

AI ENGINEER

FINTECH-FOCUSED CAREER TRANSITION

WITH MLOPS & COMPLIANCE FOUNDATIONS

Start Date:	November 17, 2025
Current Status:	Week 5 (December 17, 2025) ✓
Target Completion:	September 2026
Weekly Commitment:	11-13 hours/week
Total Duration:	38 weeks (9.5 months)
Target Role:	Senior AI/ML Engineer (Fintech)
Target Salary:	£115,000 - £135,000
Interview Readiness:	99% (fintech-specialized)

FINTECH DIFFERENTIATORS:

- ✓ Compliance-first approach (PII redaction, RBAC, audit trails)
- ✓ Production resilience (circuit breakers, graceful degradation)
- ✓ Cost optimization (model routing, 50%+ savings)
- ✓ Enterprise integration (Java + Python hybrid, Pydantic schemas)
- ✓ Regulatory awareness (human-in-loop, citation extraction)
- ✓ Real-world UX (async streaming, no spinners for traders)

MONTH 1: FOUNDATIONS + COMPLIANCE START

Weeks 1-4 | November 17 - December 14, 2025

Week 1-2: ML/DL Foundations ✓ COMPLETED (22-26h)

- Vectors, matrices, basis vectors (fraud detection)
- Eigenvectors for PCA | NumPy, Pandas, scikit-learn
- ML metrics | APIs & FastAPI

→ **Deliverable: Mathematical foundations + Python ML basics**

Week 3: Infrastructure ✓ COMPLETED (14.5h)

- Docker, PostgreSQL, OpenSearch, Airflow
- Complete Docker Compose stack

→ **Deliverable: Full infrastructure running**

Week 4: Data Pipeline + PII Redaction [+2h] ✓ COMPLETED (16.5h) ■

- arXiv API integration | PDF download + storage
- GROBID/Docling parsing | Airflow DAG automation

■ *Fintech: PII redaction layer with Presidio - detect/redact emails/phones before storage (GDPR/CCPA compliance)*

→ **Deliverable: Automated pipeline with regulatory data sanitization**

Month 1 Total: 44-54h | Status: ✓ COMPLETED (4/4 weeks)

MONTH 2: LLM FUNDAMENTALS + FINTECH SEARCH

Weeks 5-8 | December 15, 2025 - January 11, 2026

Week 5: LLM Fundamentals ■ CURRENT WEEK (11-13h)

- Andrej Karpathy lectures | Transformer architecture
- Tokenization, embeddings, context windows
- Temperature, top-k, top-p | OpenAI API practice

→ **Deliverable: LLM understanding + OpenAI API integration**

Week 6: Prompt Engineering + Compliance (11-13h)

- Chain-of-thought, few-shot, system prompts
- Prompt injection prevention
- Build fintech prompt library (20+ patterns)

■ *Fintech: Compliance prompts: System prompts forbidding financial advice + forcing source citations (liability protection)*

→ **Deliverable: Fintech prompt library with compliance guardrails**

Week 7: BM25 Search + Metadata Filtering (11-13h)

- OpenSearch BM25, Query DSL, relevance tuning
- Filtering, facets, pagination

■ *Fintech: Metadata filtering: Time-aware search with date fields (audit windows - 'show Q3 2024 reports only')*

→ **Deliverable: Production keyword search with temporal filtering**

Week 8: Hybrid Search + System Design [+45min] (11.75h)

- Embeddings (OpenAI/local) | Semantic search
- Hybrid ranking (BM25 + semantic) | nDCG evaluation
- System Design: Whiteboard hybrid search at scale

→ **Deliverable: Hybrid search system + search architecture diagram**

Month 2 Total: 44-52h

MONTH 3: RAG + TESTING + SECURITY

Weeks 9-12 | January 12 - February 8, 2026

Week 9: RAG Pipeline + Citation Extraction (11-13h)

- RAG architecture | LlamaIndex, Ollama (local LLM)
- Query pipeline, context injection | Gradio UI
- *Fintech: Citation extraction: Return source_nodes with exact quotes (trust but verify for analysts)*
- **Deliverable: Complete RAG with citations and web interface**

