Northeastern
College of Engineering

INFO 7375 & Prompt Engineering for Generative AI

SPRING 2025

Course Information
Course Title: Prompt Engineering for Generative AI
Course Number: INFO 7375
Term and Year: SPRING 2025
Credit Hour: 4
CRN: TBD
Course Format: Online

Instructor Information
Full Name: Shirali Patel
Email Address: shi.patel@northeastern.edu
Office Hours: Virtual Upon Request; TA will host assistance hours

Instructor Biography
Shirali Patel is an adjunct faculty member, based out of the Arlington Campus. With over 20 years of experience as a systems engineer, project manager, and product manager, Shirali brings a wealth of knowledge and practical expertise to her students. She holds a Doctorate in Engineering Management from George Washington University and currently serves as a Director of Product Management at Microsoft. In this role, she leads a team responsible for launching M365 clouds for Government customers, with a recent focus on the launch of CoPilot. In addition to her professional accomplishments, Shirali is a proud US Airforce veteran, bringing a unique perspective and discipline to her work and teaching.

Teaching Assistant Information
Full Name: TBD
Email Address:TBD
Office Hours: TBD

Course Prerequisites
None, but a basic understanding of Python coding is required.

Course Description
AI prompt engineering is a powerful tool that enables individuals to leverage AI technologies without extensive coding skills. By carefully crafting prompts, users can guide large-language models (like GPT-3, GPT-4, Google Bard, and Copilot) to produce valuable outputs, aiding in the development of innovative

ideas and applications. This practice democratizes access to technology, reducing the need for deep technical expertise and lowering entry barriers for entrepreneurs. As AI continues to evolve, prompt engineering is likely to become a crucial skill, offering significant opportunities for those who choose to engage with it.

Course Learning Outcomes

This course aims to equip students with a robust understanding of the fundamental concepts and methodologies applicable to any Large Language Model (LLM). Participants will gain a deep knowledge of AI-assisted coding and data analysis, along with a comprehensive framework for developing, testing, and managing prompts.

This course is ideal for students looking to leverage advanced AI technology to enhance their work quality across various industries. By effectively utilizing LLMs, potential developers can accomplish tasks with exceptional quality and efficiency, showcasing enhanced capabilities. The course offers an in-depth exploration of the AI field, equipping learners with skills that are applicable both professionally and personally. The principles taught will enable effective interaction with AI systems, leading to transformative results that were once unimaginable.

After successfully completing this course, students will gain a comprehensive understanding of Prompt Engineering, and cultivate the necessary skills for interacting effectively with AI systems:

- Understand the fundamentals of prompt engineering and the pivotal role of prompt engineers in systems powered by Generative AI and Natural Language Processing (NLP).
- Develop in-depth knowledge of Large Language Models (LLMs) and their operational mechanisms.
- Master the skill of crafting, optimizing, and customizing prompts tailored to various AI models.
- Explore a range of prompting concepts and techniques, including zero-shot and few-shot prompting, Chain of Thought Prompting, Knowledge Generation Prompting, among others.
- Acquire the ability to fine-tune LLMs to produce structured outputs and enhance knowledge retrieval.
- Learn to identify and address common issues in LLMs, such as hallucinations, and devise innovative solutions.
- Gain proficiency in the Tree of Thought Prompting technique to improve problem-solving capabilities in AI language models.
- Efficiently utilize AI prompt libraries to organize, streamline development processes, and enhance collaborative efforts.

Required Tools and Course Textbooks.

•TEXTBOOK: El Amri, Aymen. LLM Prompt Engineering for Developers. Packt Publishing, 2024.

•Students will review academic papers, AI research reports, and articles focused on prompt engineering and fine-tuning techniques within the field of Generative AI.

Course Schedule/Topics Covered.

