Executive Summary

I started the course a week behind due to the demands of my full-time job, which also required training sessions during that period. This schedule made it difficult to attend live sessions or ask real-time questions, even though I'm naturally curious person and who learns best through curiosity and interaction.

Despite these challenges, I committed myself to working consistently, spending 2-3 focused hours each day to deeply understand the material. I wasn't just aiming to complete the projects, but to genuinely grasp the concepts and reasoning behind each step. Since I come from a non-finance background, I had to put in extra effort to familiarize myself with financial concepts alongside the technical content.

To support my learning, I extensively used ChatGPT as a conversational partner, breaking down code, testing my understanding, and clarifying ideas until they made sense. It served as a helpful tool to think through problems iteratively and reinforce my comprehension, especially when exploring unfamiliar concepts.

Due to time constraints, I had to complete all the mini projects within a single week, but I was fully engaged each day. If I had more time, I would've loved to explore additional what-if scenarios, test more of my ideas, and try alternative modeling approaches, including integrating GARCH-based volatilities into Heston-style stock simulations in a continuous setting. If this were a continuous-time modeling project, I'd experiment with interpolating between daily GARCH values to simulate smoother volatility. It would be interesting to see how well this hybrid works.

This course also sparked my curiosity beyond option pricing, particularly in understanding how realistic, short-term investment decisions are made, and whether behavioral patterns in stock movements can be studied analytically. While we primarily focused on hedging and options, I spent additional time learning how other models or tools might also apply to stock analysis. Overall, I'm proud of the consistency and dedication I brought to this course, and walk away with a grasp of financial modeling, volatility, and hedging strategies.

Projects

I constructed two investment portfolios: one high-risk and one low-risk, using real stock data. I defined risk levels based on volatility and sector exposure, calculated weighted returns, and visualized the outcomes. This helped me connect theoretical ideas like diversification and risk-return tradeoff with practical implementation.

I also tested the assumption that log returns are normally distributed using tools like the Shapiro-Wilk test. I learned how to interpret p-values, understand how outliers affect distributions, and use statistical tests in a financial context. Then, I implemented Black-Scholes pricing for calls and puts and visualized how option prices and deltas evolve with price and time. I developed a intuition around delta hedging, especially how delta approaches 1 when a call option becomes deep in the money, and how that affects hedging decisions.

Finally, I explored how volatility affects hedging by comparing constant vs. GARCH-modeled volatility. I simulated stock paths using GBM, applied delta hedging strategies, and analyzed the resulting P&L distributions. It was especially insightful to see that while both approaches produced similar expected values, the GARCH case had more extreme outcomes, showing the impact of volatility clustering in markets.