

Ahmer Nadeem Khan

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Education

Florida State University — PhD in Financial Mathematics

Sep 2024 — May 2029

- *Current GPA: 3.93*
- *Completed Coursework: Financial Engineering I/II, Monte Carlo Methods in Finance, Advanced Probability Computational Math I/II, High Performance Computing, Differential Geometry Measure Theory I, Numerical Optimization*
- *Current Coursework: Measure Theory II, Stochastic Analysis, Numerical Linear Algebra*

Lahore University of Management Sciences, Pakistan — BS in Mathematics

Sep 2020 — May 2024

- *Minor in Computer Science, Minor in English Literature*
- *GPA: 3.84*
- *Graduate Coursework: Machine Learning, PDEs, Topology, Algebraic Geometry, Algebraic Topology*

Seoul National University, South Korea — Semester Abroad

Sep 2023 — Dec 2023

- *Department of Mathematical Sciences*
- *Coursework: Algebraic Topology II, Korean Literature*
- *Research thesis on Schubert Calculus for algebraic and arithmetic geometry under Dr. Jun Ho Whang*

Technical Skills & Certifications

Programming Languages & Platforms: Python, C++, MATLAB, Julia, R, CUDA, LaTeX

Quantitative & Computational Methods: Object-Oriented Programming, Numerical Methods and Modeling, Optimization, Monte Carlo Simulation, Stochastic Analysis, Quantitative Finance, Machine Learning, Data Analysis

Libraries & Frameworks: NumPy, Pandas, Scikit-learn, TensorFlow, PyTorch, Statsmodels, Seaborn, Regular Expressions, Matplotlib, Playwright, Beautiful Soup, STL, Boost, BLAS, LAPACK

Certifications: Erdős Institute Quant Finance Bootcamp, Akuna Options 101, Akuna Options 201

Selected Research Projects

Dynamic VIX-Based Hedging of Equity Risk during Market Stress Events

Nov 2025

- *Selected as a top project from 107 projects in the Erdős Institute Fall 2025 Cohort*
- *Empirical study on volatility-regime shifts and macro-triggered tail-risk using VIX during tariff-related market shocks*
- *Constructed and backtested a dynamic hedging strategy for a long S&P 500 portfolio using VIX exposure through a short-term VIX futures index ETF (VXX)*
- *Demonstrated substantial performance improvement: 47% reduction in annualized volatility, $2.6\times$ increase in Sharpe ratio, and max drawdown reduced from -19% to -4%*

CUDA-accelerated Monte Carlo for HPC Applications in Exotic Option Pricing

May 2025

- *Developed high-frequency Monte Carlo simulations in C++ for pricing Asian, Lookback variants, and Barrier options*
- *Benchmarked CPU vs. GPU performance against NVIDIA paper on 5 million paths, achieving a speed-up factor of 10^4 , and retaining 96–98% agreement with CPU baselines*
- *Analyzed the Wallace method for efficiency, variance behavior, pathwise error characteristics, and GPU memory-access patterns to optimize throughput in high-dimensional simulations*

Equities Portfolio Optimization using James-Stein Shrinkage

Apr 2025

- *Empirical research project analyzing covariance shrinkage estimators for mean–variance portfolio optimization*
- *Automated large-scale data extraction from Yahoo Finance for two years of daily S&P 500 constituents and Treasury rates*
- *Implemented and compared global minimum-variance (GMV) and maximum Sharpe ratio (MSR) portfolios under classical, Ledoit–Wolf and James–Stein estimators, achieving up to 2% improvement in out-of-sample risk-adjusted performance*

Numerical and Monte Carlo Algorithms Library Development in MATLAB and Julia

Sep 2024 — May 2025

- *Series of experimental projects focusing on algorithmic design, numerical stability, and convergence behavior*
- *Implemented and benchmarked canonical algorithms from the numerical analysis and Monte Carlo literature*
- *Developed a reproducible library of routines covering factorization and approximation methods, linear and non-linear system solvers, quadrature, variate-reduction, and PDE/ODE solvers*

- Undergraduate research thesis conducted at Seoul National University (Grade: A+)
- Explored algebraic and combinatorial techniques in intersection theory and enumerative geometry
- Presented and defended thesis at Lahore University of Management Sciences

Selected Talks and Presentations

Catalan Numbers and Their Properties , Algebra Seminar, Florida State University	Feb 2026
<i>Presentation on the combinatorial descriptions of the Catalan numbers, and proof of various bijections and results</i>	
Portfolio Optimization and Successive Convex Approximation , Florida State University	Dec 2025
<i>Course presentation on recent results on the application of the SCA framework to higher order portfolios</i>	
Limit Order Book Simulation: A Review and Recent Progress , Financial Math Seminar, Florida State University	Dec 2025
<i>Survey of point processes, agent-based models, deep learning, and generative AI for limit order book modeling</i>	
Market Microstructure and High Frequency Trading , Financial Math Seminar, Florida State University	May 2025
<i>Overview of HFT evolution, data structures, order-book mechanics, and algorithmic trading strategies</i>	
Borsuk–Ulam Theorem and its Applications , Lahore University of Management Sciences	Aug 2023
<i>Directed research (Topology) presentation on Tverberg’s Theorem and the Necklace Splitting Problem</i>	

Honors and Awards

Khawaja Dil Muhammad Fellowship (sbasse.lums.edu.pk/honorific-fellowships)	2021 — 2024
<i>Merit-based fellowship in Mathematics awarded for maintaining the highest departmental GPA</i>	
Dean’s Honor List Awards	2021 — 2024
<i>Annual university-wide recognition for academic excellence based on cumulative GPA</i>	
Award of High Distinction	2024
<i>Graduated with High Distinction, ranking 2nd in BS Mathematics cohort</i>	

Teaching, Work & Outreach Experience

Instructor of Record , Florida State University	Jan 2026 — May 2026
<ul style="list-style-type: none"> • Sole instructor for MAC 2311 (Calculus with Analytic Geometry), delivering three weekly lectures (50 min) and one weekly recitation (75 min) to a class of 29 students • Designed and delivered lecture materials and recitation activities, including worksheets, problem sets, and quiz reviews • Authored, administered, and graded quizzes and examinations; handled proctoring, assessment, and student communication; managed course organization via Canvas 	
Graduate Teaching Assistant , Florida State University	Sep 2024 — Dec 2025
<ul style="list-style-type: none"> • Assisted instructors across seven undergraduate courses including Trigonometry, Pre-Calculus, and Algebra • Supported grading, proctoring, weekly labs, and organization of course materials 	
Finance Intern , Mahmood Group — Punjab, Pakistan	Jun 2024 — Aug 2024
<ul style="list-style-type: none"> • Performed NPV and financial feasibility analyses for two major projects within textile manufacturing operations • Projects included solar power panels installation and new spinning factory construction • Prepared public financial statements and computed financial ratios for Pakistan Stock Exchange (PSX) listings 	
Teaching Assistant , Lahore University of Management Sciences	Sep 2022 — May 2024
<ul style="list-style-type: none"> • Assisted instruction in Discrete Mathematics, Calculus III, and Linear Algebra • Conducted weekly problem-solving sessions, tutorials, and office hours, integrating LaTeX and coding exercises • Designed, proctored, and graded quizzes, homework, and examinations 	
8th Grade Teaching Volunteer , Syedanwala High School — Pakistan	Jun 2023 — Aug 2023
<ul style="list-style-type: none"> • Led a team of six volunteers teaching students in rural Punjab • Designed and delivered lessons in Algebra, Number Theory, and Geometry • Conducted diagnostic tests, evaluations, and teacher training sessions for local staff 	