Bootcamp Info Sheet

Instructor

Name: *Dr. Veronica Red*

Bio: *Dr. Veronica Red (they / them) received their Ph.D. in Biomathematics with a Minor in Statistics from North Carolina State University. They have a certification to teach Deep Learning courses from Nvidia, and they have experience teaching everything from Intro to R/Python to Conversational AI Bots. Dr. Red teaches Machine Learning courses for Data Society to professionals at the State Department, Comcast, and many other organizations. Dr. Red also has many years of experience working as a data scientist for government projects (statistical analysis, data visualization, network analysis, machine learning) and private sector (machine learning, data visualization, network analysis, statistical analysis, and predictive modeling). In their spare time, Dr. Red also runs a Meetup dedicated to increasing gender diversity in data science.*

Bootcamp Details

Bootcamp Title: *Communicating with AI: Prompting for Enhanced Output*

Number of Days: *4*

Hours per Day: *3*

Type of Instruction: *Lecture with hands-on exercises, chat, and polling questions*

Description: *This comprehensive course guides professionals through Generative AI foundations and critical ethical considerations about AI use, then establishes core Prompt Engineering skills including zero-shot, few-shot, and Chain-of-Thought (CoT) techniques for maximizing output. The training*

advances to sophisticated strategies like XML structuring, verification (CoVe), and advanced reasoning (ReAct, ToT), applying these skills to high-value domains such as data analysis, visualization, and conducting research. Upon completion, participants will possess a powerful skill set to confidently lead a responsible and productive application of AI in the workplace.

Target Audience: *This course is designed for professionals, managers, and individual contributors across all industries who are focused on enhancing productivity and leading the responsible application of Generative AI in the workplace.*

Technologies: *This course focuses on transferable Generative AI skills rather than a single platform. The instructor will demonstrate concepts using examples such as Copilot or Gemini, and participants are encouraged to come with their preferred Generative AI tool and apply the techniques directly during the course. Learners may notice small differences based on whether they use free or professional versions of these tools.*

Prerequisites: *This course requires minimal prior technical knowledge; no background in math, statistics, programming, or formal data analysis is necessary. Learners should possess basic computer literacy and have practical experience using chat-based generative AI tools in a professional context, ideally with a foundational understanding of key prompting principles (like specificity and context) and methods. Familiarity with data concepts and common file types (Excel/CSV) is helpful, and learners are encouraged to bring and apply the techniques using their preferred Generative AI tool of choice*

Student References: *Class slides and exercise files.*

Bootcamp Syllabus

Day 1: Foundations of Generative AI

- **Introduction to Generative AI**
  - **What is generative AI?**
  - **How does generative AI differ from other types of AI?**
  - **Why is generative AI important?**
  - **What major uses does generative AI have?**
- **How Generative AI Works**
  - **How generative AI learns from data**
  - **Common generative AI models**
- **Limitations of Generative AI**
  - **Training data limitations**
  - **Biases and mitigation**
  - **Hallucinations and mitigation**
  - **Ethical considerations**
- **Future Developments in Generative AI**
  - **Agentic AI**
  - **Multimodal AI**
  - **From large to small models**
  - **Regulation and Responsible AI**
- **Defining Prompt Engineering**

    - What are Large Language Models (LLMs)?
    - What is prompt engineering?
    - Example prompting tasks

Day 2: Core Prompt Engineering

- Introduction to Prompt Engineering
    - Define prompt engineering and its core principles
    - Identify how prompt engineering is being used in today's workplace
    - Analyze the capabilities and limitations of prompt engineering
- Prompt Engineering Frameworks
    - Establish the purpose and goals for prompt development
    - Outline key concepts and structural elements
    - Construct detailed prompts with specific instructions
    - Specify the scope and boundaries of desired outputs
    - Refine prompts through systematic iteration processes
- Foundational Prompting Methods
    - Apply zero-shot prompting for basic task completion
    - Implement few-shot prompting with strategic examples
    - Execute Chain-of-Thought (CoT) prompting for complex reasoning
    - Develop refinement techniques for output optimization
- Evaluating Generative AI Responses
    - Assess the relevance of generated content
    - Identify opportunities for addressing bias via prompting
    - Evaluate outputs in light of ethical considerations

Day 3: Advanced Prompt Engineering for Productivity

- Chain of Verification and XML Structuring Implementation
    - Implement CoVe self-critique techniques and develop verification questions for accuracy enhancement
    - Organize complex prompts using XML markup to distinguish context, instructions, and examples
- Multi-Path Reasoning Prompting Strategies
    - Execute ReAct (Reasoning + Acting) workflows and Tree-of-Thought exploration techniques
    - Design Graph-of-Thought frameworks for interconnected problem-solving scenarios
- Risk Assessment and Output Quality Assurance
    - Evaluate prompt outputs for bias, hallucinations, and accuracy using structured criteria
    - Develop iteration and refinement processes for workplace AI applications
- Interacting with AI Assistants and Research Methods
    - Navigating key interface features and multimodal capabilities
    - Apply effective prompting techniques and refinement strategies
    - Identify file upload options and platform limitations
    - Execute market research and competitor analysis techniques

    - Compile literature reviews and bibliography resources
    - Conduct web research and information gathering strategies

Day 4: AI Assistants for Data Analytics and Research

- Document Analysis, Summarization, and Quality Assurance
    - Implement best practices for summarizing complex documents
    - Perform thematic analysis and document coding techniques
    - Categorize content and recognize patterns
    - Evaluate strategies for verifying AI-generated outputs
    - Analyze potential biases and inaccuracies
    - Apply ethical considerations and responsible AI practices
- AI-Powered Data Analysis and Visualization
    - Core capabilities of generative AI models for data analysis
    - Recognizing supported file formats and data types
    - Benefits of using AI for data exploration and visualization
    - Conducting human validation when analyzing data with AI
    - Identifying relevant and impactful data for analysis
    - Determining appropriate visualization types for different data
    - Creating visualizations using natural language prompts
    - Interpreting AI-generated insights and recommendations
- Data Quality and AI-Assisted Cleaning Techniques
    - Defining clean data and its characteristics
    - Common data quality issues (incorrect, incomplete, etc.)
    - Impact of data quality on analysis outcomes
    - Tasks AI can help with in data cleaning processes
    - Identifying and correcting inconsistencies, standardizing formats, and handling missing values