Thomas Cole

thomaswcole.github.io | linkedin.com/in/thomascole | twc2131@columbia.edu | 438-462-2918 | New York, New York

Education

Columbia University Sept. 2024 – Dec. 2025

Master of Arts, Mathematics of Finance *CGPA: 3.9/4.0*

- **Coursework:** Stochastic Processes, Time Series Analysis, Mathematical Finance, Computational Portfolio Construction, Numerical Methods, Computational Statistics (PhD), Machine Learning (PhD)
- **Winner, 2025 IAQF Academic Competition**: Researched S&P500 concentration risks, including factor model decomposition, index option pricing, and its impact on equity factor investing

McGill University Sept. 2019 – May 2024

Bachelor of Commerce, Major in Mathematics, Minor in Finance *CGPA: 3.8/4.0*

- **Coursework:** Probability, Statistics, Linear Algebra, Single and Multivariable Calculus, ODE's, PDE's

Work Experience

Graham Capital Management | *Rowayton, Connecticut* June 2025 – Aug. 2025

Risk Analyst Intern

- Researched and implemented distributional clustering techniques such as Wasserstein K-Means to classify discretionary portfolio managers into peer groups, and enable synthetic performance benchmarking
- Reviewed and evaluated alternative methodologies from academic literature to enhance the risk factor index, testing and implementing improved models for more accurate and interpretable measurements

TD Bank | *Toronto, Ontario* May 2024 – Aug. 2024

Analyst Intern, Treasury Hedge Strategy

- Analyzed time series data of mortgage commitment hedging performance, examining the impact of factors such as interest rate fluctuations and loan terms on the propensity to fund.
- Streamlined the data processing pipeline and enabled real-time access to key performance metrics through an interactive dashboard using Python with Pandas, Dash and Plotly
- Created an SQL script to parse a daily data feed of over 1 million mortgage records to track features such as funding status, while ensuring efficient storage for historical comparison.

Analyst Intern, Treasury Investment Strategy and Analytics Jan. 2024 – May 2024

- Developed a Python package to support analytics for the front office investments team, automating daily and weekly reporting procedures for portfolios exceeding $130B, significantly reducing turnaround time on ad-hoc requests.
- Led and prepared weekly Python workshops, translating complex technical concepts into practical tools.

Projects and Research Experience

Columbia University | *New York, New York* Sept. 2024 – Sept. 2024

Student Research Analyst, Statistical Arbitrage using Clustering | Link

- Developed a systematic, market-neutral statistical arbitrage strategy by clustering equities based on their correlation matrix and applying K-means and graph algorithms such as spectral clustering.
- Optimized the number of clusters using the Marchenko-Pastur law and the explained variance threshold.
- Achieved an annualized return of 10% with a Sharpe ratio of 1.3, while effectively managing downside risk, achieving a Sortino ratio of 1.8.

McGill University | *Montreal, Quebec* Sept. 2023 – Dec. 2023

Student Research Analyst, PCA Applications on Implied Volatility Surfaces | Link

- Conducted independent research under the guidance of a faculty member on the application of PCA to implied volatility surfaces of US equity options
- Benchmarked 11 principal component selection methods including Kaiser-Guttman, and the Marchenko-Pastur Law by utilizing Monte Carlo simulations and bootstrapping to identify statistically robust eigenvalue thresholds
- Efficiently processed 75GB+ of both price and implied volatility data for all options on equities in S&P500 over a multi-year period utilizing Python with scikit-learn, NumPy, Pandas, and Dask.

Skills

Computer Skills: Python, R, Java, MATLAB, SQL, Tableau
Language Skills: English (Native), French (Intermediate)
Interests: Guitar, Computers, Personal Finance