



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Information Technology

Subject Code: DI05016011

Subject Name: Artificial Intelligence with Prompt Engineering

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

Prerequisite:	Students should have basic knowledge of: • Python programming • Data handling and programming logic • Fundamentals of Machine Learning (classification, regression, clustering) • Basic understanding of computer applications and internet technologies
Rationale:	Artificial Intelligence has evolved significantly with the emergence of Generative AI and Large Language Models (LLMs). Modern software systems increasingly rely on AI-powered assistants for coding, content generation, data analysis, and automation. Prompt Engineering has emerged as an important skill that enables users and developers to effectively interact with AI systems and guide them to produce accurate and meaningful outputs. This course introduces students to the fundamentals of Artificial Intelligence, Generative AI, and Large Language Models, followed by practical techniques for designing effective prompts. Students will learn prompting strategies, AI productivity tools, and how to build simple AI-powered applications using APIs and Python. The course also introduces concepts such as Retrieval Augmented Generation (RAG) and Agentic AI along with ethical considerations of AI usage. The course focuses on practical AI usage rather than mathematical AI modelling, making it suitable for diploma students and preparing them for AI-assisted software development environments.

Course Outcome: After Completion of the Course, the student will be able to: **Revised Bloom's Taxonomy (RBT)*

No	Course Outcomes	RBT Level
01	Explain the fundamentals of Artificial Intelligence and Generative AI.	Understand
02	Describe the working principles and limitations of Large Language Models.	Understand
03	Design effective prompts using prompt engineering techniques.	Apply
04	Apply advanced prompting strategies for performing different AI tasks.	Apply
05	Develop simple AI-based applications using APIs and productivity tools.	Apply



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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE(E)	PA(M)	PA(I)	ESE(V)	
3	0	2	4	70	30	20	30	150

Course Contents:

Unit No.	Content	No. of Hours	% of Weightage
1.	Foundations of Artificial Intelligence and Generative AI 1.1 Introduction to Artificial Intelligence 1.1.1 Definition and history of AI 1.1.2 AI vs Machine Learning vs Deep Learning 1.2 Types of AI 1.2.1 Narrow AI vs General AI 1.3 Applications of AI 1.3.1 AI in daily life 1.3.2 AI in education 1.3.3 AI in healthcare 1.3.4 AI in cybersecurity 1.4 Introduction to Generative AI 1.4.1 Concept of Generative AI 1.4.2 Types of Generative AI systems 1.4.3 Text generation, Image generation, Code generation 1.5 Generative AI tools 1.5.1 ChatGPT 1.5.2 Google Gemini 1.5.3 DALL·E 1.6 Basics of Natural Language Processing 1.6.1 Concept of NLP 1.6.2 Role of NLP in chatbots and LLMs	06	15



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2.	Basics of Large Language Models (LLMs) 2.1 Introduction to Large Language Models 2.1.1 Concept of LLMs 2.1.2 Training data and parameters 2.2 Working of LLMs 2.2.1 Tokens 2.2.2 Embeddings (conceptual) 2.2.3 How LLM predicts the next word 2.3 Popular LLM Models 2.3.1 GPT models 2.3.2 Claude 2.3.3 LLaMA 2.3.4 Gemini 2.4 Capabilities and Limitations 2.4.1 Hallucination problem 2.4.2 Context window limitations 2.4.3 Bias in AI systems 2.4.4 Cost of AI models	06	15
3.	Prompt Engineering Fundamentals 3.1 Introduction to Prompt Engineering 3.1.1 Definition and importance 3.1.2 Prompt lifecycle 3.2 Prompt Structure 3.2.1 Instruction 3.2.2 Context 3.2.3 Input data 3.2.4 Output format 3.3 Prompting Methods 3.3.1 Zero-shot prompting 3.3.2 Few-shot prompting 3.3.3 Role-based prompting 3.3.4 Instruction prompting 3.4 Prompt Design Best Practices 3.4.1 Writing effective prompts 3.4.2 Prompt testing and evaluation 3.4.3 Iterative prompt improvement	09	20
4.	Prompt Engineering Techniques 4.1 Prompting Techniques 4.1.1 Chain-of-Thought prompting 4.1.2 Prompt chaining 4.1.3 Self-consistency prompting 4.1.4 ReAct prompting	09	20



