

Ryleigh Moore

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RESEARCH INTERESTS

Applied mathematics, numerical analysis, stochastic differential equations, algorithm development, mathematical modeling, probability theory

EDUCATION

Ph.D. Mathematics, University of Utah 2017 — Expected May 2022

- Numerical methods for high dimensional stochastic differential equations — Advisor: Dr. Akil Narayan
- Medical applications of mathematics in blood transfusion safety and cross quality control rules — Dr. Robert Schmidt
- Theory and numerical simulation of the evolution of Arctic melt pond geometry — Dr. Kenneth Golden

M.S. Mathematics, University of Utah 2017 — 2021

B.S. Applied Mathematics, B.S. Mathematics, Boise State University 2014 — 2017

- Summa Cum Laude
- Minor: Computer Science

Valedictorian, Rocky Mountain High School 2010 — 2014

RESEARCH EXPERIENCE

Ph.D. Research: Numerical Methods for Stochastic Differential Equations Nov 2018 — Present

Dr. Akil Narayan, Department of Mathematics, Scientific Computing and Imaging Institute, University of Utah

- Developed Numerical algorithms for solving high dimensional stochastic differential equations (SDEs)
- The SDE is discretized in time and viewed as a Markov chain. Quadrature is used at each time step to solve the associated Chapman-Kolmogorov equation which updates the probability density of the SDE's solution.

Ph.D. Research: Medical Applications of Mathematics Apr 2020 — Present

Dr. Robert Schmidt, Department of Pathology, University of Utah

- Developed a mathematical model to minimize the risk of blood platelet contamination during blood transfusion
- The costs and benefits of cross-level quality control rules
- An improved method to estimate the risk associated with a quality control policy using Markov processes

Ph.D. Research: Modeling Arctic Melt Pond Evolution Sep 2017 — Present

Dr. Kenneth Golden, Department of Mathematics, University of Utah

- Theory and numerical simulation of the evolution of Arctic melt pond geometry
- Mentored undergraduate and high school students in melt pond research

NSF Mathematical Sciences Graduate Internship (MSGI) Summer 2020

Marissa Torres, US Army Corps of Engineers Cold Regions Research and Engineering Lab (CRREL) — Remote due to COVID-19

- Characterization of seasonal variability in the ocean tide for storm surge modeling using time series and harmonic analysis

MOSAic Arctic Expedition Participant Sep 2019 — Oct 2019

Association of Polar Early Career Scientists MOSAic School

- Led a team to deploy 3 seasonal ice mass balance buoys in the Central Arctic
- Worked with leading polar scientists from around the world on *Research Vessel Akademik Fedorov*
- Selected as part the MOSAic School which accepted 20 students from around the world

Industrial Math/Stat Modeling Workshop for Graduate Students Participant July 2019

SAMSI and US Army Corps of Engineers, North Carolina State University

- Worked on a team to study ocean wave breaker types using coastal imagery analysis and machine learning

Undergraduate Thesis Research with Dr. Jens Harlander Jan 2017 — June 2017

Department of Mathematics, Boise State University

- Quadratic forms and when they are solvable

Research with Dr. Kris Campbell

May 2015 — Oct 2015

Department of Electrical and Computer Engineering, Boise State University

- Reconfigurable electronics and electronic memory technology
- Programmed a semiconductor device parameter analyzer

Research with Dr. Henry Charlier

Summer 2013

Department of Biochemistry, Boise State University

- Study of Carbonyl Reductase (CR) for the use of cancer treatment

TEACHING EXPERIENCE**Graduate Student Instructor**

Aug 2017 — Present

Department of Mathematics, University of Utah

- MATH 1090 Business Algebra instructor — Fall 2021, Fall 2020, Fall 2018, Spring 2018
- MATH 2210 Calculus 3 teaching assistant — Fall 2019
- MATH 1080 Pre-calculus instructor — Summer 2019
- MATH 1060 Trigonometry instructor — Spring 2019
- MATH 2250 ODEs for Engineers lab instructor — Fall 2017

I have had the opportunity to teach in person, synchronously online, and asynchronously online.

