**6 Weeks AI Foundational Course Onboarding Guide**

**Course Overview** This course provides a structured introduction to Python programming, machine learning, generative AI, and retrieval-augmented generation. Organized into distinct modules, the course covers both theoretical concepts and practical applications. It employs a project-based approach to facilitate hands-on learning and skill development.

**Course Modules**

**Module 1: Python Programming Fundamentals (1week)**

* IDE setup and environment configuration
* Python data types and structures
* Functions
* File handling
* End of module project

**Module 2: Machine Learning Fundamentals(2 weeks)**

* Introduction to data and data analysis
* Data manipulation using Pandas and NumPy
* Visualization techniques and exploratory data analysis (EDA)
* Data cleaning and preprocessing
* Overview of machine learning algorithms and models
* Model training, evaluation, and optimization
* Building interactive applications using Gradio
* End of module project

**Module 3: Generative AI and Prompt Engineering (1 week)**

* History of large language models
* Overview of open-source and proprietary models (e.g., Hugging Face, OpenAI)
* Working with APIs for AI applications
* Developing prompt templates and practicing prompt engineering
* Use-case analysis: iterative tasks, summarization, inference, and transformation
* Considerations of transparency, fairness, bias, accountability, and ethics in AI
* End of module project

**Module 4: Retrieval-Augmented Generation (RAG) and Agent Systems ( 1 week)**

* Fundamentals of vector databases
* Embedding models (open-source and proprietary) and pipeline configuration
* Introduction to frameworks such as LangChain
* Techniques for vector storage and retrieval
* Generating structured outputs
* Design and development of a RAG engine and agentic systems
* Development of a RAG-based application
* End of module project

**Module 5: End of Training Capstone and Off boarding (1 week)**

**Course Objectives**

* Develop foundational skills in Python programming.
* Gain practical experience in data manipulation, analysis, and visualization.
* Understand and apply key machine learning algorithms and model evaluation techniques.
* Acquire introductory knowledge in generative AI and prompt engineering.
* Learn the fundamentals of retrieval-augmented generation and agent systems.
* Apply acquired skills through a capstone project.

**Course duration**

* Six (6) weeks (6 hours daily)

**Target Audience**

* Individuals with no prior programming or AI experience.
* Professionals seeking to build technical skills in machine learning and AI.
* Developers interested in expanding their expertise in emerging AI technologies.
* Entrepreneurs aiming to develop AI-driven applications.

**Prerequisites**

* No prior programming or AI experience is required.
* A computer with internet access.
* Guidance provided for installing necessary software and development tools, including popular IDEs and cloud-based notebooks (e.g.,VSCode, Jupyter Notebook, Google Colab).

**Course Outcomes** Upon completion of this course, participants will be able to:

* Write and execute Python programs effectively.
* Manipulate and analyze datasets using Pandas and NumPy.
* Develop and evaluate machine learning models.
* Understand and implement generative AI solutions with prompt engineering and API integration.
* Design and develop basic retrieval-augmented generation (RAG) engines and agent systems.
* Apply their knowledge in a comprehensive capstone project.

**Detailed Course Description**

**Module 1: Python Programming Fundamentals** *Description:* This module introduces the core concepts of Python programming. Students will learn how to set up their development environments and gain a fundamental understanding of Python data types and data structures. The module covers writing functions and performing file handling operations, laying a solid groundwork for more advanced data manipulation and analysis. Emphasis is placed on practical coding exercises that build proficiency and confidence in using Python.

*Assessment:*

*project:*

**Module 2: Machine Learning Fundamentals** *Description:* This module offers an introduction to the principles and practices of machine learning. It begins with an overview of data analysis, focusing on data manipulation using Pandas and NumPy. Students will learn to visualize data, perform exploratory data analysis (EDA), and implement data cleaning and preprocessing techniques. The module further explores a range of machine learning algorithms and models, with practical sessions on training, evaluating, and optimizing these models. The use of Gradio for building interactive applications is also introduced to connect theoretical knowledge with hands-on practice.

*Assessment:*

*Project*

**Module 3: Generative AI and Prompt Engineering** *Description:* Focusing on the emerging field of generative AI, this module examines the evolution and development of large language models (LLMs). Students will explore both open-source and proprietary models, learn how to work with APIs, and set up accounts on platforms such as Hugging Face and OpenAI. The module provides a comprehensive introduction to developing prompt templates and practicing prompt engineering. Use cases such as iterative text generation, summarization, inference, and transformation are discussed, alongside essential topics related to transparency, fairness, bias, accountability, and ethical considerations in AI.

*Assessment:*

*Project:*

**Module 4: Retrieval-Augmented Generation (RAG) and Agent Systems** *Description:* This module introduces the concept of retrieval-augmented generation and the development of agent systems. It covers the fundamentals of vector databases and embedding models, with an emphasis on both open-source and proprietary solutions. Students will learn how to configure pipelines, work with frameworks like LangChain, and apply techniques for vector storage and retrieval. The module guides learners through generating structured outputs and culminates with the design and development of a basic RAG engine and agent-based application, providing practical experience in integrating advanced AI components.

*Assessment:*

*project:*

**Module 5: Final Capstone**