7.5-Month Advanced AI Specialization

Complete Roadmap with Agentic AI

Duration:	30 weeks (Dec 1, 2025 - Jun 28, 2026)
Weekly Commitment:	~20 hours/week
Total Hours:	600 hours
Domains:	6 (GenAI, NLP, ML Eng, Automation, Agentic AI, Robotics)
Capstones:	3 major projects
Level:	Advanced practitioner

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1. Program Overview

This comprehensive 7.5-month program covers six critical domains of modern AI, with special emphasis on Agentic AI - the future of autonomous intelligent systems. By completion, you'll have deep expertise in Generative AI, NLP, ML Engineering, AI Automation, Agentic AI, and Robotics, backed by three production-grade capstone projects.

What Makes This Program Unique:

- **Comprehensive Coverage:** 6 domains instead of typical 3-4
- **Agentic AI Focus:** Dedicated 4-week phase on autonomous agents and multi-agent systems
- **Production Ready:** Build deployable applications, not just tutorials
- **Future-Proof:** Skills aligned with where AI industry is heading (2025-2030)
- **Project-Based:** 3 major capstones + 25+ weekly projects
- **Hands-On:** 75% practical implementation vs 25% theory

2. The Six Phases

Phase 1: GenAI & NLP Mastery

Weeks 1-8 (Dec 1 - Jan 25) • 160 hours

Deep dive into transformer architectures, large language models, RAG systems, generative models, and multi-modal AI.

Key Skills:

- Transformer implementation
- LLM fine-tuning (LoRA/QLoRA)
- Prompt engineering
- RAG pipelines
- Diffusion models
- CLIP and vision-language models

Capstone: LLM RAG Application - Domain-specific Q&A; system with 85%+ accuracy

Phase 2: ML Engineering Foundations

Weeks 9-12 (Jan 26 - Feb 22) • 80 hours

Production ML systems, MLOps, model serving, CI/CD, and containerization.

Key Skills:

- Model serving (FastAPI, TorchServe)
- MLOps (MLflow, W&B;)
- CI/CD pipelines
- Monitoring and drift detection
- Docker and Kubernetes
- A/B testing

Phase 3: AI Automation

Weeks 13-15 (Feb 23 - Mar 15) • 60 hours

Workflow automation with n8n, Make, Zapier, and complex integration patterns.

Key Skills:

- n8n workflow automation
- Make and Zapier integration
- API orchestration
- Custom webhooks
- Workflow testing
- Event-driven architecture

Phase 4: AGENTIC AI ■

Weeks 16-19 (Mar 16 - Apr 12) • 80 hours

Autonomous agents, multi-agent systems, tool use, task planning, and reasoning. The future of AI.

Key Skills:

- ReAct agent patterns
- LangGraph state machines
- AutoGen multi-agent systems
- Task planning and decomposition
- Agent memory systems
- Tool creation and use

Capstone: Multi-Agent System - Complex task automation with 85%+ success

Phase 5: ML Pipeline Integration

Week 20 (Apr 13 - Apr 19) • 20 hours

Combine MLOps with Agentic AI for intelligent, autonomous ML pipelines.

Key Skills:

- Agentic decision-making
- Autonomous retraining
- Intelligent monitoring
- Agent-based deployment
- Pipeline orchestration

Capstone: Agentic ML Pipeline - Autonomous decisions with 95%+ reliability

Phase 6: Robotics + AI

Weeks 21-30 (Apr 20 - Jun 28) • 200 hours

Embodied AI, ROS 2, simulation, computer vision, SLAM, RL, manipulation, and agentic robot control.

Key Skills:

- • ROS 2 programming
- • Gazebo simulation
- • Computer vision for robots
- • SLAM and navigation
- • Reinforcement learning
- • Robot manipulation (MoveIt)
- • Agentic robot control
- • Multi-modal embodied AI

Capstone: Agentic Autonomous Robot - Navigation, vision, NL control with 90%+ task success

