

Mykhaylo M. Malakhov

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Education

University of Minnesota

PhD in Biostatistics

Minneapolis, MN

2020–2025

Andrews University

BS in Mathematics

Berrien Springs, MI

2016–2020

Minor in Computing, *Summa Cum Laude*, and J. N. Andrews Honors Scholar

Budapest Semesters in Mathematics

Study Abroad

Budapest, Hungary

Fall 2019

Employment

Research Positions

University of Minnesota School of Public Health

Predoctoral Trainee

Minneapolis, MN

2020–present

- Trainee through the Interdisciplinary Biostatistics Training in Genetics and Genomics program
- Funded by a National Institutes of Health NIGMS T32 Training Grant
- Mentors: Wei Pan and Saonli Basu (University of Minnesota)

Institute for Pure and Applied Mathematics

Researcher and Project Manager

Los Angeles, CA

Summer 2019

Air Force Research Laboratory team, Research in Industrial Projects for Students program.

- Coordinated a team of four students
- Developed novel techniques for attractor reconstruction and model calibration, showcasing their efficacy by inferring reaction rate coefficients for hydrogen-oxygen combustion from a time series of one observable
- Methods used:
 - optimal transport
 - information theory
 - dynamical systems
- Mentors: Robert Martin and Daniel Eckhardt (Edwards Air Force Base)

Williams College

Research Intern

Mathematical Ecology group, SMALL REU program.

- Project 1: posed and analyzed a metapopulation model for white-nose syndrome in bats, demonstrating how exchange of individuals between subpopulations can alter the success of control strategies
- Project 2: posed and analyzed *SIRS*-type models to ascertain the relative merits of centralized and decentralized governance structures for managing transboundary infectious diseases
- Methods used:
 - differential equation models
 - high performance computing
- Mentors: Julie C. Blackwood (Williams College) and Katriona Shea (Pennsylvania State University)

Williamstown, MA

Summer 2018

Andrews University

Undergraduate Research Fellow

Mathematical modeling group, Seabird Ecology Team.

- Modeled the effects of climate change on seabird behavior and population dynamics
- Proved that egg cannibalism and egg-laying synchrony can yield strong Allee effects, which allow gull colonies to survive at higher sea surface temperatures than otherwise possible
- Methods used:
 - periodic matrix models
 - bifurcation theory
 - stability analysis
- Mentors: Shandelle M. Henson (Andrews University) and J. M. Cushing (University of Arizona)

Berrien Springs, MI

Summer 2017

Teaching Positions

Andrews University

Teaching Assistant

- Mathematics Center tutor
- L^AT_EX workshop leader
- Grader for Foundations of Advanced Mathematics
- Substitute teacher for Calculus sequence

Berrien Springs, MI

2017–2020

Publications

- [1] **M. M. Malakhov** and S. M. Henson, "Periodic matrix models for seabird population dynamics: The impact of stage structure," in preparation.
- [2] J. C. Blackwood, **M. M. Malakhov**, J. Duan, J. J. Pellett, I. Phadke, S. Lenhart, C. Sims, and K. Shea, "Governance structure affects transboundary disease management under alternative objectives," in revision.
- [3] J. Duan, **M. M. Malakhov**, J. J. Pellett, I. S. Phadke, J. Barber, and J. C. Blackwood, "Management efficacy in a metapopulation model of white-nose syndrome," *Natural Resource Modeling*, e12304, Apr. 2021, <https://doi.org/10.1111/nrm.12304>.
- [4] **M. M. Malakhov**, B. R. Fitzpatrick, R. A. Lopez, and A. Shivkumar, "Attractor reconstruction and empirical parameter inference for hydrogen-oxygen chemistry," Air Force Research Laboratory, Edwards AFB, Technical Report AD1098889, Feb. 2020, <https://apps.dtic.mil/sti/citations/AD1098889>.

- [5] **M. M. Malakhov**, “Managing white-nose syndrome in bats: A spatially dynamic modelling approach,” <https://dx.doi.org/10.32597/honors/216>, Honors Thesis, Andrews University, Apr. 2019.

Honors and Awards

National.....

Barry M. Goldwater Scholarship: \$15,000 2018

University of Minnesota.....

Dean’s PhD Scholars Award: \$5,000 2020

Jean Roberts Biostatistics Fellowship: \$13,255 2020

Andrews University.....

