Brendan Shrader

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Education

Georgia Institute of Technology — Atlanta, Georgia
Ph.D., Quantitative Biosciences — *August 2025 – Present*

University of Central Florida (UCF), Burnett Honors College — Orlando, Florida
Mathematics B.S., Computer Science Minor, 3.99 GPA — *August 2021 – May 2025*

Research Experience

UCF Honors Undergraduate Thesis — January 2024 – May 2025
University of Central Florida – Mathematics Department — *Orlando, Florida*

- Thesis Chair: Prof. Zhisheng Shuai.
- This thesis extended work from the 2023 UCF Math REU, with a focus on analyzing a new SIR epidemic model, developing an approximation of disease endemicity when recovered individuals have partial immunity, and generalizing rational Lyapunov functions.
- Defended on April 1, 2025 and uploaded to UCF STARS on May 12, 2025.
- Working on a paper in preparation based on this project.

Georgia Tech Mathematics Research Experience for Undergraduates — May 2024 – July 2024
Georgia Institute of Technology – School of Mathematics — *Atlanta, Georgia*

- Worked in a group advised by Prof. Rachel Kuske and Prof. Sam Brown.
- Studied the dynamics of quorum sensing in the bacterium *Pseudomonas aeruginosa* using differential equations. This included building models, mathematically analyzing them, and presenting weekly results.
- Presented our work at Georgia Tech's math REU poster session and at the Pi Mu Epsilon Undergraduate Poster Session at Joint Mathematics Meetings 2025.
- This work led to an application for the NSF Graduate Research Fellowship Program to study more mathematical models for *P. aeruginosa* population dynamics.

UCF Mathematics Research Experience for Undergraduates — May 2023 – July 2023
University of Central Florida – Mathematics Department — *Orlando, Florida*

- Worked with Prof. Zhisheng Shuai on a new mathematical model for epidemiology.
- Used ordinary differential equation theory to study the existence of disease-free and endemic equilibria, their stability, and the existence of limit cycles.
- Continuing this work in my Honors Undergraduate Thesis.

Teaching Experience

Graduate Teaching Assistant — August 2025 – Present
Georgia Institute of Technology – School of Mathematics — *Atlanta, Georgia*

- Graduate learning assistant for MATH 2106, Foundations of Mathematical Proof.

Undergraduate Learning Assistant – Math Success Center — August 2024 – Present
University of Central Florida – Mathematics Department — *Orlando, Florida*

- Provided individual tutoring for students in classes ranging from College Algebra and Trigonometry to Abstract Algebra and Advanced Calculus.

Leadership & Outreach

UCF Collegiate Mathematical Society | *Vice President* — May 2024 – Present

- Responsible for organizing weekly group meetings and events for students interested in math at UCF, such as REU workshops and Integration Bees.
- Volunteered at UCF's fall 2024 STEM Day. Presented math topics like the 7 Bridges of Königsberg, Hilbert's Hotel, and the Monty Hall Problem to elementary and middle school students with other CMS members.

Society of Mathematical Biology | *Member* — February 2024 – Present

UCF Collegiate Mathematical Society | *Member* — August 2022 – May 2024

Presentations

UCF Workshop on Mathematical Biology and Differential Equations, Orlando, FL — July 2025

- "Modeling social bacteria: quorum sensing, communities, and evolution."

UCF Mathematical Biology Seminar, Orlando, FL — February 2025

- "The impacts of post-infection mortality and partial immunity on disease endemicity."

Joint Mathematics Meetings 2025, Seattle, WA — January 2025

- "Mathematical Modeling of *Pseudomonas aeruginosa* Quorum Sensing." Presented at the Pi Mu Epsilon Poster Session.

Joint Mathematics Meetings 2025, Seattle, WA — January 2025

- "Investigating the impact of Long-COVID and other post-infection conditions on long-term infectious disease dynamics." Invited address at the AMS Special Session on Harnessing the Power of Mathematical Models to Understand Population Dynamics, Ecology, and Evolution

Georgia Tech Mathematics REU Poster Session, Atlanta, GA — July 2024

- "Mathematical Modeling of *Pseudomonas aeruginosa* Quorum Sensing."

UCF Mathematical Biology Seminar, Orlando, FL — April 2024

- "Investigating the impact of Long-COVID and other post-infection conditions on long-term infectious disease dynamics."

UCF Student Scholar Symposium, Orlando, FL — March 2024

- "Global dynamics of a disease model with post-infection mortality and partial immunity."

SMB MathEpiOnco 2024, Virtual — February 2024

- "Global dynamics of an SIR model with post-infection mortality and partial immunity."

Joint Mathematics Meetings 2024, San Francisco, CA — January 2024

- "Global dynamics of an SIR model with post-infection mortality and partial immunity."

UCF Summer Poster Showcase, Orlando, FL — July 2023

- "Global dynamics of an SIR Model with post-infection mortality and reinfection."

Skills

Relevant Coursework:

- Mathematical Biology, Ordinary Differential Equations, Partial Differential Equations, Numerical Methods for Partial Differential Equations, Linear Algebra, Abstract Algebra, Computational Algebra, Advanced Calculus, Probability and Random Processes, Object Oriented Programming, Computer Science.

Programming Languages:

- C, Java, Python, MATLAB, Maxima, LaTeX, Git, Conda

Academic Honors & Awards

Georgia Institute of Technology:

- President's Fellowship ($22,000) — April 18, 2025

University of Central Florida:

- Hernandez Mathematics Award for Excellence in Undergraduate Achievement — April 13, 2025
- UCF Mathematics Department Advanced Calculus Award — April 17, 2024
- UCF Student Scholar Symposium Judges' Choice Award — March 27, 2024
- UCF College of Sciences Honors Undergraduate Thesis Competition ($1,000) — March 27, 2024
- UCF President's Honor Roll — Spring 2022 – Spring 2025
- UCF Provost Scholarship ($30,000) — Fall 2021 – Spring 2025
- Florida Bright Futures — Fall 2021 – Spring 2025