Mykhaylo M. Malakhov

(530) 840-6245 • malak039@umn.edu • mykmal.xyz • MykMal
mykmal • MykMal • 0000-0002-6856-3913

Education

University of Minnesota — **Minneapolis, MN**
PhD in Biostatistics — *2020–2025*
- Advised by Wei Pan
- Member of the Interdisciplinary Biostatistics Training in Genetics and Genomics program

Andrews University — **Berrien Springs, MI**
BS in Mathematics — *2016–2020*
- Minor in Computing
- *Summa Cum Laude* and J. N. Andrews Honors Scholar
- Thesis: *Managing White-nose Syndrome in Bats: A Spatially Dynamic Modelling Approach*

Budapest Semesters in Mathematics — **Budapest, Hungary**
Study abroad — *Fall 2019*

Research positions

University of Minnesota School of Public Health — **Minneapolis, MN**
Predoctoral Trainee — *2020–present*
- Funded by a T32 Training Grant from the National Institutes of Health
- Helped develop a nonlinear extension of the transcriptome-wide association study (TWAS) framework and showed that it identifies genes missed by standard TWAS
- Proposed and implemented DRAB (Differential Regulation Analysis by Bootstrapping), a method for identifying genes with context-specific patterns of genetic regulation
- Currently working on leveraging proteomics data to boost the power of genome-wide association studies (GWAS)
- 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
- Proposed novel attractor reconstruction and model calibration methods
- Showcased these methods by inferring reaction rate coefficients for hydrogen-oxygen combustion from a time series of one observable
- Mentors: Robert Martin and Daniel Eckhardt (Air Force Research Laboratory)

Williams College — **Williamstown, MA**
Research Intern — *Summer 2018*
Mathematical Ecology group, SMALL REU program
- Project 1: demonstrated how to improve management outcomes for white-nose syndrome in bats by considering metapopulation dynamics
- Project 2: established guidelines for transboundary infectious disease management when multiple administrative jurisdictions set different objectives
- 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
- 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
- Mentors: Shandelle M. Henson (Andrews University) and J. M. Cushing (University of Arizona)

Publications

Peer-reviewed

1. **Malakhov**, **M. M.**, Dai, B., Shen, X. T. & Pan, W. Identifying genes with tissue-specific patterns of genetic regulation. *In preparation.*
2. Lin, Z., Xue, H., **Malakhov**, **M. M.**, Knutson, K. A. & Pan, W. Accounting for nonlinear effects of gene expression identifies additional associated genes in transcriptome-wide association studies. *Human Molecular Genetics* **31,** 2462–2470. https://doi.org/10.1093/hmg/ddac015 (Jan. 2022).
3. Blackwood, J. C., **Malakhov**, **M. M.**, Duan, J., Pellett, J. J., Phadke, I. S., Lenhart, S., Sims, C. & Shea, K. Governance structure affects transboundary disease management under alternative objectives. *BMC Public Health* **21.** https://doi.org/10.1186/s12889-021-11797-3 (Oct. 2021).
4. Duan, J., **Malakhov**, **M. M.**, Pellett, J. J., Phadke, I. S., Barber, J. & Blackwood, J. C. Management efficacy in a metapopulation model of white-nose syndrome. *Natural Resource Modeling* **34,** e12304. https://doi.org/10.1111/nrm.12304 (Apr. 2021).

Other

5. **Malakhov**, **M. M.**, Fitzpatrick, B. R., Lopez, R. A. & Shivkumar, A. *Attractor Reconstruction and Empirical Parameter Inference for Hydrogen-Oxygen Chemistry* Technical Report AD1098889 (Air Force Research Laboratory, Aug. 2019). https://apps.dtic.mil/sti/citations/AD1098889.
6. **Malakhov**, **M. M.** *Managing White-nose Syndrome in Bats: A Spatially Dynamic Modelling Approach* https://doi.org/10.32597/honors/216. Honors Thesis (Andrews University, Apr. 2019).

