

CONTACT INFORMATION

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EDUCATION

M.S., Statistics, Duke University

Expected May 2028

Incoming Fall 2026

B.S., Statistics, North Carolina State University

May 2026

Cumulative GPA: 3.92 | Major GPA: 4.0

RESEARCH INTERESTS

Statistical machine learning; quantitative research; Bayesian and empirical Bayes methods; Bayesian non-parametrics; stochastic modeling and stochastic processes

PROFESSIONAL EXPERIENCE

Guardian Life, New York, NY

June 2025 - August 2025

Actuarial Analyst - Internship

- Analyzed large-scale claims datasets (10M+ records) using SQL, VBA, and Excel to inform reserve factor calculations for pending, closed, and IBNR individual disability insurance claims
- Developed a GLM in Excel to forecast transitioning claim volumes, supporting reserve adequacy across a \$5.2B liability block
- Automated data validation, cleaning, and processing pipelines in VBA, replacing legacy macros and reducing manual processing time by 90%+

Emerson Rental Network, LLC, Charlotte, NC

August 2022 - Present

Owner & Asset Manager

- Established and scaled a short and long-term rental portfolio to \$150,000+ in annual revenue at age 16, managing all financial operations and maintaining profitability across seasonal demand cycles
- Developed and commercialized an Excel-based cash flow forecasting model for real estate investors, incorporating occupancy projections, expense modeling, and return-on-investment analysis
- Implemented dynamic pricing using AirDNA market occupancy data to optimize nightly rates (short-term rentals), directly improving revenue yield against seasonal baselines

Emerson Math Tutoring, Raleigh, NC

October 2025 - Present

Owner & Tutor

- Founded and scaled tutoring business serving K-12 and college students in mathematics and statistics, expanding from solo operation to a small team of tutors
- Developed full-stack web platform with Python/Flask backend and integrated APIs for scheduling (Google Calendar), payments (Stripe), and automated client communication (SendGrid)

- Programmed animated mathematical visualizations in Python (Manim) for digital marketing content, distributed across social media and company website
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ACADEMIC INVOLVEMENT

NCSU Department of Statistics

August 2025 - Present

Statistics Tutor

- Appointed tutor for the STAT Hub (Statistical Tutoring and Training Hub) by Dr. Emily Griffith & Dr. Logan Opperman
- Tutor undergraduate and graduate students from a variety of disciplines in statistics, probability, and programming (introductory through graduate-level courses)

Student Actuarial Organization, NCSU

President

May 2025 - Present

Vice President

December 2024 - May 2025

- Organize and lead monthly meetings for a student organization with 20+ active members
 - Coordinate guest speaker events with industry professionals
 - Facilitated a sponsorship with Coaching Actuaries to provide members with study material discounts and additional resources
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PROJECTS

Quantitative Equity Trading System: "Carl's Medallion Fund"

2025

<https://github.com/Carlemerson1/EBayesTrader>

- Developed end-to-end Bayesian hierarchical trading system with automated execution via Alpaca API; validated via 20-day block bootstrap permutation, $n = 2500$, $p = 0.026$, and k-fold time-series CV (results weren't amazing); currently live in paper trading
- Modeled cross-sectional equity returns using empirical Bayes priors with conjugate Normal-Normal updates for 16-ticker universe, with Kelly criterion position sizing and Ledoit-Wolf covariance estimation based portfolio rebalancing
- Built ML regime detector (gradient boosting, data augmentation, confidence threshold gating) achieving 86.5% walk-forward accuracy across 7 out-of-sample years; $p < 0.0001$ vs $n = 200$ label-shuffle null distribution
- Implemented drawdown circuit breaker with hysteresis recovery & regime based exposure scaling, constraining maximum portfolio drawdown to 10.7% over the backtest period
- Integrated live portfolio monitoring dashboard into personal website (Flask) via iframe with daily data refresh

Rental Property Cash Flow and Valuation Model

2022

- Designed a comprehensive Excel model to forecast rental property performance, incorporating NOI, cap rate, cash-on-cash return, and 5-year pro forma projections with dynamic occupancy and expense assumptions
 - Commercialized and sold to real estate investors; acquired 5 paying customers through direct outreach within the community
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TECHNICAL SKILLS

Skills: General Linear Models, Statistical Programming, Full Stack Development, Data Pipelines

Software/Programming Languages: Python, R, SAS, LaTeX, SQL, Excel, VBA, HTML, CSS, Git

Python Packages: NumPy, Pandas, Matplotlib, SciPy, scikit-learn, PyTorch, TensorFlow, statsmodels, Flask

R Packages: tidy, dplyr, ggplot2, purrr, Shiny

EXAMS AND CERTIFICATIONS

SOA Exam P

March 2025

Passed (Score: 10)

SOA Exam FM

October 2024

Passed (Score: 9)
