16-Week AI & Agent-Building Curriculum

A linked schedule with **clickable resources** and detailed **weekly project outlines**. Open this markdown in any browser or Markdown viewer, then choose *Print* ➜ *Save as PDF* to obtain an offline PDF with live links.

Week-by-Week Roadmap

Week 1 – Python Foundations & Environments

Key Topics

• Python for Everybody (Coursera)

• Python `venv` Primer – Real Python

Weekly Project Outline

1. Install Python 3.12 and create a project folder.
2. Create and activate a virtual environment with `python -m venv .venv`.
3. Write `ping_api.py` that sends a GET request to https://httpbin.org/get and prints the JSON.
4. Push the script and a one-paragraph README to GitHub.

Week 2 – NumPy ✚ Pandas ✚ Matplotlib

Key Topics

• NumPy Getting Started

• 15-min NumPy/Pandas/Matplotlib Video

Weekly Project Outline

1. Download the public “Iris” CSV from UCI ML repo.
2. Load into a Pandas DataFrame, clean column names.
3. Plot a histogram of sepal length and save `hist.png`.
4. Commit `notebook.ipynb`, `hist.png`, and a short findings blurb.

Week 3 – Building & Consuming Python APIs

Key Topics

• FastAPI 15-Minute Tutorial

• Python Requests Guide – Real Python

Weekly Project Outline

1. Scaffold a FastAPI app with one `/stats` route.
2. Inside the route, fetch live JSON from `https://api.coindesk.com/v1/bpi/currentprice.json`.
3. Return BTC price and timestamp as JSON.
4. Test with `requests` and document the curl command in README.

Week 4–5 – SQL for Developers

Key Topics

- Mode SQL Tutorial (Basic→Advanced)
- SQL JOINs – GeeksforGeeks
- Pandas vs SQL (Video)

Weekly Project Outline

1. Spin up SQLite DB, import the "Nashville Housing" CSV.
2. Write four queries: top-10 prices, avg price by year, INNER JOIN with a lookup table, and a LEFT JOIN example.
3. Replicate each query in Pandas and compare runtimes.
4. Produce `report.md` with screenshots of SQL outputs and Pandas code.

Week 6 – Data Visualization in Practice

Key Topics

- Pandas Plotting – W3Schools
- PyData "Plotting in Pandas" Tutorial

Weekly Project Outline

1. Choose any Kaggle dataset > 10 k rows.
2. Build a Streamlit dashboard with two charts (line + scatter) and one KPI metric.
3. Deploy to Streamlit Cloud; include dashboard URL in README.

Week 7–8 – Classical Machine Learning with scikit-learn

Key Topics

- scikit-learn Basic Tutorial
- Zero-to-Mastery ML Crash Course (Video)

Weekly Project Outline

1. Split the Titanic dataset into train/test.
2. Train a RandomForest classifier; tune `n_estimators`.
3. Evaluate accuracy, precision, recall, F1.
4. Expose the model behind a `/predict` FastAPI endpoint that takes JSON passenger data.

Week 9–11 – Deep Learning Essentials

Key Topics

- TensorFlow Beginner Tutorials
- PyTorch Quickstart
- CNNs with TensorFlow

Weekly Project Outline

1. Train an MNIST digit classifier in TensorFlow (Keras).
2. Re-implement the same architecture in PyTorch.

3. Compare training times & accuracy in a table.
4. Save both models and write a reflection blog post (≈500 words).

Week 12 – LLM Fundamentals & GPT

Key Topics

• OpenAI Cookbook – Function Calling

• Hugging Face Transformers Docs

Weekly Project Outline

1. Design 5 systematic prompts to query GPT-4 about a product spec.
2. Log responses and token counts to a CSV.
3. Summarize strengths & limits you observed; include examples of hallucinations.
4. Track all calls with LangSmith and include trace link.

Week 13 – Retrieval-Augmented Generation & Agents

Key Topics

• LangChain Quickstart

• LangGraph Overview

Weekly Project Outline

1. Load 20 internal PDF docs with `UnstructuredLoader`.
2. Create a FAISS vector store.
3. Build a LangChain agent that answers questions with citations.
4. Add a simple Gradio chat UI and record a demo GIF.

Week 14 – No-Code Agent Builders

Key Topics

• CrewAI Docs

• LangFlow Canvas

• n8n Workflow Automation

Weekly Project Outline

1. Re-create Week 13 bot visually in LangFlow.
2. Build an n8n workflow that triggers the bot on new Zendesk tickets.
3. Compare dev time vs. coded approach in a short write-up.

Week 15 – AI-Enhanced IDEs & MCP Servers

Key Topics

• Cursor IDE

• Replit AI Overview

• Model-Centric-Product Server Pattern (Blog)

Weekly Project Outline

1. Refactor Week 7 model code inside Cursor with inline GPT suggestions.
2. Containerize the FastAPI service using Docker.
3. Deploy to an MCP-style server (e.g., Docker-compose on Render).
4. Measure latency before & after deployment.

Week 16 – Capstone: Autonomous Business Agent

Key Topics

• LangSmith Monitoring

• Streamlit Components

Weekly Project Outline

1. Goal: triage incoming customer emails, query product DB, draft replies.
2. Architect multi-tool LangGraph (email › classify › retrieve › draft › send).
3. Instrument with LangSmith and set up alerting on error rate.
4. Deliverables: live demo video, GitHub repo, post-mortem report.

After Graduation

- Take Stanford CS25 (Agents) or similar MOOC.
- Contribute a pull request to an open-source LangChain module.

How to Export as PDF

1. Click the **Download** button in this chat to save `ai-curriculum-roadmap.md`.
2. Open the file in any markdown viewer or VS Code preview.
3. Select **Print ➜ Save as PDF** – all links remain clickable offline.