IntelliBI

Gen AI & Agentic AI Specialization (Syllabus)

"India's #1 IT Industry-Focused Project Training Partner"

"Your Industry-Focused Project Training hunt ends here."

"Hands-on training covering 99% of real-world IT project scenarios, preparing you to succeed as a senior Software Engineer."

Courses Per Week

01 Data Science Foundations

02 Deep Learning & NLP with Trans -formers

03 Generative AI with APIs, Local Deployment & Prompt Engineering

04 RAG & AI Agents

05 Advanced Deployment, Multimodal GenAI & MLOps

Course Curriculum Overview
(By Weeks)

Data Science Foundations (Weeks 1–6)

Technology	Topics	Sub-Topics
General	Introduction to Data Science	• Data Science lifecycle, Types of data, Real-world use cases, Tools (Jupyter, Colab, Git, GitHub)
Python	Python for Data Science	• Data types, Control flow, Functions, Data structures (lists, tuples, dicts), Libraries (NumPy, Pandas), File I/O (CSV, JSON, SQL)
Python	Data Exploration & Visualization	• Descriptive stats, Missing data handling, Visualization (Matplotlib, Seaborn, Plotly), Interactive dashboards
Statistics	Probability & Statistics	• Distributions (Normal, Binomial), Bayes theorem, Hypothesis testing, Confidence intervals
Machine Learning	ML Fundamentals	• Regression (Linear, Logistic), Classification (Decision Trees, SVM, Random Forest), Unsupervised (K-means, PCA), Metrics
ML + Deployment	Advanced ML + Deployment	• Ensemble methods, Basics of Neural Networks, Flask/FastAPI deployment, Intro to Docker

Mini-Capstone Project 1:

Problem Statement: Predict housing prices using regression. Dataset: Kaggle House Prices dataset.

Deliverables:

- Jupyter Notebook with EDA + model training
- Deployed Flask API (Dockerized)
- README + GitHub repo

Evaluation: Model accuracy **(R^2 > 0.75)**, working API demo

Deep Learning & NLP with Transformers (Weeks 7–11)

Technology	Topics	Sub-Topics
Deep Learning	Neural Networks	• Perceptrons, Activation functions, Backpropagation, Gradient descent, PyTorch/TensorFlow basics
NLP	NLP Basics	• Tokenization, Text cleaning, Vectorization (TF-IDF, Word2Vec, GloVe)
Deep Learning	Sequence Models	• RNN, GRU, LSTM, Attention mechanism
Transformers	Transformers	• Self-attention, Encoder-decoder, BERT vs GPT, Hugging Face basics
NLP	Fine-Tuning Transformers	• Transfer learning, LoRA, PEFT, Task-specific fine-tuning

Mini-Capstone Project 2:

Problem Statement: Fine-tune a Hugging Face transformer for sentiment classiCication.

Dataset: IMDB reviews dataset.

Deliverables:

- Fine-tuned model checkpoint
- REST API using FastAPI
- Deployment on Hugging Face Spaces Evaluation: F1-score > 0.80, working deployment

Generative AI with APIs & Prompt Engineering (Weeks 12–15)

Technology	Topics	Sub-Topics
GenAI	Intro to Generative AI	• GANs, VAEs, Transformers, Applications (text, image, code)
APIs	OpenAI & Hugging Face API	• API integration, GPT models for text generation, Hugging Face Inference API
Local LLMs	Ollama & vLLM	• Running LLaMA, Mistral locally, vLLM optimization
Prompt Engineering	Prompt Techniques	• Zero-shot, Few-shot, Chain-of-thought, Prompt evaluation
AI Ethics	Responsible AI	• Bias, fairness, hallucination mitigation, AI safety

Mini-Capstone Project 3:

Problem Statement: Build a customer-support chatbot using either OpenAI API or Ollama local LLM.

Deliverables:

- Prompt library (templates)
- Working chatbot (CLI or web interface)
- Documentation comparing API vs local model Evaluation: Responsiveness, accuracy, ethical handling

RAG & AI Agents (Weeks 16–19)

Technology	Topics	Sub-Topics
Vector DBs	Embeddings	• OpenAI embeddings, FAISS, Pinecone, Weaviate
RAG	Retrieval-Augmented Generation	• Retriever + Generator architecture, LangChain RAG pipeline, Knowledge Graphs
AI Agents	Agentic AI	• LangChain Agents, CrewAI, AutoGen, Tool usage, Multi-Agent Collaboration
LLM	Fine-Tuning LLMs	• LoRA, QLoRA, RLHF, Evaluation methods

Mini-Capstone Project 3:

Problem Statement: Build an enterprise-grade RAG assistant with LangChain + FAISS and augment it with CrewAI agents for workClow automation.

