Mykhaylo M. Malakhov

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Education

University of Minnesota **Minneapolis, MN**
PhD in Biostatistics *2020–present*
○ 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

Industry

Denali Therapeutics **South San Francisco, CA**
Human Genetics Intern *Summer 2023*
Discovery Genomics Group
○ Leveraging public GWAS data to better understand the molecular mechanisms of genetic variants associated with neurodegenerative disease
○ Developing computational infrastructure to internalize, store, and readily access public GWAS data
○ Mentor: Shan Andrews

Institute for Pure and Applied Mathematics (IPAM) **Los Angeles, CA**
Researcher and Project Manager *Summer 2019*
Research in Industrial Projects for Students (RIPS) program
○ Proposed novel attractor reconstruction and model calibration methods
○ Inferred reaction rate coefficients for hydrogen-oxygen combustion from a time series of one observable
○ Mentors: Robert Martin and Daniel Eckhardt (Air Force Research Laboratory)

Academia

University of Minnesota **Minneapolis, MN**
Predoctoral Trainee *2020–present*
Division of Biostatistics
○ Funded by a T32 Training Grant from the National Institutes of Health (NIH)
○ Proposed and implemented DRAB (Differential Regulation Analysis by Bootstrapping), a statistical framework for identifying genes with context-specific patterns of local genetic regulation
○ Currently working on ensemble learning methods for more accurate transcriptome imputation
○ Currently working on boosting GWAS power by integrating proteomics data
○ Mentor: Wei Pan

Williams College **Williamstown, MA**
Student Researcher *Summer 2018*

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
- ○ Mentor: Julie C. Blackwood

Andrews University   **Berrien Springs, MI**
Undergraduate Research Fellow   *Summer 2017*
Seabird Ecology Research Group
- ○ 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
- ○ Mentor: Shandelle M. Henson

Awards and scholarships

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*

Publications

Peer-reviewed

1. **M. M. Malakhov**, B. Dai, X. T. Shen, W. Pan, A bootstrap model comparison test for identifying genes with context-specific patterns of genetic regulation. *bioRxiv*, (`https://doi.org/10.1101/2023.03.06.531446`) (Mar. 2023).

2. Z. Lin, H. Xue, **M. M. Malakhov**, K. A. Knutson, W. Pan, 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. J. C. Blackwood, **M. M. Malakhov**, J. Duan, J. J. Pellett, I. S. Phadke, S. Lenhart, C. Sims, K. Shea, 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. J. Duan, **M. M. Malakhov**, J. J. Pellett, I. S. Phadke, J. Barber, J. C. Blackwood, 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. **M. M. Malakhov**, B. R. Fitzpatrick, R. A. Lopez, A. Shivkumar, "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. **M. M. Malakhov**, Managing White-nose Syndrome in Bats: A Spatially Dynamic Modelling Approach, Honors Thesis, Andrews University, Apr. 2019, (`https://doi.org/10.32597/honors/216`).

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

"How to find differentially regulated genes." School of Public Health 3-Minute Thesis (3MT®) Competition; University of Minnesota; Minneapolis, MN. (April 2023)

"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)

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

Poster presentations

"Identifying genes with tissue-specific patterns of genetic regulation." School of Public Health Research Day; University of Minnesota; Minneapolis, MN. (April 2023)

"Governance structure affects transboundary disease management under alternative objectives." School of Public Health Research Day; University of Minnesota; 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

Ad-hoc reviewer:
○ Ecology and Evolution

Society affiliations:
○ Institute of Mathematical Statistics (IMS)
  - Student Member
  - Member of the IMS New Researchers Group
○ Pi Mu Epsilon (PME)

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
- Survival Analysis

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

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