Week 10: Evaluation + Golden Dataset [+1h] (12-13h) ■

- RAGAS framework (faithfulness, answer relevance)
- Automated test suite | Observability (Langfuse)
- SQL analytics queries [Tier 2A]
- *Fintech: Golden dataset: 50 Q&A; pairs for automated testing (get risk committee sign-off with metrics like '92% faithfulness')*
- **Deliverable: Evaluated RAG system + monitoring + SQL analytics**

Week 11: Advanced RAG + Testing [+1h] (12-13h) ■

- Self-RAG, query rewriting, metadata filtering
- MLflow experiment tracking [Tier 2B]
- Complete golden dataset testing
- *Fintech: Evaluation-driven development: Write tests before features (prevent 10% hallucination rate)*
- **Deliverable: Optimized RAG + experiment tracking + test coverage**

Week 12: Security & RBAC [NEW WEEK] (11-13h) ■

- AWS Secrets Manager migration (all API keys)
- Mock user roles (JUNIOR, SENIOR, ADMIN)
- RBAC filtering logic | Security testing
- *Fintech: Role-based access: Junior traders can't access CONFIDENTIAL M&A; docs (enterprise security)*
- **Deliverable: Secure RAG with role-based access control**

Month 3 Total: 47-56h (includes new Week 12)

MONTHS 4-5: PHASE 2 AGENTS + FINTECH TOOLS

Weeks 13-19 | February 9 - March 29, 2026

Week 13: Agent Foundations (11-13h)

- ReAct pattern, tool use basics
- Phase 2 cohort starts (live sessions)

→ **Deliverable: Basic agent with tool calling**

Week 14: Advanced Tool Use + Math Tool (11-13h)

- API integration, custom tool creation
- Calculator, search, stock price tools

■ *Fintech: Math tool: Explicit calculator tool - ban LLM from arithmetic (LLMs say '10+10=21', unacceptable in banking)*

→ **Deliverable: Agent with calculator tool (no probabilistic math)**

Week 15: Multi-Agent + System Design [+45min] (11.75h)

- LangGraph workflows, supervisor/worker patterns
- System Design: Whiteboard agent orchestration

→ **Deliverable: Multi-agent system + orchestration architecture**

Week 16: Multimodal + Table Extraction (11-13h)

- GPT-4V/Claude 3.5 for vision
- Focus: Balance sheet and table extraction

■ *Fintech: Table extraction: Financial data lives in tables (PDFs jumble rows) - use vision models for clean CSV extraction*

→ **Deliverable: Multimodal agent extracting financial tables**

Week 17: Structured Outputs + Pydantic (11-13h)

- Pydantic schemas, Instructor library
- Force exact JSON output

■ *Fintech: Pydantic schemas: Java backends expect strict JSON {'risk_score': 5} - text output crashes legacy systems*

→ **Deliverable: Agent with guaranteed structured outputs**

Week 18: Evaluation + Human-in-Loop [+3h] (14-16h) ■

- Agent benchmarking, tool use evaluation
- Build approval queue UI (confidence < 90%)
- Two-person approval workflow

■ *Fintech: Human-in-loop: Four-eyes principle for fraud decisions - AI + human must both approve critical actions*

→ **Deliverable: Agent system with manager approval workflow**

Week 19: Phase 2 Completion (11-13h)

- Project polish, professional documentation
- GitHub README with architecture

→ **Deliverable: Production AI agent system with comprehensive docs**

Months 4-5 Total: 80-95h

MONTH 6: TRANSFORMERS + SYSTEM DESIGN + RESILIENCE

Weeks 20-22 | March 30 - April 19, 2026

Week 20: Transformers + System Design [+1h] (12-14h) ■

- Attention mechanism, architecture deep-dive
- PyTorch basics, HuggingFace models
- System Design: Design 3 ML systems (fraud detection, doc Q&A, support bot)

→ **Deliverable: Transformer understanding + 3 architecture diagrams**

Week 21: Fine-tuning Fundamentals (11-13h)

- Transfer learning, LoRA, QLoRA, PEFT
- Training loops, optimization
- Fine-tune on domain data

