Mykhaylo M. Malakhov

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Education

University of Minnesota

Minneapolis, MN 2020–2025

PhD in Biostatistics

Berrien Springs, MI

Andrews University *BS in Mathematics*

2016–2020

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

Budapest Semesters in Mathematics

Budapest, Hungary

Study Abroad

Fall 2019

Experience

Research Positions

University of Minnesota School of Public Health

Minneapolis, MN

Predoctoral Trainee

2020-present

- Funded by a National Institutes of Health NHLBI T32 Training Grant through the Interdisciplinary Biostatistics Training in Genetics and Genomics program
- Developing improved tissue-specific gene expression prediction models for use in transcriptome-wide association studies (TWAS)
- o Methods used:
 - elastic net regularization
 - non-nested model selection tests
 - whole-genome sequencing and expression quality control
- o Mentor: Wei Pan (University of Minnesota)

Institute for Pure and Applied Mathematics

Los Angeles, CA

Researcher and Project Manager

Summer 2019

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

- o Coordinated a team of four students
- Proposed 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
- o Methods used:
 - optimal transport
 - information theory
 - dynamical systems
- o Mentors: Robert Martin and Daniel Eckhardt (Edwards Air Force Base)

Williams College Williamstown, MA

Research Intern

Summer 2018

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 populations can alter the success of control strategies
- \circ Project 2: posed and analyzed SIRS-type models to ascertain the relative merits of centralized and decentralized governance structures for managing transboundary infectious diseases
- o Methods used:
 - differential equation models
 - high performance computing
 - public policy analysis
- o Mentors: Julie C. Blackwood (Williams College) and Katriona Shea (Pennsylvania State University)

Andrews University

Berrien Springs, MI

Undergraduate Research Fellow

Summer 2017

Mathematical modeling group, Seabird Ecology Team.

- o Modeled the effects of climate change on seabird behavior and population dynamics
- o 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
- o Methods used:
 - periodic matrix models
 - bifurcation theory
 - stability analysis
- o Mentors: Shandelle M. Henson (Andrews University) and J. M. Cushing (University of Arizona)

Teaching Positions.....

Berrien Springs, MI

Andrews University *Teaching Assistant*

2017-2020

- o Mathematics Center tutor
 - Tutored undergraduates for math classes of all levels (arithmetic review through abstract algebra)
- LATEX workshop leader
 - Co-organized and co-taught a short course on LATEX
- o Grader for Foundations of Advanced Mathematics
 - Wrote solution keys and graded assignments
- o Substitute teacher for Calculus sequence
 - Prepared and presented lectures for Calculus I and II several times per semester

Peer-reviewed Papers

- 1. **Malakhov MM** and Henson SM. Periodic matrix models for seabird population dynamics: the impact of stage structure. In preparation.
- 2. Blackwood JC, **Malakhov MM**, Duan J, et al. Governance structure affects transboundary disease management under alternative objectives. BMC Public Health 2021;21:1782.
- 3. Duan J, **Malakhov MM**, Pellett JJ, Phadke IS, Barber J, and Blackwood JC. Management efficacy in a metapopulation model of white-nose syndrome. Natural Resource Modeling 2021;34:e12304.

Other Publications

 Malakhov MM, Fitzpatrick BR, Lopez RA, and Shivkumar A. Attractor Reconstruction and Empirical Parameter Inference for Hydrogen-Oxygen Chemistry. Technical Report AD1098889. Air Force Research Laboratory, 2020. 5. **Malakhov MM**. Managing White-nose Syndrome in Bats: A Spatially Dynamic Modelling Approach. https://dx.doi.org/10.32597/honors/216. Honors Thesis. Andrews University, 2019.

Honors and Awards

| National | |
|--|-------------|
| American Mathematical Society Conference Travel Grant: \$400 | 2020 |
| 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:

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

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

Harold T. Jones Scholarship: \$2,250

Louis Ulloth Scholarship: \$2,250

ACT/SAT Scholarship: \$145,000

2018

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 and Students in Post-Baccalaureate Programs; 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

Application of Convergent Cross Mapping to Chemical Reactions. Invited guest lecture; Air Force Research Laboratory; Edwards Air Force Base; Boron, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (August 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)

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 Krzywon. (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

Computer Languages:

Proficient: R, MATLAB, LATEX
 Learning: Python, Java, SAS

Genomics Tools:

o plink, bcftools, GCTA

Human Languages:

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