML in Silicon Valley, Types of machine learning, Supervised Learning, Induction and Deduction - Unsupervised Learning, Reinforcement Learning **Explore machine learning using python -** Introduction to Machine Learning, The world of Machine Learning, What is Machine Learning?, Types of Machine Learning, Machine Learning Process, Regression - Introduction to Regression, Association between variables, Regression Techniques, Simple Linear Regression, Evaluation of Regression Model, Multiple Linear Regression, Classification - Introduction to Classification, Logistic regression, Logistic regression - Exercise, 1, Decision Tree, Decision Tree - Exercise, K-Nearest Neighbor, K-Nearest Neighbor - Exercise, Support Vector Machine, Cross Validation and Ensemble method	13	20
2.	Clustering, Clustering analysis, Applications of clustering, Introduction to Artificial Neural Network, DetAIls of ANN, Layers in ANN, Activation function, The Learning Process, Building an Artificial Neural Network, **Capstone Project** **Functions** - Arguments, Argument Behavior, Types of Arguments, Variables & Scope, Types of Variables, Variables & its Scope, 'global Variable', Boundary Value Analysis, Exception Handling in Python, Exception Handling - Different Types, Customized Error Messages, Multiple Try Blocks, Finally Block, Exception Handling, Recursive Functions, Termination Condition in Recursion, Tower of Hanoi Problem,	15	22
3.	Modules & Packages, File Handling in Python, Assignment	16	24
4.	Practice Problems	15	22
5.	**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	8	12

	Algorithms, Pseudo Algorithm & its Representation, Basics of Algorithms, Pseudo Variables & Operators, Decision Constructs, Iteration Constructs, **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-, , Parts of Speech -Adjectives, PREPOSITION, Parts of Speech-Preposition of Time, Parts of Speech-Preposition of Place and Direction, Conjunctions and Interjections, Conjunctions and Interjections-Quiz, Tenses-Introduction, Tenses- Past Tense, Tenses-Present Tense, Tenses- Future Tense **Communicating to Succeed:** 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 **Design Thinking,** Design Thinking to Practice, Introduction to Design Thinking, Design Thinking Stories, what is Design Thinking? Design Thinking Constructs, Design Thinking Problem, IDEO Design Thinking Constructs, Design Thinking Introduction Quiz, Empathy, Design Thinking Templates, Empathy Exercise, Define, Define Exercise, Solution Space Exploration in Design Thinking Ideate Prototype and Test, Solution Space Exploration, Design Thinking at Apple, Comvita, Design Thinking Success Story **Problem Solving for Success -** Critical Thinking Skills, Introduction to Critical Thinking, Understanding Cognition, Definition of Critical Thinking, Difference between Knowledge and Intelligence, The process of Critical Thinking, Decision Making Skills, Introduction to Decision making skills, The Science behind Decision Making, Common Mistakes while taking Decisions, Decision Making Styles, Why good leaders make bad decisions, Steps in Decision Making, Problem Solving Skills, Introduction to Problem Solving, Root Cause Analysis, Step Method for Problem Solving, Brainstorming, Pareto's Principle on Problem Solving, Corrective Action versus Preventive Action **Building Agile mindset -**Agile Mindset Overview, Managing Self and Others, Communication Dynamics, Agile Mindset, The DAIly Standup, Agile Mindset Holding a dAIly standup meeting, **Creative Thinking -** Creativity Story and Myths, What promotes and restricts creativity?, What is Creativity?,		

	Understanding Convergent and Divergent Thinking, Convergent and Divergent Thinking, Divergent Thinking Techniques, Biomimicry – a form of analogous inspiration		
	Total	**67**	**100**

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

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10%	**20%**	**30%**	**20%**	**10%**	**10%**

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

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