Shamuel Auyeung

(970) 214-3512 |Hartford, CT | samcauyeung@gmail.com | LinkedIn | Github | Personal Webpage

SUMMARY

Mathematics PhD with expertise in probability, statistics, and data science, specializing in Python, machine learning, and quantitative modeling. Skilled at applying advanced mathematical techniques to identify patterns in financial markets and inform data-driven decision-making. Adept at solving complex problems, extracting actionable insights, and collaborating in dynamic, research-focused environments.

SKILLS & CERTIFICATIONS

- **Quantitative:** statistical analysis and modeling, probability (stochastic processes), calculus, linear algebra
- **Languages/Platforms:** Python, GitHub, MS Excel, VSCode, Mathematica, Dolt; Linux, SQL, C++, MATLAB
- **Python Libraries:** Pandas, NumPy, Scikit-learn, Matplotlib, seaborn, statsmodels, ARCH, Prophet
- **Machine Learning/AI:** model validation, linear regression, XGBoost, Random Forest, LLM's, NLP (Flair, Fundus), ARIMA
- **Certifications:** The Erdős Institute Data Science Boot Camp, Quant Finance Boot Camp
- Series 7 (General Securities Representative Exam) and Series 63 (Uniform Securities Agent State Law Exam)

SELECTED PROJECTS

Predicting Agricultural Future Contracts with Exogenous Factors (The Erdős Institute)　　　　　**Spring 2025**
- Developing predictive models for agricultural futures by integrating USDA reports and weather/geographic raster data, enhancing baseline regression on historical data, and achieving a positive R^2 in forecasting log returns.

Binomial Options Pricing Model with Nonconstant Volatility (in progress)　　　　　**Spring 2025**
- Refining options pricing models by incorporating nonconstant volatility, leveraging GARCH forecasting, machine learning, sentiment analysis, and binomial trees.

The Effects of Daylight Savings Times (DST) on Market Outcomes (The Erdős Institute)　　　　　**Fall 2024**
- Developed machine learning models (logistic regression, k-NN, random forest with AdaBoost) to analyze DST effects on US and Japan stock markets, uncovering statistically significant ($\alpha=0.05$) fall return shifts and spring volatility changes.

SELECTED PUBLICATIONS

Adjacent Singularities, TQFTs, and Zariski's Multiplicity Conjecture, arXiv　　　　　**2024**
- Resolved a 52-year-old algebro-geometric conjecture by leveraging Floer cohomology.

On the algebra generated by $\bar{\mu}, \bar{\partial}, \partial, \mu,$ with J. Guu, J. Hu, Complex Manifolds　　　　　**2023**
- Established new results for differential bi-graded algebras through computational experimentation, leveraging software to uncover algebraic structures and relationships.

The Krein Matrix and an Interlacing Theorem, with E. Yu, SIURO　　　　　**2014**
- Performed spectral analysis and numerical computations in MATLAB to investigate a generalized eigenvalue problem, deriving insights into its behavior and applications to Sturm-Liouville problems.

WORK EXPERIENCE

Trinity College, Department of Mathematics: Hartford, CT　　　　　**Jul 2023 - Present**
Harold L. Dorwart Visiting Assistant Professor, Center for Teaching and Learning Fellow (2025-2026)
- Taught single/multivariable/vector calculus, statistics, and differential equations, translating abstract mathematical concepts into intuitive explanations. Developed problem-solving skills, emphasizing logical reasoning and quantitative analysis.

Stony Brook University: Stony Brook, NY　　　　　**Aug 2017 - Aug 2023**
Research Assistant & Teaching Assistant
- Led problem-solving sessions for 400+ students over 12 semesters in calculus and linear algebra. Designed and delivered course materials for advanced math courses, fostering analytical reasoning.

LEADERSHIP EXPERIENCE

The Erdős Institute Data Science Boot Camp Teaching Assistant　　　　　**Jan 2025 - Present**
- Mentored PhDs in data science and machine learning, providing hands-on guidance to accelerate their understanding and application of key concepts.

Graduate Student Seminar co-founder and organizer, Stony Brook University　　　　　**2019-2023**
- Co-founded and organized the Graduate Student RTG and Symplectic Geometry Seminars, creating a platform for students to explore advanced topics in geometry, topology, and mathematical physics beyond PhD coursework.

EDUCATION

Ph. D. *Stony Brook University***,** Mathematics (geometry and topology)　　　　　**Aug 2023**
B.S. Calvin University, Mathematics, *summa cum laude*　　　　　**May 2017**
- NSF Scientific Computing Scholar: for excellence in mathematical modeling and computation.
- Barry Goldwater Scholar: for excellence in mathematical research.
- Top 17% in 2014 William Lowell Putnam Mathematical Competition.