3. Complete 30-Week Schedule

Week	Dates	Domain	Topic	Deliverable
1	Dec 1-7	NLP	Transformers	Transformer from scratch
2	Dec 8-14	NLP	Fine-tuning	Fine-tuned models
3	Dec 15-21	GenAI	LLM Architectures	Local LLM deployment
4	Dec 22-28	GenAI	Prompt Engineering	Prompt toolkit
5	Dec 29-Jan 4	GenAI	RAG Systems	RAG pipeline
6	Jan 5-11	GenAI	Generative Models	Diffusion model
7	Jan 12-18	GenAI	Multi-Modal AI	CLIP application
8	Jan 19-25	CAPSTONE	LLM RAG App	Deployed Q&A system
9	Jan 26-Feb 1	ML Eng	ML Engineering	Model API
10	Feb 2-8	ML Eng	MLOps	Experiment tracking
11	Feb 9-15	ML Eng	CI/CD	Pipeline + monitoring
12	Feb 16-22	ML Eng	K8s & Scaling	Containerized ML
13	Feb 23-Mar 1	Automation	n8n	Automated workflows
14	Mar 2-8	Automation	Make/Zapier	Integrations
15	Mar 9-15	Automation	Workflows	Workflow library
16	Mar 16-22	Agentic AI	ReAct Agents	ReAct agent
17	Mar 23-29	Agentic AI	LangGraph	Multi-agent system
18	Mar 30-Apr 5	Agentic AI	Planning	Planning agent
19	Apr 6-12	CAPSTONE	Multi-Agent	Agent application
20	Apr 13-19	CAPSTONE	Agentic Pipeline	ML pipeline
21	Apr 20-26	Robotics	ROS	Robot controller
22	Apr 27-May 3	Robotics	Simulation	Gazebo robot
23	May 4-10	Robotics	Vision	Vision pipeline
24	May 11-17	Robotics	Navigation	SLAM system
25	May 18-24	Robotics	RL	RL agent
26	May 25-31	Robotics	Manipulation	Grasping
27	Jun 1-7	Robotics	Agentic Control	Agent interface
28	Jun 8-14	Robotics	Embodied AI	Multi-modal robot
29	Jun 15-21	CAPSTONE	Robot Part 1	Integration
30	Jun 22-28	CAPSTONE	Robot Part 2	Complete robot

4. Three Capstone Projects

Capstone 1: LLM RAG Application

Week 8 (January 25, 2026)

Build a production-ready domain-specific question-answering system using retrieval-augmented generation.

Goals:

- Implement production-grade RAG pipeline
- Optimize retrieval and generation quality
- Deploy as accessible web application
- Achieve 85%+ answer accuracy with <2s latency

Tech Stack: LLaMA 2/GPT-3.5, ChromaDB/Pinecone, LangChain, FastAPI, Streamlit

Deliverables:

- Deployed web application
- GitHub repository with documentation
- Performance evaluation report
- Demo video

Capstone 2A: Multi-Agent System

Week 19 (April 12, 2026)

Build a sophisticated multi-agent system with specialized agents collaborating to solve complex tasks.

Goals:

- Design multi-agent architecture with 3-5 specialized roles
- Implement effective agent communication and coordination
- Demonstrate solving tasks requiring multi-step reasoning
- Achieve 85%+ task completion rate

Tech Stack: LangGraph/AutoGen, GPT-4/Claude, custom tools, vector DB for memory

Deliverables:

- Working multi-agent application
- Agent orchestration system
- Tool library and integrations
- Task completion analysis

Capstone 2B: Agentic ML Pipeline

Week 20 (April 19, 2026)

Production ML pipeline where agents make intelligent autonomous decisions about training, deployment, and monitoring.

Goals:

- Build end-to-end ML pipeline with full automation
- Use agents for data validation, training, deployment decisions
- Achieve 95%+ pipeline reliability
- Minimize human intervention (<10%)

Tech Stack: PyTorch, LangChain agents, MLflow, n8n, FastAPI, Docker, Kubernetes, Evidently AI

Deliverables:

- Deployed ML pipeline with agent control
- Monitoring dashboards
- Agent decision logs and analysis
- Performance metrics

Capstone 3: Agentic Autonomous Robot

Weeks 29-30 (June 28, 2026)

Robot that navigates autonomously, uses agentic reasoning for task planning, understands natural language, and adapts to environment.

Goals:

- Integrate navigation, vision, manipulation, and agentic AI
- Autonomous task decomposition and planning
- Natural language control with intelligent interpretation
- Achieve 90%+ task success on complex commands

Tech Stack: ROS 2, Gazebo, Nav2, MoveIt 2, YOLOv8, LangGraph agents, GPT-4/Claude

Deliverables:

- Complete autonomous robot system
- Multi-modal AI integration
- GitHub repository with simulation
- Demo video with multiple scenarios

6. Core Technology Stack

Languages:

Python 3.11+, Bash/Shell scripting

DL Frameworks:

PyTorch, TensorFlow, Hugging Face Transformers, PEFT

GenAI Tools:

LangChain, LlamaIndex, vLLM, Stable Diffusion, Diffusers

Agentic AI ■:

LangGraph, AutoGen, CrewAI, LangSmith, AgentOps

MLOps:

MLflow, Weights & Biases, DVC, Evidently AI

Serving & Deploy:

FastAPI, Docker, Kubernetes, TorchServe, TensorRT

Automation:

n8n, Make, Zapier, Apache Airflow

Databases:

ChromaDB, Pinecone, FAISS, PostgreSQL

Robotics:

ROS 2 Humble, Gazebo, Nav2, MoveIt 2, PyBullet

Monitoring:

Prometheus, Grafana, Evidently AI, Phoenix AI

Cloud:

AWS/GCP/Azure, Hugging Face Spaces, Modal

7. Essential Resources

Courses:

- Hugging Face NLP Course
- Fast.ai Practical Deep Learning
- DeepLearning.AI Specializations
- Stanford CS224N (NLP)
- LangChain Academy (Agents) ■
- Full Stack Deep Learning

Books:

- "Attention Is All You Need" (Vaswani et al.)
- "Designing Machine Learning Systems" (Chip Huyen)
- "Natural Language Processing with Transformers" (Tunstall)
- "Probabilistic Robotics" (Thrun et al.)
- "Hands-On Large Language Models" (Alammar)

Key Papers ■:

- ReAct: Synergizing Reasoning and Acting (Yao et al.)
- HuggingGPT: Solving AI Tasks (Shen et al.)
- AutoGen: Multi-Agent Conversation (Wu et al.)
- Chain-of-Thought Prompting (Wei et al.)
- RT-2: Vision-Language-Action Models

Communities:

- Hugging Face Discord
- r/MachineLearning Reddit
- ROS Discourse
- MLOps Community Slack
- LangChain Community

Documentation:

- PyTorch docs (pytorch.org)
- Hugging Face docs (huggingface.co/docs)

- LangChain docs (docs.langchain.com)
- LangGraph docs ■
- ROS 2 docs (docs.ros.org)

8. Assessment & Success Metrics

By Week 30, you will have:

✓ **Portfolio:** 3 deployed capstone projects + 25+ weekly projects on GitHub

✓ **Technical Skills:** Can implement transformers, build RAG systems, design ML pipelines, create autonomous agents, program robots

✓ **Documentation:** Professional README for every project, demo videos, technical write-ups

✓ **6 Domains Mastered:** GenAI, NLP, ML Engineering, Automation, Agentic AI, Robotics

✓ **Interview Ready:** Resume updated, portfolio live, can explain and implement concepts from scratch

✓ **Career Ready:** Qualified for senior AI/ML engineer, agentic AI specialist, or AI researcher roles

Weekly Checkpoint Rubric (1-5 scale):

- **Technical Understanding (40%):** Can explain concepts, understands trade-offs, applies to new problems
- **Implementation Skills (30%):** Code runs without errors, follows best practices, clear documentation
- **Project Deliverables (20%):** Meets requirements, includes testing, deployed/shareable
- **Time Management (10%):** Completed within allocated hours, balanced theory and practice

Pass criteria: Average score of 3.5+ to proceed to next week

Capstone Success Criteria:

- **Capstone 1 (RAG):** >80% accuracy, <2s latency, >0.7 precision@5, code quality
- **Capstone 2A (Agents):** >85% task completion, effective collaboration, clear reasoning
- **Capstone 2B (Pipeline):** >95% reliability, <10% manual intervention, agent decisions logged
- **Capstone 3 (Robot):** >90% navigation success, >85% command understanding, robust error handling

9. Getting Started Checklist

Week 0 (Before December 1, 2025):

Planning & Setup:

- ■ Read complete roadmap PDF
- ■ Import task_tracker_v2.csv to Google Sheets
- ■ Set up calendar with all 30 weeks marked
- ■ Block 20 hours/week in schedule
- ■ Identify capstone dates (Weeks 8, 19, 20, 30)

Technical Environment:

- ■ Install Python 3.11+
- ■ Install PyTorch with CUDA (if GPU available)
- ■ Install Hugging Face: transformers, datasets, accelerate
- ■ Install LangChain and LangGraph
- ■ Install MLflow and experiment tracking tools
- ■ Set up GitHub account and repositories
- ■ Test GPU availability (nvidia-smi)
- ■ Create virtual environment for project

Community & Resources:

- ■ Join Hugging Face Discord
- ■ Subscribe to r/MachineLearning
- ■ Join LangChain community
- ■ Bookmark key documentation sites
- ■ Find accountability partner (optional)
- ■ Join local AI/ML meetup (optional)

Prerequisites Check:

- ■ Comfortable with Python programming
- ■ Basic ML knowledge (supervised learning, neural nets)
- ■ Command line proficiency
- ■ Git basics understood
- ■ Can train a simple ML model

Weekly Workflow (During Program):

- **Monday:** Review week plan, theory (3-4h)
- **Tuesday-Thursday:** Hands-on implementation (14-15h)
- **Friday:** Wrap up coding, documentation (3h)
- **Saturday:** Complete deliverables, testing (4h)
- **Sunday:** Review, self-assessment, plan next week (1h)

You're Ready to Begin!

This 7.5-month journey will transform you into an advanced AI practitioner with expertise across 6 critical domains. With consistent effort, hands-on projects, and portfolio development, you'll be positioned for senior AI/ML roles, research positions, or launching your own AI products.

Start Date: December 1, 2025
End Date: June 28, 2026
Your future in AI begins now! ■