Matthias Dogbatsey | Curriculum Vitae

Department of Mathematics, The University of Alabama. – Tuscaloosa, Alabama 35401
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Education

The University of Alabama **Tuscaloosa, AL**
Ph.D. Mathematics (Department of Mathematics) 05/2026
Advisor: Prof. Shan Zhao

M.A. Mathematics (Department of Mathematics) 05/2024

African Institute for Mathematical Sciences **Accra, GH**
M.Sc. Mathematical Sciences (Kwame Nkrumah Uni. Science and Technology) 07/2020
Advisor: Prof. Farai Nyabadza

University of Cape Coast **Cape Coast, GH**
B.Sc. Mathematics and Economics 05/2017

Research Interests

Mathematical Biology, Scientific Computing, Numerical Analysis, Numerical Methods for PDEs, Social Dynamics.

Research Experience

The University of Alabama **Tuscaloosa, AL**
Ph.D. Mathematics (Department of Mathematics) 05/2024 – Present
Graduate Research Assistant

- Developed fast and effective numerical solvers for the 3D p-Laplacian operator
- Applied the numerical schemes to biological problems
- Incorporated the p-Laplace operator in calculating solvation-free energies

African Institute for Mathematical Sciences **Accra, GH**
M.Sc. Mathematical Sciences (AIMS-Ghana and KNUST) 08/2019-07/2020
Advisor/Supervisor: Prof. Farai Nyabadza
Project: Modeling the role of imitation in crime dynamics.

- *Developed and analyzed nonlinear compartmental models to study the role of imitation in the spread of crime in Ghanaian society*
- *Performed bifurcation analysis and numerical simulations using Python.*
- *Applied stability theory and parameter sensitivity analysis to assess model behavior under varying assumptions*

Professional Experience

The University of Alabama **Tuscaloosa, AL**

Department of Mathematics Aug/2021 - Present

Instructor of Record

- **MATH 227, Calculus III,** Spring 2025
- **MATH 238, Applied Differential Equations I,** Spring 2024
- **MATH 125, Calculus I**, Spring 2023
- **MATH 115, Precalculus Algebra and Trigonometry,** Fall 2022, Fall 2023 (2 Sessions)

Teaching Assistant

- **MATH 112-227,** Fall 2021- Present (Tutor)
- **MATH 301, Discrete Mathematics,** Spring 2023 (Grader)

Publications

- **Dogbatsey, M.**, Chen, Z., Shao, Y., & Zhao, S. (2025). Numerical solutions to the 3D p-Laplace equation: Finite difference methods and biological applications. (submitted).
- Kwofie, T., **Dogbatsey, M.**, & Kang, Y. (2025). Gang Dynamics: A mathematical modeling approach. (Submitted).
- Kwofie, T., **Dogbatsey, M.**, & Moore, S. E. (2023). Curtailing crime dynamics: A mathematical approach. Frontiers in Applied Mathematics and Statistics, 8, 1086745.

Posters and Presentations

- 2025 Southeast Applied and Computational Mathematics Graduate Student Workshop, Auburn University, AL, 04/06/2025 (*Invited talk*).
  Talk: Numerical solutions to the 3D p-Laplace equations.

- SIAM SEAS 2025, The University of Tennessee, TN, 03/23/2025 (*Contributed talk)*.
  Talk: Numerical solutions to the 3D p-Laplace equations

- Joint Mathematics Meetings (JMM) 2024, San Francisco, 01/03/2024 (*Invited talk*).
  Talk: Assessing the Impact of Intervention Programs on Gang Dynamics: A Mathematical Modeling Approach

- Applied Mathematics Seminar, Department of Mathematics, The University of Alabama, AL, 10/13/2023 (*Invited talk*).
  Talk: Assessing the Impact of Intervention Programs on Gang Dynamics: A Mathematical Modeling Approach

Computer Skills

- **Programming Languages:** FORTRAN, Python
- **Mathematical Software:** MATLAB
- **Biomolecular Simulations:** VMD

Honors and Awards

- *Summer Research Fellowship, Department of Mathematics, The University of Alabama – 2025*
- 2025 Southeast ACM Workshop Travel Support, *Auburn University - 2025*
- Graduate Student Travel Award, *Graduate School, The University of Alabama - 2025*
- SIAM SEAS 2025 Travel Support, *The University of Tennessee- 2025*
- Graduate Student Travel Award, *College of Arts and Sciences, The University of Alabama - 2025*
- *Summer Research Fellowship, Department of Mathematics, The University of Alabama – 2024*
- Graduate Student Travel Award, *Graduate School, The University of Alabama – 2024*
- Edith & Richard Ainsworth Endowed Scholarship*, The University of Alabama – 2022, 2023*
- *AIMS Ghana Fellowship, $25000 - 2019- 2020*
- *Funding to attend Probability, Analysis, and Applications (PAA) workshop, AIMS Ghana- 2020*

Leadership and Community Involvement

Judge: SIAM M3 Challenge 2025

Served as a triage judge for the MathWorks Math Modeling (M3) Challenge, organized by SIAM. Graded and provided feedback to challenge teams of over 20 teams of high school students in the United States and sixth form students in England and Wales.

Delegate: Graduate Students Association, House of Delegates 08/2024-05/2025

Served on the Academic Development Committee of the house, where we worked on resolutions to help graduate students in their job search and get additional funding for conferences

Grader: MATHCOUNTS 2022-2025

Served as a grader for the MATHCOUNTS competition for pupils in grades six to eight in West Alabama, organized by the MATHCOUNTS Foundation, and hosted by the University of Alabama.

Judge: SIMIODE Challenge Using Differential Equations Modelling (SCUDEM) IX 2024

Served as a judge for SCUDEM IX 2024, organized by SIMIODE.
Judged undergraduate students' research on modeling using differential equations and MATLAB worldwide.

Judge: Ohio Science Day 2024

Served as a judge for the 2024 Ohio Science Day, organized by the Ohio Academy of Arts and Sciences. Judged research carried out by high school and middle school students.

Judge: Undergraduate Research and Creative Activity Conference (URCA) 2024

Served as a judge for the 2024 URCA, organized by the University of Alabama, judging research by undergraduate students.

Professional Memberships

- *American Mathematical Society (AMS), 2021 – Present*
- *Mathematical Association of America (MAA), 2022 – Present*
- *Association of Women in Mathematics (AWM), 2021 – Present*
- *Society of Industrial and Applied Mathematics (SIAM) 2021 – Present*