AI-CCRE

UNIVERSITY OF NEBRASKA AT OMAHA

AI BOOTCAMP

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The lectures are always very informative , with both visual and discussion components. The questions & discussions are always well received with simple and easy to understand answers. Today really bought everything together.

-Bootcamp participant , March 2025

OVERVIEW

WHY IS NOW THE TIME FOR ADVANCED AI SKILLS?

With job postings for AI roles growing by more than 15,000% since 2021, the skills you'll gain in this bootcamp are among the most valuable in today's workforce. The rapid adoption of AI across industries has created an urgent demand for professionals who can build, implement, and oversee intelligent systems. Emerging technologies like generative AI and large language models are transforming workflows, making advanced AI skills essential to stay competitive. As businesses invest heavily in AI innovation and sectors like healthcare, finance, and logistics continue to be reshaped, now is the time to gain the expertise needed to lead in this evolving landscape.

WHAT YOU'LL EXPERIENCE IN THIS BOOTCAMP

This immersive, hands-on program is designed to equip you with both confidence and capability. Over four sessions, you'll progress from foundational concepts to advanced applications, guided by expert instructors and supported by a collaborative peer community. You will gain the skills to design, build, and optimize AI-driven solutions—including RAG-powered knowledge tools—while working with LLM stacks that integrate platforms like Snowflake and Databricks. The focus is on mastering modern AI workflows—from prompt engineering and NLP pipelines to end-to-end automation—and applying your learning directly to challenges from your own field. You'll also work on customized use cases and build AI prototypes tailored to your domain. No prior AI experience is required—just a passion for learning and innovation.

FROM PROMPTS TO PROTOTYPES : BUILD REAL AI SOLUTIONS

This AI Bootcamp is designed to take you from the fundamentals of prompt engineering to building end-to-end AI applications using Retrieval-Augmented Generation (RAG). Each session is packed with practical, hands-on learning—helping you go beyond theory to create working, portfolio-ready solutions.

You'll start by mastering how to write, test, and refine prompts for large language models. Then, you'll apply natural language processing techniques using libraries like spaCy and NLTK to build pipelines that clean, embed, and retrieve textual data.

By the end of the program, you'll have compared different LLM models, created prompts with varying levels of complexity, built an AI application using GitHub Copilot, and developed a RAG-based solution that retrieves and generates answers from internal documentation. You'll also gain experience integrating enterprise data solutions like Snowflake and Databricks to power intelligent, scalable applications. Your learning will culminate in building a no-code AI prototype that addresses a specific use case in your industry, demonstrating your ability to apply document embeddings, retrieval mechanisms, and modern generative AI tools to solve real-world challenges with impact and precision.

The process of learning is amazing. I'm enjoying the interactive aspect of this class

-Bootcamp participant , March 2025

Tackle challenges like:

Crafting Effective Prompts

Building End-to-End Generative AI Solutions

Mastering NLP and Embeddings

Tackling AI Security and Privacy Risks

Implementing RAG with Enterprise Data Stacks

Comparing LLM Models

WHO SHOULD ATTEND

Forward-Thinking Data Analyst and Developers

Ideal for professionals working with data, insights, and automation.

Aspiring AI Engineer

Perfect for those passionate about building AI-driven solutions.

Tech-Savvy Consultant

Designed for strategic thinkers applying AI in business contexts.

CURRICULUM AT A GLANCE

Build advanced AI skills in 4 sessions

FOUNDATIONS OF LANGUAGE MODELS, PROMPT ENGINEERING, AND NATURAL LANGUAGE PROCESSING

Begin your AI journey by exploring how modern language models interpret and generate human language. This session lays the groundwork for working with large language models (LLMs) by focusing on core natural language processing (NLP) concepts, prompt engineering strategies, and the fundamentals of text representation through embeddings.

Learning Objective:

- Understand how LLMs process and generate text
- Learn foundational NLP concepts and preprocessing techniques
- Practice creating and refining prompts tailored to specific tasks
- Evaluate how variations in prompts affect model responses
- Gain exposure to NLP tools like NLTK and spaCy for text manipulation
- Learn concepts of vector embeddings for text representation

Hands-On Activities:

- Compare LLM responses on the same prompts to analyze performance differences
- Experiment with prompt engineering to see its impact on responses
- Design a use-case specific prompt and evaluate its output
- Build a notebook interface with GitHub Copilot in VS Code
- Compare traditional NLP techniques with LLM outputs
- Explore document embeddings in real-world contexts

INTRODUCTION TO RETRIEVAL-AUGMENTED GENERATION

This session introduces Retrieval-Augmented Generation (RAG), a powerful architecture that enhances large language model (LLM) outputs by grounding them in external, contextually relevant information. You'll explore the core components of RAG systems, examine architectural variations, and learn strategies to optimize performance through chunking, embedding, and retrieval.

Learning Objective:

- Understand RAG fundamentals and how it enhances LLMs
- Compare standard LLM outputs with RAG-enhanced ones
- Explore various RAG architectures and design principles
- Identify advantages and limitations of RAG in real-world use
- Learn and apply document chunking strategies for retrieval
- Understand the role of embedding models and vector databases in RAG

Hands-On Activities:

- Compare outputs from standard LLMs and RAG systems
- Implement a basic RAG pipeline for document retrieval
- Experiment with text chunking strategies to evaluate performance
- Explore different embedding and vector storage options
- Visualize the impact of chunking on retrieval quality and response generation

PRIVACY, SECURITY, AND DOMAIN-SPECIFIC AI PROTOTYPING

In this session, we address critical privacy and security considerations when deploying Retrieval-Augmented Generation (RAG) systems in real-world settings. Participants will learn how to identify and mitigate risks such as data leakage, unauthorized access, and hallucinated outputs. This session also marks the transition from guided activities to applied development, as participants begin designing their own AI prototypes based on domain-specific use cases.