Deliverables:

- Vector DB + retriever
- LLM integration (API or local)
- Multi-step agent reasoning

Evaluation: Quality of answers, robustness to unseen queries

Advanced Deployment, Multimodal GenAI & MLOps (Weeks 20–24)

Technology	Topics	Sub-Topics
Deployment	Cloud Deployment	•Docker, Kubernetes, AWS/GCP deployment
MLOps	GenAI MLOps	•CI/CD pipelines, Monitoring (MLflow, W&B), Scaling
Multimodal AI	Multimodal GenAI	•CLIP, DALL·E, Stable Diffusion, Text-to-image, Speech-to-text
Final Prep	Capstone Execution	•RAG assistant, Multi-agent system, Multimodal search engine

Mini-Capstone Project 5:

Deliverables:

- End-to-end project (data → model → deployment → monitoring)
- Documentation + demo presentation
- GitHub repo

Evaluation: End-to-end execution, scalability, clarity of documentation Career Pathway

Detailed Syllabus
(Week by Week)

Course 1: Data Science Foundations

Week / Module	Curriculum Details
Week 1: Introduction to Data Science	• Data Science lifecycle: problem → data → model → deployment • Types of data: structured vs unstructured • Real-world use cases (Cinance, healthcare, retail, GenAI) • Tools: Jupyter, Colab, Git, GitHub **Hands-on: Setup Python environment, version control with Git**
Week 2: Python for Data Science	• Python refresher: data types, control Flow, functions • Data structures: lists, tuples, dictionaries • Libraries: NumPy, Pandas • File I/O: CSV, JSON, SQL integration **Hands-on: Clean and manipulate a Kaggle dataset (Titanic or Iris)**
Week 3: Data Exploration & Visualization	• Descriptive statistics: mean, variance, skewness • Handling missing data & outliers • Visualization: Matplotlib, Seaborn, Plotly dashboards • Interactive visualizations **Hands-on: EDA on a large dataset (COVID, e-commerce sales)**
Week 4: Probability & Statistics	• Probability distributions: Normal, Binomial, Poisson • Bayes' theorem & conditional probability • Hypothesis testing (t-test, chi-square) • ConCidence intervals **Hands-on: A/B testing experiment simulation**

Week / Module	Curriculum Details
Week 5: Machine Learning Fundamentals	• Regression (Linear, Logistic) • ClassiCication (Decision Trees, SVM, Random Forest) • Unsupervised Learning: K-means, PCA • Metrics: Accuracy, Precision, Recall, F1, ROC **O Hands-on: Train ML models on UCI datasets (wine quality, churn)**
Week 6: Advanced ML + Deployment	• Ensemble methods: Bagging, Boosting, XGBoost • Basics of Neural Networks • Deploy ML with Flask/FastAPI • Intro to Docker containerization

Course 2: Deep Learning & NLP with Transformers

Week / Module	Curriculum Details
Week 7: Neural Networks	• Perceptrons, activation functions (ReLU, Sigmoid, Tanh) • Backpropagation & gradient descent • PyTorch & TensorFlow basics Hands-on: Train an MNIST digit classiCier

Week / Module	Curriculum Details
Week 8: NLP Basics	• Tokenization (WordPiece, BPE) • Text cleaning & preprocessing • Vectorization: TF-IDF, Word2Vec, GloVe • Limitations of bag-of-words Hands-on: Build a spam detection classiCier
Week 9: Sequence Models	• RNNs, GRUs, LSTMs • Attention mechanism introduction • Use cases: text classiCication, translation Hands-on: LSTM for sentiment analysis
Week 10: Transformers	• Self-attention & multi-head attention • Encoder-decoder architecture • BERT vs GPT comparison • Hugging Face Transformers introduction Hands-on: Use BERT embeddings for classiCication
Week 9: Sequence Models	• Transfer learning in NLP • LoRA, PEFT for efCicient Cine-tuning • Task-speciCic Cine-tuning (classiCication, summarization)

