

Matt Reichenbach

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<https://mpreichenbach.github.io>

Research Interests

- **General:** Combining mathematical and computational tools to solve challenging, real-world problems.
- **Scientific:** Data science, environmental science, ecological modeling, and remote sensing.
- **Mathematical:** Machine learning, statistical analysis, mathematical modeling, numerical analysis, and optimization.

Education

- **University of Nebraska-Lincoln** Lincoln, NE
Ph.D. in Mathematics (GPA: 3.8) Dec. 2020
 - Dissertation: *Spectral Properties of a Non-compact Operator in Ecology*
 - Advised by Dr. Richard Rebarber and Dr. Brigitte Tenhumberg
- **University of Nebraska-Lincoln** Lincoln, NE
M.S. in Mathematics May 2017
- **University of Colorado Boulder** Boulder, CO
Post-Baccalaureate Teacher Licensure in Secondary Mathematics Dec. 2013
- **University of Colorado Boulder** Boulder, CO
B.A. in Mathematics (GPA: 3.86) May 2012

Skills

Python: Proficient with **Keras**, **Tensorflow**, **scikit-learn**, **pandas**, **OpenCV**, **rasterio**, **matplotlib**, and **Numpy** packages, among others. Primarily familiar with the **Anaconda** distribution.

R: Proficient with the **tidyverse**, **ggplot2**, **parallel**, **raster** libraries, and the **momentuHMM** library for fitting Hidden Markov Models.

Additional Languages: \LaTeX for document preparation.

Applications: QGIS, ArcGIS Pro, Microsoft Office, Google Docs.

Operating Systems: Linux, Windows, MAC OS.

Soft Skills: Motivated self-starter, effective communicator, productive independently and on a team.

Selected Employment

- **US Army Corps of Engineers - Geospatial Research Laboratory** Alexandria, VA
Research Mathematician Feb. 2021 to Current
 - **Enhanced Terrain Processing:** Lead developer of deep-learning models to perform land-cover classification of high-resolution imagery; trained models on a multiple-GPU NVIDIA DGX machine; created datasets from satellite and drone imagery with labels from OpenStreetMaps.
 - **Acoustic Deterrence of Invasive Carp:** Lead developer of movement models to determine the effects of acoustic deterrents on carp behavior; incorporated sound intensity values in a pond experiment as a novel covariate in Hidden Markov Models; helped generate a suite of data-processing tools for fish telemetry.

- **US Army Corps of Engineers - Geospatial Research Laboratory** Alexandria, VA
NSF Mathematical Sciences Graduate Intern Jun. 2020 – Aug. 2020
 - **Enhanced Terrain Processing:** Developed deep-learning models to remove noise from synthetic-aperture radar (SAR) imagery; created synthetic datasets from publicly available imagery; acted as technical lead with minimal oversight from mentors.
- **University of Nebraska-Lincoln** Lincoln, NE
Graduate Teaching Assistant Aug. 2015 – Dec. 2020
 - Taught courses as the instructor-of-record, directed recitation sessions, and tutored in the Mathematics Resource Center
- **Center for Science, Mathematics & Computer Education** Lincoln, NE
Instructor for MATH 806T: Number Theory and Cryptography Jul. 2019
 - Co-taught this Master’s-level course for in-service secondary teachers
- **Daewoo Elementary School** Geoje-si, Republic of Korea
Head Elementary English Teacher Feb. 2014 – Feb. 2015
 - Taught four English lessons daily to 1st through 6th-grade students
 - Organized English-language initiatives and acted as the liaison between English teachers and school administrators
- **Laboratory for Atmospheric and Space Physics** Boulder, CO
Student Procurement Assistant VI Mar. 2010 – May 2013
 - Maintained parts lists for NASA-funded projects, including instruments on the GOES-R, MAVEN, and TSIS satellites

Publications

- [2] M. Reichenbach, R. Rebarber, and B. Tenhumberg, “Spectral properties of a non-compact operator in ecology,” *Journal of Mathematical Biology*, no. 50, 82 2021.
- [1] M. Reichenbach, K. Lasko, and E. Sava, “Denoising SAR using synthetic data and deep learning,” *GRL White Paper*, 2020, prepared.

