

# 6-Month Roadmap for AI/Data Engineer in Finance & Risk

This roadmap outlines a clear plan for developing advanced skills in investment, risk, AI, and data engineering to achieve a high-paying role in a hedge fund. The plan spans 6 months, focusing on practical, real-world tasks and technologies.

## Month 1: Foundations in Investment & Risk + Tech setup

Goals:

- Master the finance domain concepts for investment & risk.
- Set up your cloud and data engineering stack.
- Build simple but domain-focused applications.

Tasks:

1. Study core Investment concepts: asset classes, portfolio theory, risk measures (VaR, CVaR), performance metrics.
2. Study Risk management principles: market risk, credit risk, operational risk, Basel norms.
3. Setup Azure environment: Databricks, Azure SQL, Kafka.
4. Build ETL pipelines for financial data ingestion (market data, prices, risk factors).
5. Create dashboards in Power BI / Plotly visualizing key investment and risk metrics.
6. Use Python to implement simple portfolio optimization and risk calculation (e.g., using `cvxpy`, `numpy`).

## Month 2: Advanced Data Engineering + ML Basics for Finance

Goals:

- Improve data pipeline robustness and scalability.
- Build ML models for price prediction and risk forecasting.
- Learn model tracking and deployment.

Tasks:

1. Build real-time streaming pipelines with Kafka and Databricks for market and risk data.
2. Use Docker for containerized development & MLFlow for experiment tracking.
3. Develop ML models (random forest, XGBoost) to predict asset returns and volatility.
4. Explore and apply NLP on financial news to predict market sentiment.
5. Deploy your models as APIs or microservices on Azure.

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## Month 3: Deep AI & Reinforcement Learning in Finance

Goals:

- Deep dive into generative AI, reinforcement learning applications in trading.
- Use advanced NLP models to analyze reports, filings, news.

Tasks:

1. Fine-tune LLMs on financial text (earnings calls, news, reports) using Hugging Face libraries.
2. Develop RL trading agents to learn portfolio allocation or optimal execution strategies.
3. Build sentiment analysis pipelines integrating with risk models.
4. Create Jupyter notebooks showing deep dive analyses and backtests.
5. Start writing blog posts or documentation showcasing your work and domain knowledge.

## Month 4: Risk Modelling & Compliance Automation

Goals:

- Focus on risk model development and regulatory compliance automation.
- Incorporate scenario analysis and stress testing.

Tasks:

1. Develop VaR, CVaR, and Expected Shortfall models in Python.
2. Automate compliance reports using your data pipelines.
3. Build anomaly detection systems for operational risk using unsupervised learning.
4. Use ML to detect fraud or unusual trading activity.
5. Integrate your systems with Azure security & monitoring best practices.

## Month 5: End-to-End System Architecture + Cloud Automation

Goals:

- Architect end-to-end AI + data pipelines for Investment and Risk.
- Automate deployment and monitoring.

Tasks:

1. Design and document architecture diagrams showing data flow, ML lifecycle, and risk reporting.
2. Use Terraform or Azure ARM templates for infrastructure as code.

## **6-Month Roadmap for AI/Data Engineer in Finance & Risk**

3. Automate CI/CD pipelines for your data and ML code.
4. Use advanced Power BI dashboards with real-time alerts.
5. Conduct load and performance testing of your systems.

### **Month 6: Real-World Projects + Interview Prep + Networking**

Goals:

- Build 2-3 polished, real-world projects that solve Investment or Risk problems.
- Prepare for interviews targeting senior roles.
- Build a professional presence.

Tasks:

1. Build a project integrating multi-source data, ML models, risk analytics, and visualization.
2. Practice behavioral and technical interviews - focus on finance domain and coding.
3. Update LinkedIn and GitHub with your projects and write blog posts.
4. Network with finance and AI professionals.
5. Explore certifications or courses to boost your CV (FRM, CFA, etc).