ABOUT THE COURSE:

TOTAL DURATION:	45 HRS
MODE OF DELIVERY	Virtual Instructor led by Industry Experts + Physical Session conducted by FDP faculty
TRAINER TO STUDENT RATIO:	1:50
TOTAL MARKS:	75

TABLE 1	
OVERALL COURSE OBJECTIVE:	• Analyze the evolution, principles, and real-world applications of Generative AI. • Evaluate the architecture and mechanisms of LLMs like IBM Granite, including Transformers and Attention. • Construct AI-powered applications using Watsonx and Streamlit through hands-on deployment and integration. • Design and implement practical applications such as text summarization, sentiment analysis, and multimodal tools. • Develop fine-tuned AI models customized for specific domain tasks through data preparation and tuning. • Integrate multiple data modalities (text, image, etc.) into unified AI applications for real-world impact. • Critically assess and apply ethical AI principles, ensuring fairness, transparency, and bias mitigation. • Optimize and refine AI models to enhance efficiency, accuracy, and performance in production settings. • Collaborate within interdisciplinary teams to prototype, evaluate, and present innovative Generative AI solutions.

LEARNING OUTCOME:	• Analyze the structure and functionality of Generative AI and LLMs such as IBM Granite. • Apply advanced prompt engineering and model fine-tuning techniques using tools like Watsonx to develop AI applications. • Design and deploy complex multimodal AI systems including chatbots and text generation tools using IBM Granite and Streamlit. • Create domain-specific generative AI applications to address challenges in sectors such as healthcare, education, and business. • Collaborate in teams to prototype, evaluate, and present innovative AI solutions to real-world problems.

TABLE 2: MODULE WISE COURSE CONTENT AND OUTCOME				
SL.NO	MODULE NAME	MODULE CONTENT	MODULE LEARNING OUTCOMES	DURATION (HRS)
1	Introduction to Generative AI	- Generative AI: Definition, evolution, importance - Use cases across modalities (text, image, speech, code) - LLMs: Transformers, Attention, IBM Granite - Hands-on: Generate text using IBM Granite	- Analyze the evolution of AI and differentiate Generative AI from traditional approaches - Apply knowledge of LLMs to AI problems - Create text outputs using IBM Granite	9
2	Generative AI Development Tools	- Watsonx AI Suite: Overview and configuration - Streamlit setup and integration - Hands-on: Build a web app using IBM Granite for real-time output	- Apply Watsonx to deploy AI models - Create functional AI-integrated web applications using Streamlit and IBM Granite	9
3	Applications of Generative AI	- Text Analytics: Summarization,	- Analyze diverse real-	9

		sentiment analysis, classification - Image generation in business contexts - Case studies: Healthcare, finance, e-commerce - Hands-on: Develop summarization/image tools	world applications of Generative AI - Apply AI techniques in domain-specific contexts - Create text and image generation tools	
4	Advanced Techniques in Generative AI	- LLM Fine-tuning: Datasets and practices - Multi-functional apps: Text-to-image, chatbots, summarization - Hands-on: Fine-tune IBM Granite and build AI solutions	- Evaluate datasets and methods for LLM fine-tuning - Create comprehensive AI applications using advanced integrations	9
5	Optimization, Ethics & Real World Usage	- Optimization and deployment challenges - Ethics: Bias, fairness, regulations - Career insights and industry alignment - Hands-on: Final AI project	- Evaluate performance and ethical implications of AI systems - Create optimized and ethically responsible AI applications for real-world deployment	9

TABLE 3: OVERALL COURSE LEARNING OUTCOME ASSESSMENT CRITERIA AND USECASES		
LEARNING OUTCOME	ASSESSMENT CRITERIA	USE CASES
Grasp the concepts of Generative AI and the workings of Large Language Models (LLMs) like IBM Granite.	Demonstrate understanding of key concepts in Generative AI and the structure and functionality of LLMs. Exhibit knowledge of IBM Granite's features and applications.	Use Case 1: LLM Exploration Tool Scenario: You are tasked with developing an interactive tool that allows users to query an LLM (e.g., IBM Granite) for explanations on AI-related topics, showcasing the LLM's knowledge retrieval capabilities. Tasks: - User Interaction: The tool should greet users and provide an explanation of its purpose. - Topic Input: Allow users to enter AI-related topics, such as "What is Generative AI?" or "Explain fine-tuning in LLMs." - Response Generation: Query IBM Granite to generate and display accurate, user-friendly responses. - Feedback Collection: Allow users to rate the response quality, helping improve system training. Use Case 2: AI Knowledge Evaluation Quiz Scenario: Develop a quiz application that tests users'

		understanding of Generative AI concepts and the working of LLMs. Tasks: - Quiz Creation: Design multiple-choice questions related to Generative AI and LLMs. - User Interaction: Allow users to select answers and provide real-time feedback on correctness. - Score Display: Show users their performance at the end of the quiz. - Learning Resources: Provide links to additional resources based on incorrect answers.
Gain hands-on experience with prompt engineering, fine-tuning LLMs, and creating AI-powered applications using Watsonx.	Create effective prompts for different tasks and evaluate LLM responses. Design and implement fine-tuning processes to optimize model performance. Develop AI-powered applications showcasing Watsonx's functionalities.	Use Case 1: Prompt Engineering Playground Scenario: You are developing a tool to test and refine LLM prompts for various tasks, such as question answering, summarization, and creative writing. Tasks: - Interface Design: Build an interface where users can input prompts and view LLM responses. - Task Selection: Provide a list of tasks, such as summarizing text or generating stories. - Result Evaluation: Enable users to compare responses