Awards

- **ERDC Award for Outstanding Team Effort** Engineer Research Development Center
Awarded to the Enhanced Terrain Processing team April, 2022
- **Linda Bors Fellowship** UNL Math Dept.
Awarded to three graduate students annually for excellence in research Fall 2018
- **Steven Hataaja Award** UNL Math Dept.
Awarded for excellent exposition by a graduate student Spring 2018
- **Robert Noyce Teacher Scholarship** CU Boulder Dept. of Education
NSF-funded merit scholarship Spring 2013 & Fall 2013
- **Dean’s List** CU Boulder
Awarded to students with semester GPA greater than 3.75 Spring 2010, Sp. 2013, & Fall 2013

Conference Presentations

- 3. **American Fisheries Society Annual Meeting (abstract accepted)** Spokane, WA
“Modeling the Effects of Acoustic Deterrents on Invasive Carp Behavior” Aug. 2022
- 2. **ERDC Research and Development Symposium (RD22)** Virtual
“Modeling the Effects of Acoustic Deterrents on Invasive Carp Behavior” (15 mins) Apr. 2022
- 1. **Colorado Council of Teachers of Mathematics Annual Conference** Denver, CO
“The Impact of Inquiry-Based Teaching in Two High School Math Classrooms” Oct. 2013

Invited Seminar Presentations

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| 7. | MathBio Seminar (remote), University of Nebraska-Lincoln
“Modeling Behavioral Changes in Invasive Carp” (50 mins) | Lincoln, NE
Mar. 2022 |
| 6. | STAMP Meeting (remote), Geospatial Research Laboratory
“Modeling Behavior Changes in Invasive Carp” (50 mins) | Alexandria, VA
Mar. 2022 |
| 5. | Math Club (remote), University of Nebraska-Kearney
“Modeling Ecological Populations” (50 mins) | Kearney, NE
Oct. 2020 |
| 4. | Final Presentation (remote), Geospatial Research Laboratory
“Denoising Synthetic Aperture Radar Using Convolutional Neural Networks” | Alexandria, VA
Aug. 2020 |
| 3. | STAMP Meeting (remote), Geospatial Research Laboratory
“Integral Projection Models in Mathematical Biology” (50 min.) | Alexandria, VA
Jun. 2020 |
| 2. | Math Department Colloquium, Creighton University
“Integral Projection Models in Mathematical Biology” (50 min.) | Omaha, NE
Dec. 2019 |
| 1. | Augustana University Math Club
“Population Models in Mathematical Biology” (50 min.) | Sioux Falls, SD
Nov. 2018 |

Graduate School Seminar Presentations (all Lincoln, NE)

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| 9. | Graduate Student Seminar (remote)
“What Can Math Say About Conspiracy Theories?” (50 min.) | Oct. 2020 |
| 8. | Math Bio Seminar
“Asymptotic Convergence to a Stable Stage Distribution” (50 min.) | Feb. 2020 |
| 7. | Graduate Student Seminar
“Conway & Kochen’s Free Will Theorem” (50 min.) | Oct. 2019 |
| 6. | Math Bio Seminar
“A Positive Eigenvalue for a New Integral Projection Model” (50 min.) | Oct. 2019 |
| 5. | SPiDERS Graduate Seminar
“Compactness Criteria in Infinite-Dimensional Spaces I, II, & III” (50 min.) | Feb. 2019 |
| 4. | Graduate Student Seminar
“Learnability Can be Undecidable” (50 min.) | Jan. 2019 |
| 3. | MathBio Seminar
“Cannibalism & Stunting in an IPM for Fish” (50 min.) | Sep. 2018 |
| 2. | Graduate Student Seminar
“Continuous-Time Population Models” (50 min.) | Sep. 2017 |
| 1. | Graduate Student Seminar
“An Exploration of the Calculus of Variations” (50 min.) | Nov. 2016 |

Service and Involvement

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| • High school tutor
Northstar Tutors | Apr. 2022 to current
Washington, DC |
| • Chapter President
UNL Graduate Chapter of the American Mathematical Society | Sep. 2019 to Sep. 2020
Lincoln, NE |
| • Tutor for Native American high-school students
Lincoln Public Schools | Aug. 2019 to Mar. 2020
Lincoln, NE |
| • Project mentor
UNL Math Dep. Directed Reading Program | Aug. 2019 to May 2020
Lincoln, NE |

- **STAAR Seminar Co-organizer**
University of Nebraska-Lincoln Math Dept. Aug. 2019 to Aug. 2020
Lincoln, NE
- **Volunteer**
National Conference for Undergraduate Women in Mathematics Jan. 2017 to Jan. 2020
Lincoln, NE
- **Mentor to First-Year Graduate Students**
University of Nebraska-Lincoln Math Dept. Aug. 2018 to May 2020
Lincoln, NE
- **Representative to Graduate Student Advisory Board**
University of Nebraska-Lincoln Math Dept. May 2016 to May 2018
Lincoln, NE
- **UNL Math Day Volunteer**
University of Nebraska-Lincoln Math Dept. Nov. 2015 to Dec. 2020
Lincoln, NE