COURSE TITLE	**PROMPT ENGINEERING FOR GENERATIVE AI**
COURSE CODE	**01CT0727**
COURSE CREDITS	**3**

Objective:

1 The course aims to introduce the fundamental concepts of Generative AI and Large Language Models (LLMs), focusing on the design and development of effective prompts for diverse applications. It develops the ability to craft structured prompts using various techniques such as few-shot learning, chain-of-thought reasoning, and prompt patterns. The course emphasizes practical skills in building prompt-based systems, integrating LLMs into applications, and performing evaluation and optimization of prompts. It also provides exposure to multimodal AI systems including text and image generation, while addressing ethical considerations and responsible use of generative AI technologies.

Course Outcomes: After completion of this course, student will be able to:

1 Design effective prompts using structured prompt engineering techniques
2 Analyze and optimize prompts for improved performance and reliability.
3 Develop prompt-based applications using APIs and external tools.
4 Evaluate ethical issues and limitations associated with Generative AI systems

Pre-requisite of course: Python Programming language and AI fundamentals

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to Generative AI and LLMs** Overview of Generative AI, Large Language Models, evolution of NLP, transformer architecture (conceptual), applications of LLMs, introduction to prompting, tools (ChatGPT, Gemini, Claude)	3
2	**Fundamentals of Prompt Engineering** What is a prompt, components of prompts, prompt design principles, prompt templates, role prompting, zero-shot and few-shot prompting, prompt limitations	4
3	**Advanced Prompting Techniques** Chain-of-Thought prompting, ReAct prompting, prompt patterns (persona, question refinement, cognitive verifier, template pattern), prompt chaining, multi-step prompting	7

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Contents : Unit	Topics	Contact Hours
4	**Prompt Optimization and Evaluation** Prompt testing strategies, benchmarking prompts, evaluation metrics, hallucination detection, bias and reliability, prompt debugging and refinement	6
5	**Multimodal Prompting and Applications** Text generation, image generation (DALL·E, Stable Diffusion basics), prompt design for images, content generation use-cases, API-based integration (OpenAI/Gemini APIs)	6
6	**Ethics, Applications, and Deployment** Responsible AI, bias and fairness, misuse of generative AI, privacy concerns, real-world applications, introduction to LLM-based systems and workflows	4
Total Hours		**30**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment 1** Design basic prompts for text generation tasks	2
2	**Experiment 2** Implement zero-shot and few-shot prompting techniques	2
3	**Experiment 3** Create role-based prompts for different personas	2
4	**Experiment 4** Implement chain-of-thought prompting for reasoning tasks	2
5	**Experiment 5** Apply prompt patterns (persona, template, refinement)	2
6	**Experiment 6** Develop multi-step prompt workflows	2
7	**Experiment 7** Evaluate prompts using different inputs and analyze consistency	2
8	**Experiment 8** Identify hallucinations and improve prompt reliability	2
9	**Experiment 9** Perform prompt optimization using iterative refinement	2
10	**Experiment 10** Generate images using prompt-based tools (DALL·E / Stable Diffusion)	2
11	**Experiment 11** Compare outputs across different generative AI tools	2
12	**Experiment 12** Build a simple application using LLM APIs	2
13	**Experiment 13** Develop a prompt-based AI application	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
14	**Experiment 14** Implement Retrieval-Augmented Generation (RAG) by integrating external documents for context-aware responses	2
15	**Advance Experiment 1** Design and evaluate prompt pipelines for complex tasks (e.g., multi-stage content generation or decision-making systems)	2
16	**Advance Experiment 2** Develop an agent-based prompting system using tools/functions (tool calling, API chaining)	2
17	**Advance Experiment 3** Perform automated prompt evaluation using scoring metrics, feedback loops, or LLM-based evaluators	2
18	**Advance Experiment 4** Build a domain-specific prompt system (e.g., healthcare, education, finance) and evaluate its performance	2
Total Hours		**36**

Textbook :

1 Prompt Engineering for Generative AI , James Phoenix & Mike Taylor, O'Reilly Media , 2026

2 Prompt Engineering for Everyone: A Comprehensive Guide to Unlock the Potential of ChatGPT and AI-Language Models., David Scott Bernstein., The Passionate Programmer,, 2023

References:

1 Unlocking the Secrets of Prompt Engineering , Unlocking the Secrets of Prompt Engineering , Gilbert Mizrahi, Packt Publishing, 2024

2 Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs., Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs., James Phoenix, Mike Taylor., O'Reilly Media, 2023

3 The Quick Guide to Prompt Engineering: Generative AI Tips and Tricks for ChatGPT, Bard, Dall-E, and Midjourney., The Quick Guide to Prompt Engineering: Generative AI Tips and Tricks for ChatGPT, Bard, Dall-E, and Midjourney., Ian Khan., Packt Publishing, 2023

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	10.00	30.00	25.00	15.00	10.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1. https://www.promptingguide.ai/
2. https://platform.openai.com/docs
3. https://deepmind.google/technologies/gemini/
4. https://huggingface.co/learn

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