Dean’s List: every semester 2016 – 2020

Awards for Excellence in:

- Linear Algebra (2020)
- Complex Analysis (2019)
- Probability Theory with Statistical Applications (2019)
- Applied Mathematics (2019)
- Abstract Algebra (2019)
- Geometry (2019)
- Differential Equations (2018)
- Mathematical Modeling in Biology (2018)
- Calculus III (2018)
- Foundations of Advanced Mathematics (2017)
- Calculus II (2017)
- Calculus I (2017)

Putnam Competition: team member (2017, 2018, 2019) and highest scorer (2018, 2019)

Harold T. Jones Scholarship: \$2,250 2018

Louis Ulloth Scholarship: \$2,250 2018

ACT/SAT Scholarship: \$145,000 2016

Conference Presentations

Attractor Reconstruction and Empirical Parameter Inference for Hydrogen-Oxygen Chemistry. 2019 RIPS Projects Day; IPAM; UCLA; Los Angeles, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (August 2019)

Managing White-nose Syndrome in Bats: A Spatially Dynamic Modelling Approach. 2019 Honors Thesis Symposium; Andrews University; Berrien Springs, MI. (April 2019)

Modeling the impact of bat dispersal on white-nose syndrome control strategies. Mathematics Section; Michigan Academy of Science, Arts, and Letters; Alma College; Alma, MI. (March 2019)

Federalism in Epidemic Modeling: Multi-objective Management of Interconnected Populations. AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates; Joint Mathematics Meetings; Baltimore, MD. Jointly with Ishan Phadke. (January 2019)

Cannibalism and synchrony in a periodic matrix seabird population model. Mathematics Section; Michigan Academy of Science, Arts, and Letters; Central Michigan University; Mount Pleasant, MI. (March 2018)

Backward Bifurcations in a Periodic Matrix Model of Seabird Population Dynamics. MAA General Contributed Paper Session on Modeling and Applications; Joint Mathematics Meetings; San Diego, CA. (January 2018)

Other Oral Presentations

Attractor Reconstruction and Empirical Parameter Inference for Hydrogen-Oxygen Chemistry. Invited guest lecture; Air Force Research Laboratory; Edwards Air Force Base; Boron, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (August 2019)

Application of Convergent Cross Mapping to Chemical Reactions. RIPS Midterm Presentations Session; IPAM; UCLA; Los Angeles, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (July 2019)

SMALL Projects for a Big World: Spatial Models of Infectious Disease. eigen*Talk (undergraduate math/physics colloquium); Andrews University; Berrien Springs, MI. (November 2018)

Differential Geometry: History, Theory, and Applications. eigen*Talk (undergraduate math/physics colloquium); Andrews University; Berrien Springs, MI. Jointly with other MATH 487 Differential Geometry students. (April 2018)

Effects of Sea Surface Temperature on Seabird Behavior in the Pacific Northwest. eigen*Talk (undergraduate math/physics colloquium); Andrews University; Berrien Springs, MI. (September 2017)

Uncertainty in Mathematics: A Historical Analysis of the Validity and Rigor of Mathematical Statements. eigen*Talk (undergraduate math/physics colloquium); Andrews University; Berrien Springs, MI. Jointly with Robert C. Moore and Lukasz Krzywón. (April 2017)

Poster Presentations

Data-driven Attractor Reconstruction and Parameter Inference for Hydrogen-Oxygen Chemistry. MAA Student Poster Session; Joint Mathematics Meetings; Denver, CO. (January 2020)

Managing White-nose Syndrome in Bats: A Spatially Dynamic Modeling Approach. 2019 Honors Scholars and Undergraduate Research Poster Symposium; Andrews University; Berrien Springs, MI. (March 2019)

Efficacy of Control in a Spatially Dynamic Model of White-nose Syndrome. Summer Science Poster Session; Williams College; Williamstown, MA. Jointly with Ishan Phadke. (August 2018)

A Periodic Matrix Model of Seabird Behavior and Population Dynamics. 2018 Honors Scholars and Undergraduate Research Poster Symposium; Andrews University; Berrien Springs, MI. (March 2018)

Service and Outreach

Pi Mu Epsilon: The National Mathematics Honor Society

President, Michigan Gamma Chapter

2018 – 2020

I organized π Day festivities, game nights, and other fun activities. After one year of service I was reelected for a second term.

Engineers Without Borders USA

Vice President, Andrews University Chapter

2018 – 2019

I oversaw all club administration and functions, as well as the initial phases of a \$60,000+ solar energy project for a remote school in Madagascar. The summer of 2018 I traveled to Madagascar to help conduct the assessment phase of our project.

eigen* (Andrews University math/physics club)

Mathematics President

2017 – 2018

I planned math-related colloquia and events and invited guest speakers. I also organized the first-ever Putnam Competition team and preparation course at AU.

Engineers Without Borders USA

Treasurer, Andrews University Chapter

2017 – 2018

I oversaw all club and project finances, grant applications, and fundraising. During my time as Treasurer we raised about \$20,000.

Ruth Murdoch Elementary School

codeShack Student Leader

2016 – 2017

I helped found codeShack, a Google igniteCS project at Ruth Murdoch Elementary School. We designed a computer science curriculum that simultaneously paces and challenges students while connecting them with undergraduate mentors.

Relevant Skills

Human Languages:

- English (bilingual proficiency)
- Russian (bilingual proficiency)
- Spanish (limited working proficiency)

Computer Languages:

- Proficient: R, MATLAB, \LaTeX
- Learning: Python, Java, SAS