KOENIG SOLUTIONS · COURSE OUTLINE

Applied AI Defense: Computer Vision & LangChain Agents

Learn to build defence-focused AI systems spanning computer vision, NLP, prompt engineering and LangChain-based agentic workflows.

105 Hours	9	19	35
DURATION	MODULES	TOPICS	HANDS-ON ACTIVITIES

COURSE OVERVIEW

This Applied AI Specialization equips learners with hands-on experience in building intelligent defence applications—from real-time surveillance using computer vision to language-driven decision support. The course covers computer vision, NLP, prompt engineering, generative AI app development, and agentic AI systems. Learners engage with state-of-the-art models, frameworks like LangChain and CrewAI, and develop end-to-end AI-driven workflows essential for modern defence and surveillance operations.

WHO THIS COURSE IS FOR

- **AI engineers working on surveillance and intelligence systems**
- **Data scientists seeking domain-specific AI expertise**
- **Researchers in defence technology and national security**
- **Developers building generative and agentic AI applications**
- **Technical leads or architects in defence modernization projects**
- **Graduate students in AI, defence studies, or computer science**
- **Government or military personnel exploring AI integration strategies**

LEARNING OBJECTIVES

What You Will Learn

- Apply Python fundamentals including data structures and file handling
- Build regression, classification and clustering models
- Explain deep learning architectures such as CNN, RNN, LSTM and GRU
- Implement object detection and multi-object tracking with OpenCV
- Apply NLP techniques for entity extraction and classification
- Craft prompts using role-based and few-shot techniques
- Develop generative AI applications such as chatbots and RAG systems
- Configure agentic AI workflows using LangGraph and CrewAI

COURSE SYLLABUS

9 Modules, 19 Topics

Pre-requisite Session on Python

8 hours

This module is to get familiar yourself with the python language that is going to be used extensively throughout the sessions.

TOPICS

Variables, operators · Function, loops, conditional flow · Data structure · Modules, try-catch block · File handling · Introduction to Object oriented programming

01

16 hours **4 Labs**

Data Science

This module introduces learners to the core concepts of data science, focusing on supervised and unsupervised learning techniques. Participants will explore regression and classification algorithms, along with clustering methods like K-Means. Through practical labs, they'll gain hands-on experience in data analysis, model building, and pattern discovery—laying the foundation for applying machine learning to real-world problems across various domains. Ideal for beginners looking to enter the data science field.

TOPICS

- Introduction to Data science
- Supervised and Unsupervised learning
- Supervised - Regression and Classification algorithms
- Unsupervised Learning algorithms

02

16 hours | 4 Labs

Introduction to Deep Neural Network

This module provides a foundational understanding of deep learning, covering perceptrons, artificial neural networks (ANN), convolutional neural networks (CNN), and recurrent neural networks (RNN) including LSTM and GRU. Learners explore key concepts like padding, pooling, strides, flattening, and transfer learning. With dedicated labs for each architecture, participants gain hands-on experience in building and predicting with deep learning models for image classification, sequence modeling, and real-world AI applications.

TOPICS

- Understanding Perceptron
- Understanding Artificial Neural network / multi-layer perceptron
- Understanding Convolutional Neural network - CNN
- Padding, strides, pooling, Transfer learning etc
- Flattening layer and prediction
- Understanding Recurrent neural network
- RNN, LSTM, GRU

03

16 hours | 4 Labs

Computer Vision

This module builds practical skills in real-time computer vision. Starting with NumPy image arrays, learners progress to OpenCV-based image and video processing, object detection, and multi-object tracking. The focus is on understanding pixel-level manipulation, applying classic filtering techniques, detecting objects using deep learning models, and tracking their movement across frames using OpenCV tracking algorithms—all essential for real-time vision applications.

04

8 hours | 4 LABS

Natural Language Processing

Natural Language Processing techniques for Entity extraction, text Classification. Understanding Different techniques to convert a sentence into a vector - Bag of words, TF-IDF. Moving forward with Large Language models, Understanding Transformer and their architecture. Performing Summarisation, translations, Classification activities with different Hugging face/Local system-based models and API based

05

4 hours | 4 Labs

Prompt Engineering

This module introduces the art and science of prompt engineering—crafting inputs to get optimal responses from generative AI systems. Learners explore prompt types, context injection, role-based prompting, few-shot learning, and code generation tasks. With hands-on labs, participants develop skills to guide large language models (LLMs) like GPT or Open-source models effectively for summarization, classification, reasoning, and creative writing.

TOPICS

- Understand Limitations of Prompt engineering with different models
- Learning this will develop them to create better AI application - agentic

06

16 hours | 5 Labs

Generative AI Application Building

This module comprises of understanding generative AI apps with Lang chain. Building simple Lang chain applications, Chatbots, RAG systems, SQL based QnA systems, Semantic search. This module refers to the exposure on application building.

07

16 hours | 5 Labs

Understanding Agentic AI Systems - Langgraph and CrewAI

This module refers to the understanding of Uniqueness in agentic systems in genai apps. Frameworks will be using is Langgraph and Crewai. Understanding of tool calling, memory, parallel, routed workflow, different workflow orchestrations with multi-agents supports

Capstone Project

8 hours | 5 Capstone Activities

Here we will be focussing on what we have learnt so far and Capstone projects

HANDS-ON ACTIVITIES

Practise What You Learn

#	MODULE	ACTIVITY
01	**Data Science**	**LAB** ■ **Lab 1:** Data analysis insights ■ Lab 2: Regression ■ Lab 3: Classification ■ **Lab 4:** Unsupervised - K means clustering
02	**Introduction to Deep Neural Network**	**LAB** ■ Lab: Perceptron ■ Lab: ANN ■ **Lab:** CNN prediction ■ Lab: RNN
03	**Computer Vision**	**LABS** ■ Numpy Image Basics ■ OpenCV image Processing ■ Video Basics with Python and OpenCV ■ Object detection with Python and OpenCV
04	**Natural Language Processing**	**LABS** ■ Understanding of Traditional ML models for Natural Language Processing - Sentiment analysis ■ Performing same sentiment analysis with Transformers ■ Familiar ourselves with Hugging Face and Ollama based models with various Language based workloads ■ Deploying the activity on front end using streamlet
05	**Prompt Engineering**	**LABS** ■ Understanding Prompt with different models, Knowing Hallucination ■ In context Learning ■ Role based prompting ■ Chain of Thoughts
06	**Generative AI Application Building**	**LABS** ■ Simple Langchain application ■ Context aware chatbot ■ Vector store and similarity search ■ Retrieval augmented generation ■ SQL based Retrieval augmented generation

#	MODULE	ACTIVITY
07	**Understanding Agentic AI Systems - Langgraph and CrewAI**	**LABS** ■ Langgraph - creating simple agentic chatbot ■ Langgraph - creating agentic RAG Chatbot ■ Langgraph - Parallelisation, routing etc ■ Crewai - single agents ■ Crewai - Multiple agents in different orchestration
	Capstone Project	**CAPSTONE ACTIVITY** ■ Deploying a datascience model on fastapi - dockerised and deploying it on AWS ■ Deploying a fully functional Hugging face model ■ Capstone project on Image segmentation ■ Creating a memory based chatbot ■ Agentic chatbot memory based

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

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