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	4.2 Step-by-step reasoning prompts 4.3 Prompt Engineering for Tasks 4.3.1 Text summarization 4.3.2 Content generation 4.3.3 Code generation 4.3.4 Question answering 4.3.5 Language translation 4.4 Retrieval Augmented Generation (RAG) 4.4.1 Concept of RAG 4.4.2 Using external knowledge sources		
5.	AI application development: Generative AI, Agentic AI 5.1 Using AI Tools for Productivity 5.1.1 Writing emails 5.1.2 Generating reports 5.1.3 Creating presentations 5.2 AI in Software Development 5.2.1 Code generation 5.2.2 Code explanation 5.2.3 Code documentation 5.3 AI for Debugging Code 5.3.1 Finding errors in code 5.3.2 Fixing bugs using AI 5.4 Introduction to AI APIs 5.4.1 Concept of APIs 5.4.2 Examples: OpenAI API, Gemini API 5.5 Developing AI Applications 5.5.1 AI chatbot 5.5.2 AI blog writer 5.5.3 AI document summarizer 5.5.4 AI question generator 5.6 Introduction to Agentic AI 5.6.1 Concept of AI agents 5.6.2 Autonomous task execution 5.6.3 Examples: AutoGPT, CrewAI 5.7 Responsible AI 5.7.1 Ethical AI usage 5.7.2 Bias and fairness, Data privacy 5.7.3 Risks and limitations of AI systems	15	30
	Total	45	100



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Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	35	20	-	-	-

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:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Artificial Intelligence: A Modern Approach	Stuart Russell, Peter Norvig	Pearson Education, May 2022 ISBN-10: 9356063575
2	Hands-On Large Language Models	Jay Alammar, Maarten Grootendorst	O'Reilly Media, October 2024 ISBN-10: 1098150961
3	Natural Language Processing with Python	Steven Bird, Ewan Klein, Edward Loper	O'Reilly Media, July 2009 ISBN-10: 0596516495
4	Machine Learning with Python Cookbook	Chris Albon	O'Reilly Media, March 2018 ISBN-10: 9781491989388
5	Prompt Engineering Guide	DAIR.AI	Online Resource

(b) Open-source software and website:

1. <https://chat.openai.com>
2. <https://huggingface.co>
3. <https://platform.openai.com>
4. <https://www.promptingguide.ai>
5. <https://developers.google.com>
6. <https://claude>



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Suggested Course Practical List:

The following practical outcomes (PrOs) are the subcomponents of the COs. These PrOs need to be attained to achieve the Cos

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Use Generative AI tools to perform different types of tasks and document their applications in various domains.	1	2
2	Perform basic NLP-based tasks such as sentiment analysis and text classification using AI tools or Python libraries.	1	2
3	Perform experiments to analyze the behavior of LLM by testing prompt variations, context understanding and response consistency.	2	2
4	Evaluate the capabilities and limitations of LLMs by testing factual, logical, and ambiguous queries and identifying hallucinations.	2	2
5	Design and refine prompts for tasks such as email writing and concept explanation. Compare outputs before and after prompt refinement.	3	2
6	Apply prompting techniques such as zero-shot, few-shot, and role-based prompting.	3	2
7	Apply advanced prompting techniques such as chain-of-thought and prompt chaining to solve multi-step problems.	4	2
8	Perform task-based prompt engineering for summarization, blog generation, and code generation. Optimize prompts for better output.	4	2
9	Use AI tools for software development tasks such as code generation, debugging, and code explanation.	5	2
10	Develop a simple AI chatbot using API integration (OpenAI/Gemini) with Python.	5	4
11	Build a document-based question-answering system using AI APIs. (Basic RAG concept)	5	4
12	Develop an AI-based application such as a Study Assistant/Resume Generator/Blog writer/Coding assistant.	5	4
Total			30

Note:- More practical exercises can be designed and offered by the respective course teacher to develop the industry-relevant skills/outcomes to match the COs. The above table is only a suggestive list.



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List of Laboratory/Learning Resources Required:

Sr. No.	Laboratory/Learning Resources/Equipment Name with Broad Specifications	PrO. No.
1	Computer system with internet connectivity and a minimum of 8 GB RAM	All
2	Python IDE (VS Code / Jupyter Notebook)	All
3	Access to AI tools (ChatGPT, Gemini, Claude)	All

Suggested Project List: (if required)

Only one project is planned to be undertaken by each student, assigned at the beginning of the semester. Each project should integrate at least two Course Outcomes (COs).

Sample Projects: (if required)

1. AI Study Assistant for students
2. AI Resume & Cover Letter Generator
3. AI Summarization Tool
4. AI Personal Productivity Assistant

Suggested Activities for Students: (if required)

- a) Seminar on Generative AI and LLMs
- b) Prompt Engineering competitions
- c) Exploration of AI tools and frameworks
- d) Mini hackathon on AI applications

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