ACCESS Program Instructor

Summer 2018, 2019

Department of Mathematics, University of Utah

- Worked on a team to plan, write course materials for, and teach mathematics for a week during a summer-long ACCESS program for first generation college women interested in STEM

OTHER SELECTED WORK EXPERIENCE**Math Learning Center Front Desk**

Sep 2016 — May 2017

Department of Mathematics, Boise State University

- Worked at the front desk and helped students that had questions about the Math Learning Center classes
- Managed the test scheduling, proctored exams, and kept documentation sorted

Workers' Compensation Analyst Intern

Summer 2016

Underwriting Services of America, LLC

- Assisted in creating the processes and procedures used in the writing of workers' compensation insurance across the United States

Jr. Software Engineer

Sep 2013 — May 2015

Zenware Software

- Wrote, tested, and worked to improve technician scheduling software
- Implemented a website examination platform for the International Detailing Association

SERVICE & MEMBERSHIPS

- Ambassador for the MOSAiC Arctic expedition
- ACCESS math week instructor at the University of Utah
- Association for Women in Mathematics member (AWM)
 - Co-founded and co-ran a graduate to undergraduate mentoring network
 - Treasurer
- Society for Industrial and Applied Mathematics (SIAM) Member
- Emergency Safety Floor Captain for University of Utah Math Department
- National Honor Society at Rocky Mountain High School
 - President

Summer 2018, 2019

2018 — 2020

2018 — 2019

2013 — 2014

TECHNICAL SKILLS & CERTIFICATIONS

Advanced in: Python, LaTeX, MATLAB, Git
Experience using: R, Java, JavaScript, MySQL, C++, HTML

- Microsoft Office Certified — Access, Excel, Word, PowerPoint
- SCUBA Certified Diver

PUBLICATIONS & TECHNICAL PAPERS

1. Moore, R. A., Jones, J. B., Gollero, D., Strong, C. & Golden, K. M. Saddle Points of the Sea Ice Surface and the Fractal Geometry of Arctic Melt Ponds (2021, Submitted).
2. Moore, R. A. & Narayan, A. Adaptive Density Tracking by Quadrature for Stochastic Differential Equations. arXiv: 2105.08148 [math.NA] (2021, Submitted).
3. Moore, R. A., Schmidt, R. L. & Metcalf, R. A. In reply: Window periods for secondary bacterial culture of platelets according to FDA guidance. *Transfusion* **61**, 1343–1344. <https://doi.org/10.1111%2Ftrf.16311> (Apr. 2021).
4. Moore, R. A., Schmidt, R. L. & Metcalf, R. A. The impact of the sample time of secondary bacterial culture on the risk of exposure to contaminated platelet components: A mathematical analysis. *Transfusion* **61**, 873–882. <https://doi.org/10.1111%2Ftrf.16258> (Jan. 2021).
5. Schmidt, R. L., Moore, R. A. & Pearson, L. N. The costs and benefits of cross-level quality control rules. *Clinica Chimica Acta* **510**, 697–702. <https://doi.org/10.1016%2Fj.cca.2020.09.006> (Nov. 2020).
6. Moore, R. A. & Torres, M. Characterization of Seasonal Variability in Tides. *NSF MSGI Technical Report*. <https://www.math.utah.edu/~rmoore/NSFMSGIReport.pdf> (2020).
7. Moore, R., Tsamados, M., Vasilevich, I., Schneider, T., Craw, L., Raphael, I. & Perovich, D. Setting up the MOSAiC Distributed Network in October 2019 with Research Vessel AKADEMIK FEDOROV: Seasonal ice mass balance (SIMB3) buoys. *Reports on polar and marine research: The Expedition AF122/1*. <http://www.math.utah.edu/~rmoore/MOSAICCruiseReport.pdf> (2020).
8. Arce-Garro, J., Cho, T., Lee, H. R. L., Moore, R., Sayre, R. R., Xuan, Y. & Zhou, Z. Coastal Imagery Analysis and Breaking Wave Type Estimation with Machine Learning. *Twenty-fifth Mathematical and Statistical Modeling Workshop for Graduate Students*. <https://projects.ncsu.edu/crsc//reports/ftp/pdf/crsc-tr20-01.pdf> (2019).

