Matt Reichenbach

https://mpreichenbach.github.io

(303) 502-6191

matthew.[lastname](at)gmail_dot_com

Research Interests

- **General:** Combining mathematical and computational tools to solve challenging, real-world problems.
- **Scientific:** Machine learning, remote sensing, atmospheric science, ecological modeling.
- **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: Developed convolutional neural networks using **Keras** and the **Tensorflow** backend to perform land-cover classification of high-resolution imagery; trained models using **multiple GPUs** on an NVIDIA DGX machine; processed satellite and drone imagery using the **NumPy**, **SciPy**, **OpenCV**, and **Rasterio** packages to create training datasets; primarily use the **Anaconda** distribution for current work.

R: Analyzed time-series data of invasive carp movements using the **tidyverse** and **ggplot2** libraries; fit Hidden Markov Models with the **momentuHMM** and **parallel** libraries; performed spatial interpolation of sound intensity data with the **raster** and **automap** libraries, among others.

Additional Languages: LaTeX.

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

Operating Systems: Windows, Linux, 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*
- **US Army Corps of Engineers - Geospatial Research Laboratory** — Alexandria, VA
  NSF Mathematical Sciences Graduate Intern — *Jun. 2020 – Aug. 2020*
  - Developed denoising tools for the Enhanced Terrain Processing project
  - Trained convolutional neural networks on synthetic data using Keras and Tensorflow, and applied them to SAR imagery
  - Acted as the technical lead, and worked with minimal oversight from mentors
  - Presented results at seminars to technical and non-technical audiences

- **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

- **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

2. **American Fisheries Society Annual Meeting (abstract accepted)** — Spokane, WA
   "Modeling the Effects of Acoustic Deterrents on Invasive Carp Behavior" — *Aug. 2022*
1. **ERDC Research and Development Symposium (RD22)** — Virtual
   "Modeling the Effects of Acoustic Deterrents on Invasive Carp Behavior" (15 mins) — *Mar. 2022*

Seminar Presentations

7. **MathBio Seminar (remote), University of Nebraska-Lincoln** — Lincoln, NE
   "Modeling the Effects of Acoustic Deterrents on Invasive Carp Behavior" (50 mins) — *Mar. 2022*
6. **Math Club (remote), University of Nebraska-Kearney** — Kearney, NE
   "Modeling Ecological Populations" (50 mins) — *Oct. 2020*
5. **Final Presentation (remote), Geospatial Research Laboratory** — Alexandria, VA
   "Denoising Synthetic Aperture Radar Using Convolutional Neural Networks" — *Aug. 2020*

4. **STAMP Meeting (remote), Geospatial Research Laboratory** — Alexandria, VA
"Integral Projection Models in Mathematical Biology" (50 min.) — *Jun. 2020*

3. **Math Department Colloquium, Creighton University** — Omaha, NE
"Integral Projection Models in Mathematical Biology" (50 min.) — *Dec. 2019*

2. **Augustana University Math Club** — Sioux Falls, SD
"Population Models in Mathematical Biology" (50 min.) — *Nov. 2018*

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*

UNL Math Department Seminar Presentations

9. **Graduate Student Seminar (remote)** — Lincoln, NE
"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

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