→ **Deliverable: Fine-tuned model with evaluation**

Week 22: Circuit Breakers & Resilience [NEW WEEK] (11-13h) ■

- Circuit breaker pattern (tenacity library)
- Offline fallback mode (rule-based)
- Graceful degradation testing | SLA monitoring
- Chaos engineering (simulate OpenAI outage)

■ *Fintech: Resilience: SLAs require graceful degradation - if OpenAI down, switch to rule-based system (not '500 Error')*

→ **Deliverable: System with circuit breakers and failover**

Month 6 Total: 34-40h

MONTH 7: PRODUCTION ENGINEERING + MLOPS

Weeks 23-26 | April 20 - May 17, 2026

Week 23: ECS Deployment + System Design [+30min] (11.5-13.5h)

- Docker multi-stage builds | AWS ECS/Fargate
- Load balancing, auto-scaling
- System Design: Blue-green deployment architecture

■ *Fintech: Java integration preview: Mini REST call from Java to Python service (bridge old Core Banking to new AI)*

→ **Deliverable: ML app deployed on ECS + deployment architecture**

Week 24: Production Monitoring [+2h] (13-15h) ■

- LangSmith, Prometheus, Grafana dashboards
- CloudWatch integration | Alert rules

→ **Deliverable: Complete monitoring stack (Grafana/Prometheus/CloudWatch)**

Week 25: Security & Guardrails (11-13h)

- Input validation, output filtering
- PII detection, prompt injection defense, rate limiting

→ **Deliverable: Secure ML application with guardrails**

Week 26: CI/CD + Cost + System Design [+2.75h] (13.75-15.75h)

- Caching, batch processing, cost analysis
- CI/CD pipeline (GitHub Actions + AWS)
- Performance testing | System Design: MLOps pipeline

→ **Deliverable: Cost-optimized system + CI/CD + MLOps architecture**

Month 7 Total: 49-59h

MONTH 8: ADVANCED TECHNIQUES + CERTIFICATION

Weeks 27-30 | May 18 - June 14, 2026

Week 27: GraphRAG & Advanced Retrieval (11-13h)

- GraphRAG concepts, knowledge graph construction
- Graph traversal for RAG | CRAG, Self-RAG

→ **Deliverable: GraphRAG implementation with knowledge graphs**

Week 28: Knowledge Graphs + System Design [+30min] (11.5-13.5h)

- Neo4j setup, entity extraction, relationship mapping
- Cypher queries, graph reasoning
- System Design: Compliance architecture

→ **Deliverable: Knowledge graph + compliance architecture diagram**

Week 29: Fintech Specialization + Explainability (11-13h)

- Fraud detection patterns, compliance automation
- Real-time systems, Kafka integration
- Explainability framework + audit logs

■ *Fintech: Immutable audit logging: Every interaction logged with timestamp + reasoning trace (regulatory requirement)*

→ **Deliverable: Fintech AI patterns + explainability + audit trails**

Week 30: AWS GenAI Professional Cert [MANDATORY] (11-13h)

- Study 1.5h/day (official course, practice exams)
- Topics: Bedrock, SageMaker, RAG, security, cost
- Saturday: Final review | Sunday: EXAM

→ **Deliverable: AWS Certified GenAI Professional (£15-25k salary impact)**

Month 8 Total: 45-54h

MONTHS 9-9.5: CAPSTONE + FINTECH POLISH + LAUNCH

Weeks 31-38 | June 15 - August 9, 2026

Week 31: Capstone Architecture (Java + Python) (11-13h)

- Architecture design: Spring Boot + FastAPI
- Requirements doc, database schema, API contracts
- Infrastructure setup

→ **Deliverable: Complete hybrid architecture + infrastructure**

Week 32: Core Development (13-15h)

- Python ML service: RAG + agents for transaction analysis
- Java backend: API gateway, JWT auth, Kafka producer
- Integration work + testing

→ **Deliverable: Fraud detection system functional (Java + Python)**

Week 33: Integration + A/B Testing [+90min] (14.5-16.5h)

- Full system integration, testing, optimization
- Security hardening, documentation
- A/B testing framework [Tier 2B]

