Ultimate 60-Day AI Engineer Roadmap

Complete Path: ML Foundations + Modern AI Engineering

Phase 1: ML Foundations (Days 1-20)

Essential Machine Learning & Deep Learning Base

Week 1: Python & Classical ML

Day 1: Python for AI Mastery

- Project: Advanced data manipulation toolkit with NumPy, Pandas, and data pipeline
- Goal: Solid Python foundation for AI development

Day 2: Data Science & Visualization

- Project: Interactive analytics dashboard with statistical analysis
- Goal: Data exploration and presentation skills

Day 3: Machine Learning from Scratch

- Project: Implement linear/logistic regression without libraries
- Goal: Understanding ML mathematics and fundamentals

Day 4: Scikit-learn Ecosystem

- Project: Complete ML pipeline with multiple algorithms and evaluation
- Goal: Classical ML workflow mastery

Day 5: Feature Engineering & Selection

- Project: Advanced feature engineering toolkit for tabular data
- Goal: Data preparation and feature optimization

Day 6: Ensemble Methods & Model Selection

- Project: Automated model selection system with ensemble techniques
- Goal: Advanced classical ML techniques

Day 7: Time Series & Forecasting

- Project: Multi-variate time series forecasting system
- Goal: Sequential data analysis and prediction

Week 2: Deep Learning Foundations

Day 8: Neural Networks from Scratch

- Project: Build neural network library from scratch (backprop, optimizers)
- Goal: Deep understanding of neural network mechanics

Day 9: Deep Learning with TensorFlow/PyTorch

- Project: Image classifier with custom CNN architecture
- Goal: Deep learning framework proficiency

Day 10: Computer Vision Fundamentals

- Project: Object detection system using traditional CV + deep learning
- Goal: Vision AI basics

Day 11: Natural Language Processing Basics

- Project: Text classification system with traditional + neural approaches
- Goal: NLP fundamentals and preprocessing

Day 12: Recurrent Networks & Sequences

- Project: Stock prediction + sentiment analysis using RNN/LSTM
- Goal: Sequential modeling expertise

Day 13: Advanced CNN Architectures

- Project: Implement ResNet/EfficientNet for transfer learning
- Goal: Modern computer vision architectures

Day 14: Model Deployment & Serving

- Project: Deploy multiple models using Flask/FastAPI with monitoring
- Goal: Basic model serving skills

Week 3: Advanced Deep Learning

Day 15: Attention Mechanisms & Transformers

- Project: Build transformer from scratch for text classification
- Goal: Understanding attention and transformer architecture

Day 16: Generative Models (GANs/VAEs)

- Project: Image generation system using GANs and VAEs
- Goal: Generative modeling fundamentals

Day 17: Advanced NLP with Transformers

- Project: Fine-tune BERT for multiple NLP tasks
- Goal: Pre-trained model utilization

Day 18: Multi-modal AI

- Project: Image captioning and visual question answering system
- Goal: Cross-modal learning

Day 19: Reinforcement Learning

- Project: Game-playing agent using Q-learning and policy gradients
- Goal: RL fundamentals and applications

Day 20: MLOps Foundations

- Project: Complete ML pipeline with versioning, monitoring, and automation
- Goal: Production ML workflow basics

Phase 2: Modern LLM & AI Engineering (Days 21-40)

LLMs, RAG, Agents, and Modern AI Stack

Week 4: LLM Fundamentals

Day 21: Large Language Models Basics

- Project: Build a mini-GPT model and understand tokenization/training
- Goal: LLM architecture and training fundamentals

Day 22: LLM APIs & Integration

- Project: Multi-LLM comparison system (OpenAI, Anthropic, local models)
- Goal: Working with various LLM providers

Day 23: Prompt Engineering Mastery

- Project: Advanced prompt engineering framework with optimization
- Goal: Systematic prompt design and improvement

Day 24: LLM Fine-tuning & LoRA

- Project: Fine-tune open-source LLM using LoRA/QLoRA techniques
- Goal: Efficient model customization

Day 25: Embeddings & Vector Operations

- Project: Advanced embedding system with multiple embedding models
- Goal: Understanding vector representations

Day 26: Vector Databases Deep Dive

- Project: Production vector database system with hybrid search

- Goal: Vector storage and retrieval optimization

Day 27: LLM Evaluation & Benchmarking

- Project: Comprehensive LLM evaluation suite with custom metrics
- Goal: LLM performance measurement

Week 5: RAG Systems

Day 28: RAG Fundamentals

- Project: Basic document Q&A system using vector similarity
- Goal: Retrieval-augmented generation basics

Day 29: Advanced RAG Architectures

- Project: Multi-document RAG with re-ranking and context optimization
- Goal: Production-ready RAG systems

Day 30: RAG with Structured Data

- Project: RAG system combining documents, databases, and APIs
- Goal: Hybrid information retrieval

Day 31: Conversational RAG

- Project: Multi-turn conversational system with memory and context
- Goal: Advanced conversational AI

Day 32: RAG Evaluation & Optimization

- Project: RAG performance monitoring and optimization framework
- Goal: RAG system improvement

Day 33: Domain-Specific RAG

- Project: Specialized RAG for technical/legal/medical domains
- Goal: Domain adaptation techniques

Day 34: RAG at Scale

- Project: High-performance RAG system with caching and optimization
- Goal: Scalable RAG deployment

Week 6: LangChain & Framework Mastery

Day 35: LangChain Fundamentals

- Project: Complex LLM application using LangChain components
- Goal: LLM orchestration framework mastery

Day 36: LangChain Advanced Patterns

- Project: Multi-step reasoning system with memory and tools
- Goal: Advanced LangChain architectures