Course 3: Generative AI with APIs, Local Deployment & Prompt Engineering

Week / Module	Curriculum Details
Week 12: Introduction to Generative AI	• Generative vs discriminative models • Key models: GANs, VAEs, Transformers • Applications: text, images, music, code
Week 13A: OpenAI & Hugging Face API Integration	• Getting OpenAI API keys • Using openai Python client • Calling GPT models for text generation, summarization, chat • Hugging Face Inference API usage Hands-on: Build a chatbot with OpenAI API
Week 13B: Local Deployment with Ollama & vLLM	• Install Ollama on Mac/Linux • Run open-source LLMs (LLaMA, Mistral, Mixtral) locally • vLLM for optimized inference • Trade-offs: API vs Local deployment **O Hands-on: Compare responses of GPT-4 API vs local LLaMA**
Week 14: Prompt Engineering	• Zero-shot, few-shot prompting • Chain-of-thought reasoning • Self-consistency & role prompting • Prompt evaluation: BLEU, ROUGE, TruthfulQA **O Hands-on: Build a structured prompt template for customer support**

Week / Module	Curriculum Details
Week 15: Ethics & Responsible AI	• Bias, fairness, transparency • Mitigating hallucinations • AI safety principles

Course 4: RAG & AI Agents

Week / Module	Curriculum Details
Week 16: Vector Databases & Embeddings	• SentenceTransformers, OpenAI embeddings • FAISS, Pinecone, Weaviate, Milvus • Indexing, similarity search Hands-on: Build semantic search engine
Week 17: Retrieval-Augmented Generation (RAG)	• Retriever + Generator architecture • Chunking, context injection • LangChain RAG pipeline • Knowledge Graphs & Hybrid RAG (Neo4j, GraphDB integration) • Evaluation: hallucination reduction ○ **Hands-on: Document QA chatbot with RAG**

Week / Module	Curriculum Details
Week 18: Agents & Agentic AI	• LangChain Agents, CrewAI, AutoGen, LlamaIndex • Industry Agent Frameworks → OpenAI Assistants API, Anthropic Claude Agents, AutoGen Studio, ChatGPT Plugins • Tool use (SQL, web search, APIs) • Multi-Agent Collaboration Patterns → Manager–Worker, Hierarchical, Swarm • Memory types: short-term, long-term, episodic • Advanced Memory Systems → Hybrid memory (Vector + Symbolic), LLMLingua, MemGPT ○ **Hands-on: Build an autonomous research assistant**
Week 19: Fine-Tuning LLMs	• LoRA, QLoRA, RLHF • Evaluation methods (perplexity, human evals)

Course 5: Advanced Deployment, Multimodal GenAI & MLOps

Week / Module	Curriculum Details
Week 20: Cloud Deployment	• Docker & Kubernetes • Deploying LLMs on AWS/GCP/Azure Hands-on: Deploy chatbot as a cloud service

Week / Module	Curriculum Details

Week 21: GenAI MLOps & Security	• CI/CD pipelines for GenAI
	• Monitoring & retraining with MLflow, W&B
	• Scaling with vLLM & DeepSpeed
	• Agent Security & Governance
	  ▪ Prompt injection defense
	  ▪ Agent jailbreak prevention
	  ▪ Secure API call orchestration
	  ▪ Enterprise compliance (GDPR, SOC2)
	Hands-on: Build a monitored GenAI service with MLflow

Week 22–23: Multimodal GenAI	• CLIP, DALL·E, Stable Diffusion • Text-to-image, speech-to-text • Multimodal retrieval systems Hands-on: Build a text-to-image search app
Week 24: Final Capstone Prep & Execution Capstone Options (Choose One):	• RAG-powered research assistant • Multi-agent enterprise AI assistant (CrewAI + LangChain) • Multimodal search engine (text + image embeddings) • Enterprise Workflow Automation Agent (Jira, Slack, CRM integration) • Healthcare AI Agent (summarize patient records + assist doctors)

IntelliBI

Get In Touch With Us

Phone Number:
+91 99706 56907

Email Address:
inquiry@intellibiinnovationstechnologies.in

Website:
intellibiinnovationstechnologies.in

Address:
Sagar Complex, Dange Chowk, Jai Hind nagar, Thergaon, Pimpri-Chinchwad, Maharashtra 411033