

# Complete Lesson Plan: Mastering Prompt Engineering with Advanced Applications

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## Lesson Objective:

By the end of this lesson, students will:

1. Understand the concept of prompt engineering and its significance.
  2. Learn how to craft effective prompts for various AI tools like ChatGPT, Gemini, and GitHub Copilot.
  3. Practice creating prompts for advanced use cases (creative writing, coding, summarization).
  4. Explore advanced applications of prompt engineering in real-world scenarios.
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## 1. Introduction

### What is Prompt Engineering?

Prompt engineering is the art and science of crafting precise instructions to guide AI models in generating desired outputs. The quality of the input directly affects the quality of the output.

### Why is it Important?

1. Helps AI understand your requirements.
2. Makes tasks faster and easier (e.g., summarizing documents, writing essays, generating code).
3. Bridges the gap between human needs and machine intelligence.

### Real-Life Examples of Prompt Engineering:

1. Writing a research paper or report.
  2. Debugging or generating code.
  3. Generating marketing strategies or creative ideas.
  4. Building conversational AI chatbots.
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## 2. Principles of Effective Prompts

Introduce the core principles of prompt engineering with examples.

### 1. Be Clear and Specific

#### Example:

- Weak Prompt: "Explain AI."

- Strong Prompt: "Write a 200-word explanation of artificial intelligence, focusing on its applications in healthcare and education."

## 2. Provide Context

### Example:

- Weak Prompt: "Generate a summary."
- Strong Prompt: "Summarize this article for a 10-year-old: [Paste text]."

## 3. Specify Format

### Example:

- "List the top 5 programming languages in 2025, and provide 2 advantages for each in table format."

## 4. Use Constraints

### Example:

- "Write a poem about renewable energy in 4 lines."

## 5. Break Down Complex Tasks

### Example:

- "Step 1: Describe renewable energy. Step 2: Explain its benefits. Step 3: Compare it with fossil fuels."

## 6. Iterate and Refine

If the output isn't satisfactory, tweak the prompt and try again.

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## 3. Hands-On Practice

### Activity 1: Informative Prompts

1. **Prompt:** "What are the top 5 renewable energy sources? Provide a 1-line explanation for each."
  2. **Prompt:** "Explain the Pythagorean theorem to a 12-year-old with an example."
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## **Activity 2: Creative Prompts**

1. **Prompt:** "Write a short story about a robot that saves a city from a flood."
  2. **Prompt:** "Generate a motivational speech for students preparing for exams."
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## **Activity 3: Coding Prompts**

1. **Prompt:** "Write a Python function to calculate the area of a circle given its radius."
  2. **Prompt:** "Fix the following Python code: `def max_num(list): return maxlist.`"
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## **Activity 4: Summarization Prompts**

1. **Prompt:** "Summarize this paragraph in 3 bullet points: [Insert text]."
  2. **Prompt:** "Create a 50-word summary of the causes of climate change."
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## **4. Advanced Applications**

### **1. Chaining Prompts**

Guide AI to perform multiple tasks in sequence.

**Example:**

- Prompt 1: "List 5 business ideas in the education sector."
  - Prompt 2: "For each idea, suggest a marketing strategy and estimate the startup cost."
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### **2. Using AI Personas**

Ask the AI to adopt a specific role or persona.

**Example:**

- "You are a doctor. Explain the symptoms of the flu in simple terms."
  - "You are a history professor. Provide a timeline of major events in World War II."
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### **3. Designing Chatbots**

Create conversational flows using structured prompts.

**Example:**

User: "What courses do you offer?"

Bot: "We offer Python, Math, and AI courses. Which one interests you?"

User: "Tell me about Python."

Bot: "Our Python course is for beginners and lasts 8 weeks. It costs \$200."

**Prompt to Generate Responses:**

- "Simulate a conversation between a user and a chatbot providing information about a teaching academy."
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### **4. Generating Complex Outputs**

Use advanced prompts for detailed outputs.

**Example:**

- "Write a detailed project plan for a mobile app to teach kids math. Include milestones, required resources, and estimated costs."
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### **5. Group Activity: Create Your Own Prompts**

1. **Task 1:** Create an AI prompt to generate a blog post titled "The Importance of Learning Python in 2025."
  2. **Task 2:** Write a prompt to generate a step-by-step guide on planting a home garden.
  3. **Task 3:** Ask students to work in pairs to craft a creative prompt and test it with ChatGPT.
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### **6. Summary and Discussion**

1. Recap key principles of prompt engineering:
    - o Clarity, specificity, context, constraints, iteration.
  2. Discuss how prompt engineering can be applied in:
    - o Education.
    - o Coding.
    - o Content creation.
  3. Share examples of prompts that worked well during the class.
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## Assignment: Advanced Prompt Engineering

1. **Task 1:** Write a prompt to generate:
    - o A business pitch for an eco-friendly startup.
    - o A Python script for generating Fibonacci numbers.
  2. **Task 2:** Refine the following weak prompts:
    - o "Tell me about renewable energy."
    - o "Write a story."
    - o "Explain Newton's laws."
  3. **Task 3:** Experiment with chaining prompts. For example:
    - o Prompt 1: "Generate a list of 5 creative writing topics."
    - o Prompt 2: "Write an outline for topic 3 from the list."
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## Final Note: Encouraging Experimentation

- Explore different AI tools (e.g., ChatGPT, Copilot, Gemini).
- Test prompts for various tasks (creative writing, coding, brainstorming).
- Refine and iterate prompts to see how the AI's output changes.