Week	In Class Topic	In-Class	Assignment (Due before next class)
1	• Class Syllabus • Class Expectations • Course Introduction • Introduction to AI/ML/DL • Generative Models and Types • Generative Al for Text • Al with Foundation Models • Recap of Generative Al Concepts • Traditional vs. Generative Models	Survey on Coding Skills & AI Knowledge	
2	• Understanding NLP • Understanding LLMs • Statistical Models • Knowledge-based Models • Contextual Language Models • Neural Network-based Models • Transformer Models	ChatGPT Prompt Exercises	HW1: Exploration of Language Models (short paper)
3	• OpenAI GPT • GPT vs ChatGPT • GPT Models (3.5, 4.0, etc.) • API Usage vs Web Interface • Costs, Tokens, & Initial Prompts • Probability and Sampling • API Parameters • Deprecation	Tech Stack Setup	HW2: Project Proposal (Milestone 1)
4	• N-Shot Learning • Chain of Thought (CoT) • Auto Chain of Thought (AutoCoT)	Few-Shot Exercise COT Exercise	HW3: Basic Project Model Using Prompting Techniques (Milestone 2)
5	• Self-Consistency • Transfer Learning • Fine-Tuning	Transfer Learning Exercise	HW4: Fine-Tuning the Project Model (Milestone 3)
6	• Perplexity • Hack the Prompt • ReAct = Reason + Act	BetterPrompt Exercise	Perplexity Optimization for Prompts (Remove)
7	• General Knowledge Prompting • Azure Prompt Flow	GK Prompting Exercise Azure Prompt Flow Exercise	HW5: Designing Complex Prompts using Azure Prompt Flow
8	• LangChain •	LangChain Exercise	HW6: Test and Refine the Project

			Model (Milestone 4)
9	• Partial Prompting • Pipeline Prompts • Prompt Templates • Example Selectors	ReAct with LangChain Exercise	
10	• Success Criteria & Test Cases • Evaluating a Prompt • Promptfoo • Integrating Promptfoo with LangChain	Promptfoo Scenarios	HW7: User-Centered Prompt Design
11	• Multi-modality • Prompt Hacking Defense	Multi-modal Prompting Exercise	HW8: Multi-Modal Prompting for Creative Applications
12	• Meta Prompting	Project Live Demo (Milestone 5)	
13	• Best Practices • Anatomy & Types of Prompts • Prompt Databases, Tools, & Resources		Functional Project Submission & Final Report (Milestone 6)
14	Final Exam, due by Friday		

Assignment Grading

- Class Attendance & Participation – 13%
- Homework Assignments – 40%
- Project – 30%
- Final Exam – 20%
- Class Evaluation – 2%

Grading Scale

95-100% A	87-89.9% B+	77-79.9% C+	69.9% or below F
	84-86.9% B	74-76.9% C	
90-94.9% A-	80-83.9%B-	70-73.9% C-	

Attendance/Late Work Policy

Attendance Policy

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course, with 3 or more absences resulting in an automatic 'F' for that course.** Students are expected to inform their instructors of any absences in advance of the class; if a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak

with their Academic Advisor (coe-mgen-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave in accordance with the University's academic and global entry expectations. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

End-of-Course Evaluation Surveys
Your feedback regarding your educational experience in this class is particularly important to the College of Engineering. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at **https://neu.evaluationkit.com**. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Northeastern University Mail account notifying you when surveys are available.

Academic Integrity
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

MGEN Student Feedback

Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

University Health and Counseling Services
As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit https://www.northeastern.edu/uhcs.

Student Accommodations
Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit https://drc.sites.northeastern.edu.

Library Services
The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit https://library.northeastern.edu
Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help
For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu

Canvas Student Resources: https://canvas.northeastern.edu/student-resources/

For assistance with my Northeastern e-mail, and basic technical support:
Visit ITS at https://its.northeastern.edu
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357

Diversity and Inclusion
Northeastern University is committed to equal opportunity, affirmative action, diversity, and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration, and an awareness of global perspectives on social justice.

Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion

Title IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty, and staff.

In case of an emergency, please call 911.

*Please visit **https://www.northeastern.edu/ouec** for a complete list of reporting options and resources both on- and off-campus*.