→ **Deliverable: Production-ready hybrid system + A/B testing**

Week 34: Portfolio + MLOps Docs [+1h] (14-16h) ■

- Portfolio polish (READMEs, diagrams)
- 3 blog posts + MLOps documentation [Tier 2B]
- LinkedIn update

→ **Deliverable: Complete portfolio + MLOps documentation**

Week 35: Async Streaming + UX [NEW WEEK] (11-13h) ■

- Python asyncio, streaming responses
- WebSocket setup, real-time updates
- Build streaming UI, test concurrent users

■ *Fintech: Async streaming: Traders see responses typing immediately (not 10-second spinners - critical UX)*

→ **Deliverable: Real-time streaming system (not blocking calls)**

Week 36: Model Router + Cost Optimization [NEW WEEK] (11-13h) ■

- Query classifier (simple vs complex)
- Routing logic (GPT-3.5 vs GPT-4)
- Cost tracking, A/B testing, cost dashboard

■ *Fintech: Model router: Route simple queries to GPT-3.5, complex to GPT-4 - reduce costs by 50%+ (critical for production)*

→ **Deliverable: Intelligent router with 50%+ cost reduction**

Week 37: End-to-End Fintech Testing (11-13h)

- Test complete system with all fintech features
- PII redaction, RBAC, circuit breakers, audit logs
- Performance testing, security penetration testing

→ **Deliverable: Validated fintech-grade production system**

Week 38: Job Launch (14-16h)

- Resume finalization + cover letter templates
 - Submit 15 quality applications
 - Target: Stripe, Revolut, Monzo, JP Morgan AI, Goldman Sachs
- **Deliverable: 15 job applications submitted + interview prep**

Months 9-9.5 Total: 90-110h

FINTECH FEATURES SUMMARY

COMPLIANCE & SECURITY	PRODUCTION ENGINEERING	COST & UX
<ul style="list-style-type: none">• PII redaction (W4)• Compliance prompts (W6)• Citation extraction (W9)• Golden dataset testing (W10-11)• RBAC security (W12)• Audit trails (W29)	<ul style="list-style-type: none">• Metadata filtering (W7)• Human-in-loop (W18)• Pydantic schemas (W17)• Circuit breakers (W22)• Table extraction (W16)• Java integration (W23, W31-33)	<ul style="list-style-type: none">• Math tool (W14)• Model router (W36)• Cost optimization (50%+)• Async streaming (W35)• Real-time UX (no spinners)• MLOps automation

TIMELINE BREAKDOWN

PHASE	WEEKS	FOCUS	HOURS
Month 1	W1-4	Foundations + PII Compliance	44-54h
Month 2	W5-8	LLM + Search + Fintech Context	44-52h
Month 3	W9-12	RAG + Testing + Security	47-56h
Months 4-5	W13-19	Phase 2 Agents + Fintech Tools	80-95h
Month 6	W20-22	Transformers + Resilience	34-40h
Month 7	W23-26	Production Engineering + MLOps	49-59h
Month 8	W27-30	Advanced + AWS Certification	45-54h
Months 9-9.5	W31-38	Capstone + Fintech Polish + Launch	90-110h
TOTAL	38 weeks	9.5 months	433-520h

YOUR COMPETITIVE ADVANTAGE

- ✓ 3 production projects (RAG, Agents, Hybrid Capstone) - all deployed on AWS
- ✓ AWS GenAI Professional certification (cutting-edge, few have it)
- ✓ MLOps foundations (monitoring, CI/CD, experiment tracking, A/B testing)
- ✓ 11 system design architecture diagrams in portfolio
- ✓ 12 fintech-specific features (see summary table)
- ✓ 12 years fintech domain + payments expertise (unique positioning)
- ✓ Java/Spring Boot + Python/FastAPI hybrid skills (rare combination)
- ✓ Production-ready mindset (RBAC, PII redaction, circuit breakers, audit trails)

TARGET: £115,000 - £135,000

SENIOR AI/ML ENGINEER (FINTECH)

SEPTEMBER 2026 | 99% INTERVIEW-READY ✓

Week 5/38 in progress | 33 weeks to go | Fintech-ready! ■