

Matt Reichenbach

<https://mpreichenbach.github.io>

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Research Interests

- **General:** Combining mathematical and computational tools to solve challenging, real-world problems.
- **Scientific:** Machine learning, remote sensing, ecological modeling, and data science.
- **Mathematical:** Applied functional analysis, mathematical modeling, numerical analysis, optimization, and dynamical systems.

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: Implemented convolutional neural networks using **Keras** and the **Tensorflow** backend; generated training datasets with the **GDAL**, **NumPy**, and **OpenCV**, libraries; trained various classifiers using **scikit-learn**, and processed tabular data with **pandas**. Proficient user of the **Anaconda** and **Miniconda** distributions.

R: Processed fish telemetry data using the **tidyverse** libraries; fit hidden Markov models for fish behavior using **momentuHMM**, **moveHMM**, and **crawl**; interpolated spatial data using **automap**.

Additional Languages: MATLAB, L^AT_EX.

Applications: QGIS, ArcGIS, the Microsoft Office suite, Google Docs.

Operating Systems: Windows, Linux.

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 which perform land-cover classification of high-resolution imagery; combined satellite and UAV imagery with publicly available land-cover data to create new datasets; trained models on a multi-GPU NVIDIA DGX machine; developed a Python library to simplify dataset-creation; incorporated the trained models into user-friendly ArcGIS toolbox.
 - **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 as a novel covariate in hidden Markov models; generated a suite of data-processing tools for fish telemetry. This project is a collaboration with with scientists at USGS and USACE's Environmental Laboratory.

- **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

Presentations

- 6. **American Fisheries Society Annual Meeting** Spokane, WA
Modeling the Effects of Acoustic Signals on Invasive Carp Behavior (20 min.) Aug. 2022
- 5. **ERDC RD22 Conference** Remote
Modeling the Effects of Deterrents on Carp Behavior (20 min.) Apr. 2022
- 4. **Math Club, University of Nebraska-Kearney** Remote
“Modeling Ecological Populations” (50 min.) Oct. 2020

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| 3. | Math Department Colloquium, Creighton University
<i>“Integral Projection Models in Mathematical Biology” (50 min.)</i> | Omaha, NE
Dec. 2019 |
| 2. | Augustana University Math Club
<i>“Population Models in Mathematical Biology” (50 min.)</i> | Sioux Falls, SD
Nov. 2018 |
| 1. | Colorado Council of Teachers of Mathematics Annual Conference
<i>“The Impact of Inquiry-Based Teaching in Two High School Math Classrooms”</i> | Denver, CO
Oct. 2013 |

Service and Involvement

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| • | High school tutor
<i>Northstar Tutors</i> | Apr. 2022 to Aug. 2022
Washington, DC |
| • | Chapter President
<i>UNL Graduate Chapter of the American Mathematical Society</i> | Sep. 2019 to Sep. 2020
Lincoln, NE |
| • | Tutor for Native American high-school students
<i>Lincoln Public Schools</i> | Aug. 2019 to Mar. 2020
Lincoln, NE |
| • | Project mentor
<i>UNL Math Dep. Directed Reading Program</i> | Aug. 2019 to May 2020
Lincoln, NE |
| • | STAAR Seminar Co-organizer
<i>University of Nebraska-Lincoln Math Dept.</i> | Aug. 2019 to Aug. 2020
Lincoln, NE |
| • | Volunteer
<i>National Conference for Undergraduate Women in Mathematics</i> | Jan. 2017 to Jan. 2020
Lincoln, NE |
| • | Mentor to First-Year Graduate Students
<i>University of Nebraska-Lincoln Math Dept.</i> | Aug. 2018 to May 2020
Lincoln, NE |
| • | Representative to Graduate Student Advisory Board
<i>University of Nebraska-Lincoln Math Dept.</i> | May 2016 to May 2018
Lincoln, NE |
| • | UNL Math Day Volunteer
<i>University of Nebraska-Lincoln Math Dept.</i> | Nov. 2015 to Dec. 2020
Lincoln, NE |