

Education

Doctor of Philosophy, Mathematics Texas A&M University	2024-2029
Master of Science, Mathematics University of Texas at San Antonio GPA: 3.75	2022-2024
Bachelor of Science, Mathematics with a Minor in Statistics University of Texas at San Antonio Summa Cum Laude GPA: 3.92	2019-2022

Fellowships & Awards

• Excellence in Mathematics Scholarship, UTSA	2020
• Dr. Rama Mantripragada Scholarship, UTSA	2019-2022
• Distinguished Presidential Scholarship, UTSA	2019-2022
• Baumberger Scholarship, UTSA	2019-2022
• Graduate Merit Fellowship, Texas A&M	2024-2025

Research Interests

My interests include mathematical biology and have particular interests in the mathematical modeling of infectious diseases, computational epidemiology, and optimal control theory.

Conferences and Seminars

• Mathematical Association of America Seminars (MAA)	Texas, 2023
• Applied Mathematics Seminars (AMS)	Texas, 2023
• Gordon Research Conference on Collective Behavior	Maine, August 2023
• Boston University Seminar: Deep neural networks for predicting single cell responses by Heidi Klumpe	Online, September 2023
• University of Texas at Austin Seminar: Weak turbulence modeled by quasilinear diffusion for electrostatic and magnetized plasma systems by Irena Gamba	Online, October 2023
• National Conference on Undergraduate Research (NCUR): Presenting an abstract in mathematical biology	California, April 2024

Research Contributions

1. **Optimal Control Theory in Modeling and Analysis of Micro-Parasitic Disease Dynamics**
Authors: Spalding Garakani, Mostafa Fazly
Status: **Submitted**
Summary: Explores the application of optimal control theory in understanding the dynamics of micro-parasitic diseases. It delves into mathematical modeling and analytical techniques to provide information on disease behavior and control strategies compared to the traditional way of analyzing epidemic models.

2. The Effect of Heterogeneity of Relative Vaccine Costs on the Mean Population Vaccination Rate with Mpox as an Example

Authors: Spalding Garakania, Luis Flores, Guillermo Alvarez-Pardo, Jan Rychtář, Dewey Taylor

Status: **Submitted**

Summary: Developed advanced game-theoretic models to analyze vaccination strategies for Mpox in heterogeneous populations, identifying critical factors that influence optimal vaccination rates. This work highlights the impact of inequities in vaccine access and the importance of group size in determining vaccination outcomes.

3. Evaluating Treatment versus Vaccination through Optimal Control Theory

Authors: Spalding Garakani, Mostafa Fazly

Status: **Submitted**

Summary: Explores the application of optimal control theory to compare vaccination and treatment in controlling infectious diseases, focusing on the SVIR and SITR models. Through mathematical modeling and analysis, it aims to understand which strategy, vaccination or treatment, is more effective in managing disease spread.

Master's Thesis

Title: Optimal Control Theory and Applications in Infectious Disease Modeling

This research delves into Optimal Control Theory, focusing on existence, uniqueness, principles of optimality, Hamiltonian and Autonomous Problems, and fixed endpoint states. These fundamentals lay the groundwork for modeling diseases with a variety of epidemic models using optimal control.

- Supervisor: Dr. Mostafa Fazly

Relevant Courses

MAT 5673 (Partial Differential Equations I) — MAT 5323 (Mathematical Modeling) — MAT 5653 (Differential Equations I) — MAT 5603 (Numerical Analysis) — MAT 5293 (Numerical Linear Algebra)

Programming Proficiency

Python — MATLAB — R — SAS

Teaching Experience

MAT 1053 (Business for Mathematics): Held office hours multiple times a week in person, graded all student assignments, conducted project and exam review sessions, and taught classes during the summer semester.

MAT 1224 (Calculus II): Held office hours multiple times a week both online and in-person throughout the entire semester, led review sessions for exams, created supplementary materials and videos for student use, and collaborated with professors to design exams.

Math Tutoring Center: Provided individualized assistance to students for various math courses, ranging from algebra to advanced calculus. Collaborated with other tutors to develop effective tutoring strategies and created resources for students.

Math Gym: Designed targeted workout sessions to address deficiencies in foundational topics that students may have forgotten from previous courses, such as algebra, logarithmic rules, and trigonometry.

Professional Affiliation

Mathematical Association of America — American Mathematical Society