CONFERENCES ATTENDED

- ICERM Computational Statistics and Data-Driven Models April 2020
– Presented a poster on density tracking by quadrature for high dimensional stochastic differential equations
- ICERM Algorithms for Dimension and Complexity Reduction March 2020
- APECS MOSAiC School Oct 2019
- Industrial Math/Stat Modeling Workshop for Graduate Students – North Carolina State University July 2019
- The Second SIAM Wasatch Student Chapters Conference - Utah State University April 2019
- Seminar on Stochastic Processes - University of Utah March 2019

CONFERENCE PROCEEDINGS

- Perovich, D., Raphael, I., Moore, R., and Clemens-Sewall, D.: Autonomous observations of sea ice mass balance during MOSAiC, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-5748, <https://doi.org/10.5194/egusphere-egu21-5748>, 2021.
- Golden, K., Bowen, B., Ma, Y., Moore, R., Strong, C., and Sudakov, I.: Modeling the geometry of melt ponds on Arctic sea ice, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-5812, <https://doi.org/10.5194/egusphere-egu2020-5812>, 2020

SELECTED TALKS AND PRESENTATIONS

- Reach the World – Getting To, From, and Around the Central Arctic Talk to Students Feb 2020
- Adventures in the Arctic MOSAiC Presentation – Given 6 times to various audiences Nov – Dec 2019
- Seasonal Ice Mass Balance Buoy Deployment Presentation – Research Vessel *Akademik Fedorov* Nov 2019
- Beginning Python Introduction – Research Vessel *Akademik Fedorov* Nov 2019
- ACCESS Math Week: Evolution of Arctic Melt Pond Geometry and the Role of Saddle Points – University of Utah July 2019
- The Second SIAM Wasatch Student Chapters Conference April 2019
Arctic Melt Pond Geometry and Numerical Solvers for Stochastic Differential Equations
- Applied Math Colloquium – University of Utah March 2019
An Introduction to Numerical Simulation of Stochastic Differential Equations
- Applied Math Colloquium – University of Utah Nov 2018
Percolation Theory, Fractal Dimension, and Applications to Melt Pond Geometry
- ACCESS Math Week – University of Utah July 2018
Percolation Introduction and Calculating the Fractal Dimension

SELECTED MEDIA COVERAGE

Interviews

- NSF MSGI Success Story & Podcast: Applied mathematician analyzes storm surge data during summer internship April 2021
- University of Utah Magazine article: They Pay Me to Do This, Campus jobs aren't what they used to be Spring 2020
- Exploring by the Seat of your Pants: MOSAiC Expedition talk Feb 2020
- E&E News article: Eyes overboard to gauge crunching ice for data set Oct 2019
- *Science* Magazine article: Arctic researchers will lock this ship in ice for a year to study the changing polar region Aug 2019
- University of Utah Aftermath article: Adventures in the Arctic Fall 2019

Invited Writings

- Reach the World: MOSAiC Expedition to the Arctic Ocean, Field Note - Getting To, From and Around the Central Arctic Jan 2020
- University of Colorado Boulder: A Year in the Ice, Remote Sensing and Buoy Simulations: Important Tools for MOSAiC Oct 2019

HONORS & AWARDS

- Selected for a National Science Foundation Mathematical Sciences Graduate Internship (NSF MSGI)
- Association of Polar Early Career Scientists MOSAiC School Arctic Expedition Participant
 - Selected as 1 of only 20 students from around the world and 1 of only 3 students from the United States
- Accepted to the 2019 Industrial Math/Stat Modeling Workshop for Graduate Students – North Carolina State University
- University of Utah Graduate Travel Funding Award Recipient
- Boise State University Presidential Scholarship Recipient
- Society of Women in Engineering (SWE) Scholarship Recipient
- Idaho Governor's Cup Scholarship Recipient
- United States Army Reserve National Scholar/Athlete Award
- Interscholastic Star Scholarship Finalist
- 8 High School Varsity Letters: 4 Golf, 3 Band, 1 National Honor Society
- Led Rocky Mountain Girls' Varsity Golf team to 2 State Championship titles
- 2-Time Idaho Junior Golf Association State Individual Champion
- National U.S. Jr. PGA Championship competitor
- European Jr. PGA Championship competitor