Naghmeh Akhavan

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EDUCATION

PhD in Applied Mathematics – Mathematical Biology | expected 2024 | University of Maryland Baltimore County | GPA: 3.6/4

- **Honor:** MERCK SHARP & DOHME LLC Fellowship Grant MRLCPO-22-164353
- **Honor:** Fully funded by NSF-NIH (DMS-NIGMS) Grant-1953423

Visiting Research Scholar | University of Maryland, College Park | August 2020

- Advisor: James A. Yorke, Institute for Physical Science and Technology

M. Sc. in Mathematics - Algebraic Topology | University of Guilan | Rasht, Iran | August 2012

- **Honor:** Ranked 4th in M.Sc. program of Mathematics

B.Sc. in Pure Mathematics | Shahid Beheshti University | Tehran, Iran | August 2008

- **Honor:** Elected Student of year-2006

Research Interests

- Biological Mathematics – Computational Modeling
- Pharmacology and Pharmacometrics – Immune/Oncology
- Pharmacokinetic and Pharmacodynamic (PKPD) modeling
- Infectious Diseases – Mathematical modeling

Research Experiences

Research Assistant |University of Maryland Baltimore County | Baltimore, MD | 2021 – present.

- Engaged in pioneering research on modeling cluster cell migration, leveraging advanced mathematical techniques to simulate and analyze biological phenomena, contributing to the field of mathematical biology.

Research Intern – Microsoft Research | Seattle, WA | May – August 2022

- Part of the Artificial Intelligence Quantum Physics Group under Jaron Lanier. Focused on solving complex mathematical problems in quantum field theory, enhancing the intersection of mathematics and quantum physics.

Research Scientist | University of Maryland – IPST | College Park, Maryland | 2018-2020.

- Collaborated with Prof. James A. Yorke on classifying Lyapunov functions for nonlinear population dynamics. The work included robust analysis of species networking and modeling using Python, contributing significantly to understanding nonlinear dynamics in population biology.

Research Scientist | University of Maryland – Department of Mathematics and Statistics | College Park, Maryland | 2019.

- Worked with Prof. Vadim Kaloshin and Prof. James A. Yorke on the Nicholson-Bailey 4D-model. This role involved rigorous investigation and analysis of the model's robustness, employing Python for advanced modeling tasks.

Publications

- **N. Akhavan**, B. Pant, Peter Molnar, A.B. Gumel: "To treat or not to treat: Mathematics of heartworm disease dynamics in canines' population", Manuscript.
- **N. Akhavan**, B. Pant, A.B. Gumel: "A mathematical model of the role of Temperature, Humidity, and Rainfall on West Nile Virus", Manuscript.
- **N. Akhavan**, M. Starz-Gaiano, B. E. Peercy: "Understanding Collective Cell Migration Using Phase-Field Modeling", Manuscript.
- A. S. George**, N. Akhavan**, B. E. Peercy, and M. Starz-Gaiano: "Tissue Geometry Modulates Chemoattractant Distribution to Direct Drosophila Border Cell Migration Behavior**",** Preprint - iScience.
- **N. Akhavan**, James A. Yorke: "Extinction of Multiple Populations and a team of Lyapunov functions". SIAM Journal on Applied Dynamical Systems. SIAM Journal on Applied Dynamical Systems.
- **N. Akhavan**, James A. Yorke: "Population collapse in Elite-dominated societies: A differential equations model without differential equations". SIAM Journal on Applied Dynamical Systems.

Academic Achievements

- **MERCK SHARP & DOHME LLC Fellowship Award** | Merck & co. | University of Maryland Baltimore County | 2023-Present.
- **Outstanding Graduate Research in Mathematics Award** | The College of Natural and Mathematical Science (CNMS) | 2024.
- **Travel Award** | 2024 SIAM Conference on the Life Science (LS24) | June 2024 | $650.
- **Travel Award** | International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems | ICMA-VIII | University of Louisiana at Lafayette | October 2022 | NSF - $930.
- **Best Poster Award** | "Population Collapse in Elite-dominated Society" | ICMA-VII |Arizona State University |October 2019.
- **Ranked 7th** among about 100 Mathematics graduates participating in national Annual Entrance Examination for Higher Education | Ph.D. program in Mathematics.
- **Ranked 1st** among about 1000 Mathematics graduates participating in national Annual Entrance Examination for Higher Education: M.Sc. program in Mathematics.
- **Ranked 4th** in M.Sc. program of Mathematics.

