Capstone Problem Statement

Title: *"AI Mentor Simulator: Training Learners with Virtual Instructors"*

Problem Context

Teaching prompt engineering effectively requires learners to experiment, make mistakes, and refine their skills in a guided environment. However, human trainers cannot individually attend to every learner in real-time, especially in large cohorts. Traditional classroom methods (fixed slides, pre-defined exercises) fail to adapt to the learner's pace, curiosity, and unique challenges.

Generative AI offers the possibility of creating **realistic virtual instructors and peers** — but the success of such simulations depends on **carefully crafted prompts**. Well-engineered prompts define the mentor's persona, guide interactive teaching styles, introduce variability in challenges, and provide contextualized feedback rather than generic answers.

This capstone challenges participants to design a **prompt-driven virtual mentor simulator** that enables learners to practice, explore, and refine their prompt engineering skills in dynamic, adaptive scenarios.

Your Challenge

Build a **GenAI-powered Prompt Engineering Learning Companion** that, through advanced prompt engineering techniques:

1. **Simulates diverse instructor personas**
    - Prompt design should define traits such as supportive coach, critical reviewer, or time-pressed expert.
    - Personas must stay consistent across the learning conversation while adapting tone based on learner performance.
2. **Generates adaptive learning dialogues**
    - Prompts should guide the AI to role-play as a mentor that assigns tasks, asks probing questions, and critiques learner prompts.
    - Different prompt strategies (role prompting, chain-of-thought scaffolding, few-shot examples) should be applied to control the learning journey.

3. **Evaluates learner prompt performance**
    - Prompts should instruct the AI to switch roles — from acting as a mentor to acting as a grader/peer reviewer.
    - Feedback must be structured, covering clarity, creativity, robustness, and ethical considerations in prompt design.
4. **Supports scenario customization**
    - Trainers should be able to input task domains (e.g., creative writing, data analysis, customer service).
    - Prompt templates must adapt instructor behavior and evaluation criteria accordingly.

Constraints

- Must use **prompt engineering** as the primary technique to achieve realism, adaptivity, and feedback quality.
- Must include at least **3 distinct mentor/peer personas** to demonstrate the impact of careful design.
- No reliance on static dialogues — prompts should drive dynamic, context-aware teaching interactions.

Deliverables

1. **Working Prototype** – a mentor simulation system powered by prompt-driven AI.
2. **Persona Prompt Library** – well-documented instructor/peer persona prompts with examples of good vs. bad design.
3. **Evaluation Prompts** – templates for scoring learner prompts and generating constructive feedback.