

**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

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

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### Syllabus

Unit No	Contents	Mapped CO
I	<b>Foundations of Language Models and Prompt Engineering:</b> <b>Language Models:</b> Behavior, capabilities, and limitations of LLMs. <b>Tokenization:</b> Input-output relationships, token economics, and computational considerations. <b>Introduction to Prompt Engineering:</b> Scope, importance, and real-world applications <b>Core Components of Prompts:</b> Instructions, context, examples, constraints <b>Ethical Aspects:</b> Biases, safety, hallucinations, responsible AI usage.	CO1
II	<b>Prompt Structure, Design Principles, and Core Techniques</b> <b>Prompt Content:</b> Static and Dynamic Content <b>Core Prompting Techniques:</b> Zero-shot prompting, Few-shot prompting, Template-based prompting, Role-based and persona prompting. <b>Assembling the Prompt:</b> Anatomy of the Ideal Prompt, Formatting and Positioning Elements.	CO1, CO2.
III	<b>Advanced Reasoning and Problem-Solving Strategies:</b> <b>Chain-of-Thought (CoT) Prompting:</b> Fundamentals of step-by-step reasoning, Zero-shot CoT and Few-shot CoT. <b>Advanced Prompting Strategies:</b> Tree of Thoughts (ToT), Multi-path reasoning and decision trees, Decomposition and divide-and-conquer prompting.	CO1, CO2, CO4.
IV	<b>Prompt Optimization, Evaluation, and Security:</b> <b>Prompt Optimization:</b> Iterative refinement, A/B testing methodologies, and parameter tuning (temperature, top-p). <b>Evaluation Metrics:</b> Quantitative assessment: accuracy, relevance, and coherence. Qualitative assessment and the role of human evaluation. <b>Adversarial Prompting and Security:</b> Introduction to prompt security vulnerabilities, including prompt injection and jailbreaking.	CO1, CO3, CO4.
V	<b>Software Development Applications:</b> Code generation and completion prompts, Debugging assistance and code review automation, Documentation and comment generation, Test case creation and validation. <b>Data Analysis and Research Applications:</b> 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, 1st 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

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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>