Learning Objective:

- Identify privacy and security risks in RAG-based systems
- Apply best practices for protecting sensitive data
- Learn to detect and mitigate hallucinations and model misuse
- Understand compliance concerns with enterprise and regulated data
- Begin designing a domain-specific AI prototype using RAG and LLMs

Hands-On Activities:

- Analyze privacy and security vulnerabilities in sample RAG systems
- Review and apply mitigation strategies for sensitive data exposure
- Identify and document the scope of your domain-specific use case
- Begin designing your AI prototype, including components for prompt engineering, document retrieval, and response generation
- Collaborate with peers to refine your prototype and development plan

PROTOTYPE DEVELOPMENT, DEMO, AND WRAP-UP

In this session, we address critical privacy and security considerations when deploying Retrieval-Augmented Generation (RAG) systems in real-world settings. Participants will learn how to identify and mitigate risks such as data leakage, unauthorized access, and hallucinated outputs. This session also marks the transition from guided activities to applied development, as participants begin designing their own AI prototypes based on domain-specific use cases.

Learning Objectives:

- Finalize and refine your domain-specific AI prototype
- Prepare a clear and engaging presentation and live demo
- Communicate the relevance and impact of your solution
- Receive constructive feedback from peers and stakeholders
- Reflect on key takeaways and future AI applications in your domain

Hands-On Activities:

- Complete and polish your no-code or low-code AI prototype
- Troubleshoot final issues in prompt design, retrieval, or integration
- Rehearse your demo and prepare a brief narrative about your use case, approach, and outcomes
- Present your prototype and perform a live demo for the cohort
- Participate in feedback and discussion sessions with other teams

PROJECTS FROM PREVIOUS COHORTS

CareSight AI

A RAG-Powered Preventive Care Outreach Tool for Smarter Member Engagement
CareSight AI is an intelligent, RAG-powered outreach solution designed for insurance companies to enhance preventive care efforts. By analyzing patient data and leveraging retrieval-augmented generation, it identifies missed health screenings and vaccinations with precision. The tool automatically generates and delivers personalized reminders through each patient's preferred communication channel—email, SMS, or app notification—ensuring timely follow-ups. By promoting preventive care, CareSight AI not only improves population health outcomes but also helps reduce long-term medical costs through proactive engagement.

AgriLend Insight

A RAG-Powered Financial Intelligence Tool for Agricultural Lending
AgriLend Insight is a smart, RAG-powered AI tool designed to support agricultural lenders in evaluating the financial health of loan recipients. By analyzing balance sheets, income statements, and other financial documents, the tool automatically generates a comprehensive credit narrative and a forward-looking financial outlook for each agricultural business. This streamlines the underwriting process, enhances decision-making, and enables consistent, data-driven credit assessments—helping financial institutions manage risk while supporting rural economic growth.

TransIQ

A RAG-Powered Q&A Assistant for the Transportation Industry
TransIQ is a specialized, RAG-powered question-and-answer bot built for the transportation sector. It delivers instant, accurate responses to company-specific queries related to financial performance metrics, regulatory requirements, and internal policies. By centralizing knowledge and enabling natural language access to key information, TransIQ streamlines internal workflows, reduces time spent on manual research, and empowers employees to make informed decisions quickly and confidently.

TOOLS AND TECHNOLOGIES

The lecture was very informative and made sense. Even though I don't have lots of familiarity with the technical applications. I was still able to follow along pretty well

-Bootcamp participant , March 2025

EXPERTS

Prashanti Manda, Ph.D.
BootcampLead
Associate Professor
Computer Science

Victor Winter, Ph.D.
Professor
Computer Science

Mahadevan Subramaniam, Ph.D.
Department Chair
Computer Science

The lecture was so informative ! I appreciated the examples provided throughout the explanations. It was also nice how it is all built on top of each other so we could see the building blocks to how NLP got to where we are now. I love the practical application in labs to cement the knowledge. I've saved the code and excited to try out for real world problems

-Bootcamp participant , March 2025

FAQs

Who is this AI Bootcamp for?
This bootcamp is designed for professionals and learners who want to explore the power of AI—no matter their background. Whether you're new to AI or looking to deepen your skills, the sessions offer a practical, beginner-friendly experience with both low-code and no-code tools. Optional Python tools like spaCy and NLTK are available for those ready to dive deeper.

Do I need AI experience to participate?
No prior AI experience is required. The program starts from the fundamentals, using intuitive tools and step-by-step guidance. You'll build real-world AI workflows even if you're just getting started. More advanced tools are also available for those who want to explore further.

What kind of projects will I build?
Each session includes a hands-on exercises where you'll apply what you've learned to solve a real-world problem. Projects include designing prompt templates, building NLP pipelines, and developing retrieval-augmented workflows. The final project is a fully integrated AI solution that draws on your own dataset—demonstrating your ability to connect data retrieval, prompt engineering, and language model outputs in a meaningful, domain-specific AI application.

What tools and platforms will I use?
You'll work with OpenAI's ChatGPT, Python NLP libraries (like spaCy and NLTK), and workflow automation platforms such as Make.com and n8n. The curriculum also introduces prompt engineering frameworks and techniques for document embedding and retrieval.

Will I receive a credential after completing the bootcamp?
Participants who successfully complete the AI Bootcamp will receive a verified digital credential awarded by the University of Nebraska at Omaha and AI-CCORE.

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REGISTER NOW

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