Day 37: Custom LangChain Components

- Project: Build custom tools, retrievers, and chains
- Goal: Extending LangChain functionality

Day 38: LangChain + External Systems

- Project: LLM system integrated with databases, APIs, and services
- Goal: Real-world LLM application integration

Day 39: Alternative Frameworks

- Project: Compare LlamaIndex, Haystack, and other LLM frameworks
- Goal: Framework selection and comparison

Day 40: LLM Application Architecture

- Project: Design patterns for scalable LLM applications
- Goal: Architectural best practices

Phase 3: Agentic AI & Advanced Systems (Days 41-50)

AI Agents, Multi-Agent Systems, and Complex Workflows

Week 7: AI Agents

Day 41: LangGraph Fundamentals

- Project: State-based agent workflow using LangGraph
- Goal: Agent workflow orchestration

Day 42: Single Agent Systems

- Project: Autonomous research agent with planning and execution
- Goal: Advanced single-agent capabilities

Day 43: Multi-Agent Coordination

- Project: Collaborative multi-agent system for complex tasks
- Goal: Agent communication and coordination

Day 44: Agent Memory & Learning

- Project: Agent with persistent memory and learning capabilities

- Goal: Stateful and adaptive agents

Day 45: Tool-Using Agents

- Project: Agent that can use multiple tools, APIs, and services
- Goal: Tool integration and function calling

Day 46: Specialized Agent Types

- Project: Code generation, data analysis, and creative writing agents
- Goal: Domain-specific agent development

Day 47: Agent Evaluation & Testing

- Project: Comprehensive agent testing and performance framework
- Goal: Agent quality assurance

Week 8: Advanced AI Systems

Day 48: Multimodal AI Agents

- Project: Agent that processes text, images, audio, and video
- Goal: Multimodal agent capabilities

Day 49: AI Safety & Alignment

- Project: Safe agent framework with guardrails and monitoring
- Goal: Responsible agent development

Day 50: Human-AI Collaboration

- Project: Human-in-the-loop agent system with approval workflows
- Goal: Collaborative AI systems

Phase 4: Production & Industry Applications (Days 51-60)

Enterprise-Grade AI Systems

Week 9: Production Systems

Day 51: LLM Serving & Optimization

- Project: High-performance LLM serving with vLLM and optimization
- Goal: Efficient large model deployment

Day 52: Production RAG Systems

- Project: Enterprise RAG with authentication, rate limiting, monitoring
- Goal: Scalable RAG deployment

Day 53: Agent Platform Development

- Project: Multi-tenant platform for deploying and managing agents
- Goal: Agent-as-a-Service architecture

Day 54: AI Observability & Monitoring

- Project: Comprehensive AI system monitoring with cost tracking
- Goal: Production AI operations

Day 55: LLM Security & Guardrails

- Project: Advanced security framework with jailbreak prevention
- Goal: Secure AI system deployment

Day 56: AI Workflow Orchestration

- Project: Complex business process automation using AI agents
- Goal: Enterprise AI automation

Day 57: Hybrid AI Architecture

- Project: System combining classical ML, LLMs, and agents
- Goal: Multi-paradigm AI integration

Week 10: Capstone & Portfolio

Day 58: Industry Case Study Implementation

- Project: Recreate a famous AI system (ChatGPT-like, GitHub Copilot-like)
- Goal: Understanding industry-standard implementations

Day 59: Personal AI Product Development

- Project: Complete AI-powered SaaS with modern stack
- Goal: End-to-end product development

Day 60: Portfolio & Career Preparation

- Project: Professional AI engineer portfolio with documentation
- Goal: Career readiness and presentation

Why This 60-Day Approach is Optimal

Foundational Strength (Days 1-20)

- Solid ML/DL foundation prevents "black box" syndrome
- Mathematical understanding enables debugging and optimization
- Classical ML skills still essential for many real-world problems

- Deep learning knowledge crucial for understanding modern architectures

Modern AI Mastery (Days 21-60)

- Current industry-standard tools and techniques
- RAG systems are in 80%+ of commercial AI applications
- Agentic AI is the future of AI applications
- Production skills make you immediately valuable

Career Advantages

1. **Comprehensive Knowledge:** You understand both foundations and cutting-edge
2. **Debugging Skills:** Can troubleshoot issues at any level of the stack
3. **Architectural Thinking:** Can design systems that combine multiple AI paradigms
4. **Future-Proof:** Foundation knowledge helps you adapt to new developments

Learning Structure

- **Daily Time:** 6-8 hours (2 hours theory, 4-5 hours coding, 1 hour documentation)
- **Weekly Reviews:** Consolidate learning and connect concepts
- **Progressive Complexity:** Each week builds on previous knowledge
- **Practical Focus:** Every project contributes to your portfolio

Technical Stack Mastery

Weeks 1-3: Python, PyTorch/TensorFlow, Scikit-learn, classical ML **Weeks 4-6:** LangChain, Vector DBs, RAG frameworks, LLM APIs **Weeks 7-8:** LangGraph, agent frameworks, advanced orchestration **Weeks 9-10:** Production tools, serving infrastructure, monitoring

Success Milestones

- **Week 3:** Deploy your first deep learning model
- **Week 6:** Build a production RAG system
- **Week 8:** Create a functional AI agent
- **Week 10:** Launch a complete AI product

This 60-day roadmap gives you both the depth needed to be a strong AI engineer AND the modern skills to be immediately productive in today's AI companies. You'll understand the fundamentals deeply enough to innovate and the current tools well enough to build production systems from day one.