Honors and Awards

National

American Mathematical Society Travel Grant *2020*

Barry M. Goldwater Scholarship *2018*

University of Minnesota

SPH Current Student Scholarship *2022*

1st place, People's Choice Award at the SPH Research Day conference *2022*

2nd place, Best Poster Award at the SPH Research Day conference *2022*

3rd place in the Interdisciplinary Health Data Competition *2022*

Dean's PhD Scholars Award *2020*

Jean Roberts Biostatistics Fellowship *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) at AU

Harold T. Jones Scholarship for highest mathematical excellence *2018*

Louis Ulloth Scholarship for most significant leadership *2018*

Full tuition ACT/SAT Scholarship *2016*

Presentations

Conference talks

"Accounting for nonlinear effects of gene expression in transcriptome-wide association studies." Environmental Science Section; Andrews Research Conference (ARC); Andrews University; Berrien Springs, MI. (May 2022)

"Modeling the impact of bat dispersal on white-nose syndrome control strategies." Mathematics Section; Michigan Academy of Science, Arts, and Letters (MASAL); 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 (JMM); Baltimore, MD. Jointly with Ishan Phadke. (Jan. 2019)

"Cannibalism and synchrony in a periodic matrix seabird population model." Mathematics Section; Michigan Academy of Science, Arts, and Letters (MASAL); 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 (JMM); San Diego, CA. (Jan. 2018)

Symposia and other talks

"Identifying genes with tissue-specific patterns of genetic regulation." Genomic Data Science Mini-Symposium; Masonic Institute for the Developing Brain (MIDB); Minneapolis, MN. (Oct. 2022)

"Attractor Reconstruction and Empirical Parameter Inference for Hydrogen-Oxygen Chemistry." Projects Day; Institute for Pure and Applied Mathematics (IPAM); Los Angeles, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (Aug. 2019)

"Application of Convergent Cross Mapping to Chemical Reactions." Invited Lecture; Edwards Air Force Base; Boron, CA. Jointly with Brianna Fitzpatrick, Rebecca Lopez, and Abhishek Shivkumar. (Aug. 2019)

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

Poster presentations

"Governance structure affects transboundary disease management under alternative objectives." School of Public Health Research Day; University of Minnesota, Twin Cities; Minneapolis, MN. (April 2022)

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

"Managing White-nose Syndrome in Bats: A Spatially Dynamic Modeling Approach." 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. (Aug. 2018)

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

Service and Outreach

Saint Paul Public Schools
Statistical Consultant *2022 – present*
As a member of the Biostatistics Community Outreach and Engagement Committee, I mentor high school students in clinical trial design and data analysis. I also consult the school district on data science curriculum development.

Pi Mu Epsilon: The National Mathematics Honor Society
President, Michigan Gamma Chapter *2018 – 2020*
I organized π Day festivities, game nights, and our chapter's induction ceremonies. After one year as President I was reelected for a second term.

Engineers Without Borders USA
Vice President, Andrews University Chapter *2018 – 2019*
I coordinated outreach activities, assisted with engineering design, and planned travel itineraries for a solar energy project at 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 colloquia, vespers, and other events for the math/physics community. I also helped organize the first-ever Putnam Competition preparation course and team at AU.

Engineers Without Borders USA
Treasurer, Andrews University Chapter *2017 – 2018*
I oversaw chapter and project finances, wrote grant applications, and organized fundraising efforts. During my time as Treasurer we raised about $20,000.

Graduate Courses

Theory:
- Honors Real Analysis I & II
- Theory of Statistics I & II
- Biostatistics: Regression
- Advanced Regression and Design
- Linear Models
- Probability Models for Biostatistics
- Advanced Statistical Inference
- Bayesian Decision Theory and Data Analysis

Electives:
- Statistics for Human Genetics and Molecular Biology
- Advanced Statistical Genetics and Genomics
- GIS and Spatial Analysis for Public Health
- Seminar: Transethnic Association Studies
- Seminar: Imaging Genetics
- Seminar: Bioinformatics Methods

Other:
- Research Skills in Biostatistics
- Foundations of Public Health
- Biomedical Ethics