		for different prompt structures. - Save and Export: Allow users to save effective prompts for reuse. Use Case 2: Fine-Tuning Workflow Scenario: Design an interactive workflow to fine-tune a pre-trained LLM for domain-specific tasks. Tasks: - Data Preparation: Allow users to upload domain-specific data for fine-tuning. - Model Training: Integrate Watsonx to perform fine-tuning on the uploaded dataset. - Performance Metrics: Display metrics such as accuracy and loss during training. - Deployment: Enable users to deploy the fine-tuned model for testing.
Design and deploy chatbots, text generation tools, and multimodal AI solutions using IBM Granite and Streamlit.	Develop chatbots and text generation tools with real-world applications. Integrate IBM Granite with Streamlit to create interactive AI solutions. Exhibit proficiency in deploying multimodal AI models.	Use Case 1: Customer Support Chatbot Scenario: Develop a chatbot that assists users with frequently asked questions and troubleshooting queries. Tasks: - Dialogue Design: Create a conversational flow to guide users effectively.

		- Backend Integration: Connect the chatbot with IBM Granite for natural language understanding and response generation. - User Feedback: Collect user feedback to improve chatbot responses. - Deployment: Deploy the chatbot on a Streamlit-based web interface. Use Case 2: Multimodal Assistant for Healthcare Scenario: Design a healthcare assistant that processes patient data (text, images, and audio) to provide medical advice. Tasks: - Multimodal Input Handling: Enable the assistant to process text symptoms, analyze medical images, and interpret voice descriptions. - AI Integration: Use IBM Granite APIs to power the assistant's capabilities. - Real-time Output: Provide recommendations based on the processed data. - Compliance: Ensure the assistant adheres to healthcare regulations.

Implement generative AI applications in industries such as healthcare, education, and business for tasks like summarization and sentiment analysis.	Showcase industry-specific applications of generative AI. Build models for summarization and sentiment analysis tasks. Evaluate the impact and accuracy of AI applications in real-world scenarios.	Use Case 1: Business Sentiment Analysis Tool Scenario: Develop an AI-powered tool to analyze customer feedback and generate actionable insights. Tasks: - Data Input: Allow users to upload customer reviews or feedback. - Sentiment Classification: Analyze the data to classify sentiments (positive, neutral, negative). - Insight Generation: Provide a summary of key sentiments and suggest improvements. - Dashboard: Visualize results using charts and graphs. Use Case 2: Educational Content Summarizer Scenario: Build a summarization tool to condense lengthy educational materials into concise summaries. Tasks: - Input Handling: Enable users to upload or paste long educational content. - Summarization: Use generative AI to produce concise summaries.

		- Customization: Allow users to specify the length or depth of summaries. - Output Display: Show summaries with highlighted key points.
Work in teams to innovate, prototype, and present AI solutions while learning to solve real-world challenges effectively.	Collaborate with team members to identify challenges and design solutions. Develop prototypes and present AI-powered solutions effectively. Solve real-world problems using innovative AI approaches.	Use Case 1: AI-Powered Team Project Showcase Scenario: Collaborate with a team to design and present a prototype of an AI-powered solution for education, healthcare, or business. Tasks: - Problem Identification: Identify a real-world problem to address. - Solution Design: Collaborate to design a feasible AI solution. - Prototype Development: Build a functional prototype to showcase the solution. - Presentation: Present the prototype to stakeholders effectively. Use Case 2: Collaborative AI Solution for Environmental Sustainability Scenario: Work in a team to create an AI-based solution for tackling an environmental challenge, such as monitoring deforestation or

		reducing carbon emissions. Tasks: - Problem Scoping: Identify a specific environmental issue to address. - AI Model Development: Collaborate to design a predictive or monitoring model using relevant datasets. - Prototype Creation: Develop a working prototype to visualize the model's results (e.g., using charts or maps). - Team Presentation: Present the solution to stakeholders, emphasizing the impact on sustainability.

TABLE 4: LIST OF FINAL PROJECTS (10 PROJECTS THAT COMPREHENSIVELY COVER ALL THE LEARNING OUTCOME)	
SL.NO	FINAL PROJECT
1	EduTutor AI: Personalized Learning with Generative AI and LMS Integration
2	SmartSDLC – AI-Enhanced Software Development Lifecycle
3	Sustainable Smart City Assistant Using IBM Granite LLM
4	HealthAI: Intelligent Healthcare Assistant Using IBM Granite
5	Citizen AI – Intelligent Citizen Engagement Platform

TABLE 5: COURSE ASSESSMENT RUBRICS (TOTAL MARKS: 75)				
ASSESSMENT CRITERIA	DESCRIBE THE CRITERIA OF THE BELOW CATEGORY PERFORMANCE			TOTAL MARKS
	FAIR	GOOD	EXCELLENT	
Problem Definition & Design Thinking	3	5	8	10
Innovation & Problem Solving	1	2	4	5
Implementation of Project	6	12	18	20
Performance of the Project	1	2	4	5
Project Demonstration & Documentation	3	5	8	10
MCQ-based assessment 25 Questions				25