# Generative AI for Researchers

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**Course Duration:** 20 hours, **Meeting Schedule:** 5 meetings/week, each 2.5 hours

## Course Description

This course provides an in-depth exploration of Generative AI and its applications in academic research. Participants will gain a basic understanding of generative models, with a focus on large language models (LLMs), prompt engineering, and responsible AI practices. The course will also cover various AI tools that can enhance research productivity and innovation.

## Learning Outcomes

By the end of this course, participants will be able to:

1. Understand the principles and applications of generative AI.
2. Explain the architecture and functioning of large language models.
3. Apply prompt engineering techniques to generate desired outputs from AI models.
4. Identify and implement responsible AI practices in research.
5. Utilize AI tools to support and enhance academic research activities.

#### Topics and Schedule

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| **Week** | **Meeting** | **Topic** | **Description** |
| 1 | 1 | Overview of Generative AI | Definition, history, types of generative models, and applications in research |
| 1 | 2 | Understanding Large Language Models (LLMs) | Evolution of language models, key concepts, and overview of popular LLMs, sizes, and types. |
| 1 | 3 | Basics of Prompt Engineering | What is prompt engineering, techniques, use cases, and examples |
| 1 | 4 | Advanced Prompt Engineering | Complex scenarios, multi-step prompts, prompt tuning, and hands-on session |
| 1 | 5 | Overview of AI Tools | Types of AI tools for research |
| 2 | 6 | AI Tools: Hands-On Session | Practical applications and hands-on session using AI tools for research projects |
| 2 | 7 | Ethical Considerations in AI + Implementing Responsible AI Practices | Bias and fairness, transparency, accountability, privacy, and data protection  Frameworks, guidelines, tools, techniques, case studies, and best practices |
| 2 | 8 | Practical Applications and Future Trends  Course Wrap-Up and Q&A | Emerging trends in AI for research and future directions  Summary of key points, discussion, and Q&A session |