GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Industry Led Minor/Hons.
Level: UG
Branch: Gen AI Specialist
Course / Subject Code : BE05IAO011
Course / Subject Name : Gen AI Specialist

w. e. f. Academic Year:	2026-27
Semester:	5
Category of the Course:	**Core Course**

Prerequisite: Learners should have a basic understanding of Python programming, fundamental statistics, and familiarity with core concepts of data handling and web applications.

Rationale:	These subjects are designed to provide learners with a solid foundation in data science, machine learning, and AI application development using Python and PyTorch. Beginning with Python for data science, students gain skills in handling, cleaning, and analyzing datasets. They then progress to classification methods and applied AI, where they learn to build practical machine learning solutions. Deep learning foundations with PyTorch introduce them to advanced neural network concepts and reinforcement learning essentials, while applied AI and data analysis with Python emphasize integrating models into real-world applications through tools like Flask. Together, these subjects prepare learners to analyze data, develop intelligent applications, and contribute to modern AI-driven solutions across industries.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand and apply different classification algorithms to real datasets, evaluate model performance, and build practical AI applications such as chatbots or intelligent assistants.	**A**
02	Gain hands-on experience with tensors, datasets, and data augmentation, implement linear regression and simple neural networks, and explore the essentials of reinforcement learning and deep learning models.	**N**
03	Acquire skills to process and clean datasets using Python libraries, perform exploratory data analysis, apply basic statistical methods, and create simple applications that demonstrate data-driven insights.	**C**
04	Perform advanced data analysis using Python, train and evaluate AI models, and integrate them into real-world applications with frameworks like Flask to deliver interactive, intelligent solutions.	**C**

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

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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.	**Classification Techniques and AI Application Development** This subject introduces learners to core classification methods in machine learning, including logistic regression, decision trees, and advanced approaches with PyTorch. Students explore real-world problems where classification is applied, evaluate model accuracy, and gain practical experience in building AI-powered solutions. The subject also covers applied development by guiding learners through creating intelligent applications such as a cognitive chatbot.	16	23.4
2.	**Deep Learning Foundations with PyTorch** This subject provides a foundation in deep learning using PyTorch, starting with tensors, datasets, and data augmentation techniques. Learners build linear regression models, implement neural networks, and explore key concepts in reinforcement learning and deep learning. Through practical exercises, students gain experience in training, testing, and evaluating models, preparing them to apply deep learning to real-world scenarios.	15	21.9
3.	**Python for Data Science and Applications** This subject focuses on applying Python to the field of data science, covering libraries such as pandas, NumPy, and matplotlib for data manipulation and visualization. Learners practice cleaning and preparing datasets, conducting exploratory data analysis, and applying basic statistical methods. A mini-project allows students to demonstrate their skills by creating a Python-based application that applies data science techniques to solve practical problems.	22.5	32.9

4.	**Applied AI and Data Analysis using Python** This subject integrates artificial intelligence and data analysis through Python and frameworks like Flask. Learners work with datasets to train machine learning models, evaluate their performance, and deploy them in real-world applications. The course emphasizes building end-to-end solutions that combine data analysis, AI techniques, and web-based integration, enabling students to create interactive and intelligent applications.	**15**	**21.9**
	Total	**68.5**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
5	**15**	**25**	**20**	**10**	**25**

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

References/Suggested Learning Resources:

(a) Books:

1. Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig
2. Introduction to Machine Learning – Ethem Alpaydin
3. Python Machine Learning – Sebastian Raschka & Vahid Mirjalili
4. Generative Deep Learning – David Foster

(b) Open-source software and website:

1. Python (Anaconda Distribution) – https://www.anaconda.com
2. TensorFlow – https://www.tensorflow.org
3. PyTorch – https://pytorch.org
4. Hugging Face (Transformers, LLMs) – https://huggingface.co
5. Kaggle (Datasets & Competitions) – https://www.kaggle.com

Suggested Course Practical List: Implement ML/DL models in Python, use generative AI frameworks, design prompts, and deploy models on cloud platforms.

Laboratory / Learning Resources: Jupyter/Colab, Python (Anaconda), TensorFlow, PyTorch, Hugging Face, GitHub, Kaggle, Docker, and cloud ML platforms.

Suggested Project List: Chatbot, text summarizer, recommender system, generative image app, fake news detector, or AI-driven sentiment analyzer.

Suggested Activities for Students: Kaggle challenges, hackathons, GitHub collaboration, project demos, open-source contributions, and cloud deployment.

Skill & Practical Activities to be carried out during Semester						
Important Note:- Please keep only applicable categories relevant to your offerings in this table and delete not applicable categories						
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 in 2 or 3 bullet points**
1	Master Classes / Expert Lectures by Industry Professionals	Sessions by AI experts on Foundation Models, Large Language Models (LLMs), Enterprise GenAI Adoption, RAG Architectures, and AI Governance & Responsible AI.	2–3 sessions (2 hours	Online	MS Teams / Zoom, OpenAI API, HuggingFace models, NVIDIA demos	• • Understand advanced foundations of Generative AI and LLMs. • Learn industry practices for building safe, scalable GenAI solutions. • Gain knowledge of real-world enterprise GenAI use cases.
2	Quizzes / Competency-	Quizzes covering LLM theory,	Every 2 weeks	Online	IBM LMS	• Strengthen conceptual knowledge of

	Based Evaluation	prompt engineering, transformers, fine-tuning, vector databases, and evaluation metrics for GenAI models.				GenAI and LLM architectures. • Evaluate readiness for advanced GenAI development tasks.
3	Hands-on Training / Lab Exercises / Tool-Based Learning	Labs on LLM APIs, HuggingFace Transformers, prompt engineering, fine-tuning small LLMs, embedding models, vector search (FAISS/ChromaDB), and RAG pipeline development.	Weekly (3 hours per session)	Online	IBM LMS	• • Build and fine-tune LLM-based applications. • Implement retrieval-augmented generation (RAG). • Integrate GenAI components into end-to-end AI systems.

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