

Matt Reichenbach

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<https://mpreichenbach.github.io>

Research Interests

- **General:** Combining mathematical and computational tools to solve challenging, real-world problems.
- **Earth Sciences:** Machine learning applied to remote sensing data (for example, to perform land-cover classification or to remove speckle from synthetic aperture radar)
- **Mathematics:** 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 (expected)
 - 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, and processed satellite imagery using the **NumPy**, **SciPy**, **OpenCV**, **GDAL**, and **Rasterio** libraries as an NSF Intern at the Geospatial Research Laboratory.

R: Analyzed publicly available data for a fish (*esox lucius*) population for my Ph.D. dissertation. Implemented a nonlinear model incorporating density-dependent somatic growth, and plotted results using the **ggplot2** package.

Additional Languages: MATLAB, \LaTeX .

Applications: QGIS, Anaconda, Microsoft Office, Google Docs.

Operating Systems: Windows, Linux (Ubuntu), MAC OS.

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

Selected Employment

- **USACE - 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 – Present
 - 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 1th 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, K. Lasko, and E. Sava, “Denoising SAR using synthetic data and deep learning,” *GRL White Paper*, 2020, prepared.
- [1] M. Reichenbach, R. Rebarber, and B. Tenhumberg, “Spectral properties of a non-compact operator in ecology,” *Journal of Mathematical Biology*, 2020, submitted.

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

Invited Presentations

- 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

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| 9. | Graduate Student Seminar (remote)
“What Can Math Say About Conspiracy Theories?” (50 min.) | Lincoln, NE
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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| • Chapter President
UNL Graduate Chapter of the American Mathematical Society | Sep. 2019 to Sep. 2020 |
| • Tutor for Native American high-school students
Lincoln Public Schools | Aug. 2019 to Mar. 2020 |
| • Project mentor
UNL Math Dep. Directed Reading Program | Aug. 2019 to May 2020 |
| • STAAR Seminar Co-organizer
University of Nebraska-Lincoln Math Dept. | Aug. 2019 to Aug. 2020 |
| • Volunteer
National Conference for Undergraduate Women in Mathematics | Jan. 2017 to Jan. 2020 |
| • Mentor to First-Year Graduate Students
University of Nebraska-Lincoln Math Dept. | Aug. 2018 to May 2020 |
| • Representative to Graduate Student Advisory Board
University of Nebraska-Lincoln Math Dept. | May 2016 to May 2018 |
| • UNL Math Day Volunteer
University of Nebraska-Lincoln Math Dept. | Nov. 2015 to Dec. 2020 |