Selected Posters and Presentations

- **N. Akhavan,** "Exploring the impact of the extracellular space geometry in the egg chamber "| Presentation & Session Chair | SIAM LS 2024 | Portland, Oregon | June 2024.
- **N. Akhavan,** "Exploring the Mechanisms of Cluster Cell Migration: Synergistic Roles of Tissue Architecture and Chemoattractant in a Mathematical Model "| Poster | Society of Developmental Biology (SDB) | Mid-Atlantic SDB Regional Meeting | University of Maryland, College Park | May 2024.
- **N. Akhavan,** "Navigating Collective Cell Migration: Mechanisms and Influences in Drosophila Egg Chamber Development" | Presentation |American Mathematics Society (AMS) 2024 Spring Eastern Sectional Meeting | Howard University, Washington, DC | April 2024.
- **N. Akhavan,** "The effect of the distribution of chemoattractant on the trajectory of clustered cell migration in complex geometry: A One-Dimensional hybrid model" | Poster |Society for Mathematical Biology Annual Meeting | The Ohio state University, Columbus, Ohio | July 2023.
- **N. Akhavan,** "Chemoattractant distribution in complex geometry impacts the trajectory of clustered cell migration" | Presentation |Biology and Medicine Through Mathematics Conference | Richmond, Virginia | May 2023.
- **N. Akhavan,** "Extinction of multiple populations and a team of Lyapunov functions" | Presentation | International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems | Louisiana, Lafayette | October 2022.
- **N. Akhavan,** "Effect of extracellular geometry on cluster cell migration in fruit fly egg chamber" | Presentation | International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems | Louisiana, Lafayette | October 2022.
- **N. Akhavan,** "Migratory Border Cell Cluster Adaptations to Chemical Gradients in Fruit Fly Egg Chamber" | Poster | SIAM Conference on Life Science (LS22) | Pittsburgh, Pennsylvania | July 2022.
- Mallika Bhattacharya, Alexander George, **Naghmeh Akhavan**, Bradford E. Peercy, Michelle Starz-Gaiano (presenter), "Steroid hormone signaling, and tissue structure contribute to border cell migration dynamics in the Drosophila ovary" | Poster | Society for Developmental Biology 81st Annual Meeting | Vancouver, Canada | July 2022.
- **N. Akhavan**, "Population collapse in Elite-dominated societies" | presentation | Graduate Student Seminar | Department of Math and Statistics | University of Maryland Baltimore County | March 2021.
- **N. Akhavan**, "Population collapse in Elite-dominated societies" | poster | 7th International Conference on Mathematical Modeling and Analysis of Populations, ICMA VII | Arizona State University, Tempe | October 2019.
- **N. Akhavan**, "Equivalence in Shifts of Finite Type with Topological Restrictions" | poster | Workshop on Hyperbolic Dynamics | ICTP (International Center for Theoretical Physics) | Trieste, Italy | June 2017.

Technical Strengths

Modeling and Analysis	Python, NumPy, MATLAB, Octave, Mathematica
Software and Tools	Jupyter notebook, CoLab, Spyder, IBM Watson

Selected Courses and Certifications

- **IBM Data Science** | Professional Certification | IBM

- **Google IT Support** | Professional Certificate | Google
- **Machine Learning** | Stanford University
- **Statistics with Python Specialization** | University of Michigan
- **Data Analysis, Data Science & Visualization** | Python & Pandas
- **The Complete Neural Networks Bootcamp: Theory, Application** | Udemy
- **Engineering statistics** | Sharif University of Technology | non-certification

Selected Conference and Workshop

- 2023 BioBridge Clinic Workshop | University of California, Irvine | February 2023
- International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems | Louisiana, Lafayette | October 2022.
- SIAM Conference on the Life Sciences and Annual (LS22-AN22) | Pittsburgh, Pennsylvania | July 2022.
- INMAS – Workshop for Internship Network in the Mathematical Sciences |Johns Hopkins University & University of Illinois Urbana-Champaign| October-February 2021-22.
- Math Modeling Conference on Wound Healing | Virtual | Howard University | December 2021.
- SMB 2021 Annual Meeting | Virtual | June 2021.
- Cellular Dynamics & Models | Virtual | Cold Spring Harbor Laboratory – CSHL | May 2021.
- 7th International Conference on Mathematical Modeling and Analysis of Populations | ICMA VII | Arizona State University, Tempe | October 2019.
- Workshop on Hyperbolic Dynamics | ICTP (International Center for Theoretical Physics) | Trieste, Italy | June 2017.

Teaching Experiences

Lecturer

- MATH 225 | Introduction to Differential Equations | winter 2024, summer 2024

Teaching Assistant | Undergraduate courses

- MATH 151 | Calculus and Analytic Geometry
- MATH 155 | Applied Calculus

Teaching Assistant | Graduate courses

- Dynamical systems II
- Manifold Geometry
- General Topology
- Algebraic Topology

Professional Activities

- **Graduate Assistant Advisory Committee (GAAC)** | Chair | 2024-present
- **Math-Stat Graduate Student Association (MS-GSA)** | President | 2022-present
- **Orientation Advisor** – Office for Academic and Pre-Professional Advising | 2023-present
- **Manuscript Reviewer** |SIAM |2020-present
- **Manuscript Reviewer** |Journal of Biological Dynamics |2022-present

Membership

- American Mathematics Society | Student Membership
- SIAM | Society for Industrial and Applied Mathematics | Student Membership
- SMB | Society for Mathematical Biology | Student Membership
- NIMBioS | National Institute for Mathematical and Biological Synthesis