PVP 20

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(AI&ML)

IV B Tech – I Semester

Prompt Engineering

Course Code	20AM4702A	**Year**	IV	**Semester**	I
Course Category	PEC	**Branch**	CSE(AI&ML)	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	ML, DL
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		
Upon Successful completion of course, the student will be able to		
CO1	Describe the foundational concepts of Language Models, Prompt Engineering, and their ethical implications to understand how prompt influence the behavior of the output.	**L2**
CO2	Apply prompt design principles and techniques such as zero-shot, few-shot, and persona prompting to effectively communicate with language models.	**L3**
CO3	Use prompt engineering for practical applications in software development and data science, such as code generation, data analysis, documentation and optimize prompts using evaluation metrics, security considerations.	**L3**
CO4	Analyze optimized prompts and evaluation metrics, data, and advanced reasoning strategies like Chain-of-Thought and Tree of Thoughts prompting.	**L4**

Contribution of Course Outcomes towards achievement of Program Outcome & Strength of correlation (3: High, 2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**2**												
CO2	**3**											**3**	
CO3	**3**											**3**	
CO4		**3**									**2**		**3**

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Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**Foundations of Language Models and Prompt Engineering:** **Language Models:** Behavior, capabilities, and limitations of LLMs. **Tokenization:** Input-output relationships, token economics, and computational considerations. **Introduction to Prompt Engineering**: Scope, importance, and real-world applications **Core Components of Prompts**: Instructions, context, examples, constraints **Ethical Aspects**: Biases, safety, hallucinations, responsible AI usage.	CO1
II	**Prompt Structure, Design Principles, and Core Techniques** **Prompt Content:** Static and Dynamic Content **Core Prompting Techniques:** Zero-shot prompting, Few-shot prompting, Template-based prompting, Role-based and persona prompting. **Assembling the Prompt:** Anatomy of the Ideal Prompt, Formatting and Positioning Elements.	CO1, CO2.
III	**Advanced Reasoning and Problem-Solving Strategies:** **Chain-of-Thought (CoT) Prompting:** Fundamentals of step-by-step reasoning, Zero-shot CoT and Few-shot CoT. **Advanced Prompting Strategies:** Tree of Thoughts (ToT), Multi-path reasoning and decision trees, Decomposition and divide-and-conquer prompting.	CO1, CO2, CO4.
IV	**Prompt Optimization, Evaluation, and Security:** **Prompt Optimization:** Iterative refinement, A/B testing methodologies, and parameter tuning (temperature, top-p). **Evaluation Metrics:** Quantitative assessment: accuracy, relevance, and coherence. Qualitative assessment and the role of human evaluation. **Adversarial Prompting and Security:** Introduction to prompt security vulnerabilities, including prompt injection and jailbreaking.	CO1, CO3, CO4.
V	**Software Development Applications:** Code generation and completion prompts, Debugging assistance and code review automation, Documentation and comment generation, Test case creation and validation. **Data Analysis and Research Applications**: Data exploration and analysis prompts, Research assistance and literature review automation, Statistical analysis and interpretation, Report generation and summarization, Scientific writing and technical communication.	CO1, CO3, CO4.

Learning Resources
Text Books
1. Prompt Engineering for Large Language Models: Theory and Practice, John Berryman and Albert Ziegler, Ist edition,2024, O'Reilly Media
References
1. Advanced Prompt Design: Techniques for Modern AI Systems, Jennifer Liu and David Park,2023. 2. Conversational AI and Prompt Engineering Fundamentals, OpenAI Research Team,2024 3. Practical Prompt Engineering: From Basics to Industry Applications, Thomas Anderson and Lisa Zhang,2023

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E-Recourses and other Digital Material
1. https://platform.openai.com/docs/guides/prompt-engineering
2.https://docs.anthropic.com/en/docs/build-with-claude/prompt-engineering/overview
3.https://ai.google.dev/gemini-api/docs/prompting-strategies
4. https://huggingface.co/docs/transformers/en/tasks/prompting
5.https://github.com/dair-ai/Prompt-Engineering-Guide