# PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

#### IV B Tech – I Semester

**Prompt Engineering** 

Course Code	20DS4702A	Year	IV	Semester	I
<b>Course Category</b>	PEC	Branch	CSE (DATA SCIENCE)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	ML, DL
Continuous Internal Evaluation	30	Semeste r End Evaluati	70	Total Marks	100
		on			

					(	Cours	e Outc	omes					
Upon	Succes	sful c	omplet	ion of	cours	e, the	studen	nt will b	e 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				
	Apply prompt design principles and techniques such as zero-shot, few-shot, and persona prompting to effectively communicate with language models.						L3						
CO <sub>3</sub>	Use prompt engineering for practical applications in software development and data cods science, such as code generation, data analysis, documentation and optimize prompts using evaluation metrics, security considerations.							L3					
	Analyze optimized prompts and evaluation metrics, data, and advanced reasoning CO4 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)							Ż					
	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
Ш	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.	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.	CO2,
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

### E-Recourses and other Digital Material

PVP 20

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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