Shamuel Auyeung

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SUMMARY

Recent Mathematics PhD graduate with expertise in probability, statistics, and data science. Skilled in Python, machine learning, and quantitative modeling, with a strong passion for applying advanced mathematics to financial markets. Proven ability to work collaboratively and individually to solve complex problems and deliver actionable insights.

SKILLS & CERTIFICATIONS

- **Quantitative:** calculus, linear algebra, probability (Markov chains, Brownian motion), statistics (hypothesis testing)
- **Languages & Platforms:** Python, GitHub, MS Excel, VSCode, Mathematica; *some experience:* SQL, C++
- **Python Libraries:** Pandas, NumPy, Scikit-learn, Matplotlib, seaborn, statsmodels, ARCH, Prophet
- **Machine Learning and AI:** linear regression, PCA, XGBoost, Random Forest, LLM's, NLP (Flair, Fundus)
- **Certifications:** The Erdős Institute Data Science Boot Camp

WORK EXPERIENCE

Trinity College, Department of Mathematics: Hartford, CT **2023 - Present**

Harold L. Dorwart Visiting Assistant Professor

- Teaching single/multivariable/vector calculus, statistics, and differential equations, communicating various abstract concepts and complex ideas to undergraduate students in an intuitive way

Stony Brook University: Stony Brook, NY **2017 - 2023**

Research Assistant & Teaching Assistant

- Lectured in problem-solving sessions and led discussions for over 400 students across 12 semesters. Subjects taught include Precalculus, Business Calculus, Calculus I, II, III, Advanced Linear Algebra
- Developed and taught lecture, homework, exam materials for Mathematical Thinking, Applied Abstract Algebra, Calculus II

LEADERSHIP EXPERIENCE

The Erdős Institute Data Science Boot Camp Teaching Assistant **Spring 2025**

- Instructed participants in data science theory and practices through hands-on guidance

Graduate Student Seminar co-founder and organizer, Stony Brook University **2019-2023**

- Co-founded the Graduate Student RTG and Symplectic Geometry Seminars for students to learn advanced geometry, topology, and mathematical physics not offered in graduate school courses

Directed Reading Program mentor, Stony Brook University **2021**

- Mentored an undergraduate, teaching her advanced linear algebra, analysis of smooth manifolds, Lie groups and Lie algebras, and coached her in presenting what she learned at the end of the semester

SELECTED PROJECTS

The Effects of Daylight Savings Times (DST) on Market Outcomes (The Erdős Institute) **Fall 2024**

- Worked on a 3-person team to web scrape data to study DST on the US market and compared it to the Japan Stock Exchange, using statistical methods, logistic regression, k-nearest neighbors, and random forest (with AdaBoosting) classifiers. Our team detected a statistically significant effect in fall returns and spring volatility

Binomial Options Pricing Model with Nonconstant Volatility (in progress) **Fall 2024**

- With a teammate, implemented BinomialTree class for modeling American/European call/put options with nonconstant volatility. Used machine learning models and NLP (sentiment analysis) to estimate implied volatility. Deployed in web app

PUBLICATIONS

Adjacent Singularities, TQFTs, and Zariski's Multiplicity Conjecture, arXiv **2024**

- Proved a 52-year-old algebro-geometric conjecture using Floer cohomology.

On the algebra generated by $\bar{}\mu, \bar{}\partial, \partial, \mu$, with J. Guu, J. Hu, Complex Manifolds **2023**

- Proved results for differential bi-graded algebras using Macaulay2 software.

The Krein Matrix and an Interlacing Theorem, with E. Yu, SIURO **2014**

- Conducted spectral analysis with MATLAB to study a generalized eigenvalue problem

EDUCATION

Ph. D. *Stony Brook University***,** Mathematics (geometry and topology) **2023**

B.S. Calvin University, Mathematics, *summa cum laude* **2017**

- NSF Scientific Computing Scholar: for excellence in mathematical modeling and computation
- Barry Goldwater Scholar: for excellence in mathematical research
- Math Club Organizer, Top 17% in 2014 William Lowell Putnam Mathematical Competition