EMILY BOLGER

Ph.D. Candidate in Computational Mathematics, Science, and Engineering

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EDUCATION

Ph.D. Candidate in Computational Mathematics, Science, and Engineering

Michigan State University

August 2020 – Present

Advisor: Dr. Marcos (Danny) Caballero

B.S. in Mathematics

Moravian College

August 2016 – May 2020

Minors in Economics, Informatics, and Dance (self-designed)
Summa Cum Laude with Honors in Statistics
GPA: 3.90

AWARDS AND AFFLIATIONS

- The College of Engineering Graduate Travel Fellowship MSU (March 2023)
- The Raymond P. and Marie M. Ginther Graduate Fellowship MSU (April 2020)
- The Schattschneider Mathematics and Computer Science Prize Moravian College (April 2020)
- $O\Delta K$ Unsung Hero Award Moravian College (April 2020)
- PME National Mathematical Honors Society
- $O\Delta E$ National Economics Honors Society
- $\Phi H\Sigma$ National Honors Society
- Graduate Women in Science Mid-Michigan Chapter

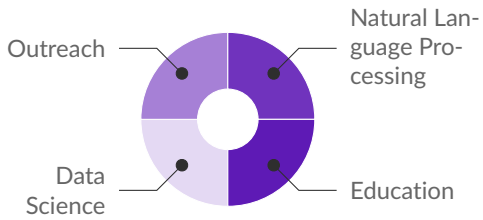
WHO AM I?

An interdisciplinary scientist using computing tools to explore questions about data science and computing education across the entire field.
An educator interested in studying how student perspectives and values can inform curriculum development.

SKILLS

Python | R | LaTeX | JavaScript | HTML | Microsoft Office | Google Applications | Leadership | Critical Thinking | Problem Solving | Written and Verbal Communication

CURRENT RESEARCH INTERESTS



RESEARCH EXPERIENCE

Graduate Research Assistant

Michigan State University

May 2021 – Present East Lansing, MI

Using Natural Language Processing in Python to analyze literature published in the past three decades on change strategies for improving undergraduate STEM instruction. Project is multi-method synthesis in collaboration with four other research institutions.

- The work is funded by the National Science Foundation Award Number 2201795.
- Project is under the instruction of Dr. Marcos (Danny) Caballero.

Using Social Network Analysis techniques to analyze and model data in R from a messaging platform consisting of interactions between instructors at various institutions, who are seeking to better incorporate computation into their traditional STEM courses.

- The work is funded through the Michigan State University Graduate Office Fellowship.
- Project is under the instruction of Dr. Marcos (Danny) Caballero and Dr. Daryl McPadden.

Statistics Honors Student

Moravian College

May 2019 - May 2020 | Bethelehem, PA

Built a linear Measurement Error Model in R and successfully defended an honors thesis to understand the relationship between dietary intake, body composition, and energy expenditure in pre-professional, contemporary dancers.

- Project was completed under the instruction of Dr. Brenna Curley.

Undergraduate Research Assistant

Michigan State University

May 2019-July 2019 | East Lansing, MI

Participated in the Institute for Cyber-Enabled Research Advanced Computational Research Experience for Students, a National Science Foundation Funded Research Experience for Undergraduates (iCER ACRES NSF REU). Built a deep learning TensorFlow Python framework to model the prediction of optimal plant traits from a genetics database. Model was a part of a larger project comparing the effectiveness of various models in predicting plant traits.

- Project was published as part of a paper listed in the Publications section.
- Project was completed under the instruction of Dr. Shin-Han Shiu and Dr. Christina Azodi.

TEACHING AND MENTORING EXPERIENCE

Graduate Teaching Assistant - CMSE Department

Michigan State University

Aug 2020 - Dec 2022 | East Lansing, MI

Assist faculty with classroom instruction. Guide and mentor small groups of students through in class assignments. Hold twice weekly office hours to assist students in classwork. Provide students with constructive, graded feedback on their assignments.

- CMSE 201: Introduction to Computational Modeling and Data Analytics with Dr. Thomas Finzell
  - Fall 2020 (remote), Spring 2021 (remote), Fall 2021 (in-person)
- CMSE 381: Fundamentals of Data Science Methods with Dr. Elizabeth Munch
  - Spring 2022 (hybrid), Fall 2022 (in-person)

Certificate in College Teaching (CCT) - The Graduate School

Michigan State University

June 2021 - June 2023 | East Lansing, MI

Demonstrate proficiency in five competencies: Developing Discipline-Related Teaching Strategies, Creating Effective Learning Environments, Incorporating Technology in Your Teaching, Understanding the University Context, Assessing Student Learning. Attend workshops focused on the competencies. Took a course on Teaching College Science focused on science education theories. Complete a Mentored Teaching Project that seeks to understand how students describe code to peers and instructors using visual tools.

- Mentored Teaching Project completed under the instruction of Dr. Devin Silvia.
- Link to submitted Portfolio.

Research Mentor to Undergraduate Student

Michigan State University

May 2022 - Present | East Lansing, MI

Mentor to undergraduate participant in ACRES REU. Met with student twice weekly and conversed with student daily. Guided student through research process and answered project questions.

- Project supervised by Dr. Marcos (Danny) Caballero.

ACRES REU Mentor

Michigan State University

May 2022 - July 2022 | East Lansing, MI

Graduate Student Mentor for all participants in the ACRES REU. Led weekly professional development workshops covering topics such as conducting literative reviews, applying to PhD programs, and developing a research poster. Held social events for students in the REU. Collaborated with other REUs to host larger social events. Interacted with students closely at multiple luncheons throughout the REU to gather information about their experience.

Curriculum Development

Michigan State University

June 2021 - December 2021 | East Lansing, MI

Consulted with teaching staff of CMSE 201 to improve course. Topics included material scope and presentation as well as course structure. Integrated modifications into the Jupyter Notebook class assignments, which are managed through a GitHub Repository.

- This work is a part of the Mentored Teaching Project above.

Academic Tutor

Moravian College

Sept 2015-Aug 2020 | Bethlehem, PA

Tutored peer students in collegiate level Mathematics and Economics courses. Tutored local students in high school and middle school mathematics courses. Provided skills assistance related to problem solving and exam preparation.

Mentor for Undergraduate Research Course

Moravian College

Jan 2019-May 2020 | Bethlehem, PA

Provided guidance to small groups of first- and second-year undergraduate students in a semester-long course focused on introducing the Mathematics research process. Developed a research question for students to explore during the semester. Assisted students with writing a formal research paper, designing a poster presentation, and creating a formal presentation on their exploration.

- Course was taught by Dr. Nathan Shank.

WORK EXPERIENCE

Summer Intern

Los Alamos National Laboratory (LANL)

June 2023-Aug 2023 | Los Alamos, NM

Developed a machine learning GUI framework using Python, JavaScript, HTML, and Py-Script. Tool will be used by scientists at LANL to perform machine learning tasks on data they chose.

- Worked in the Information Science & Technology Institute under Director Dr. Jim Ahrens.

Summer Intern

Willis Towers Watson

June 2018-Aug 2018 | New York City, NY

Created risk management analysis models for insurance brokers to use with their clients. Compiled and organized model usage data for frequency analysis. Created and edited marketing storyboards to explain the analytical tools purpose and benefits.

Summer Extern

AT&T Summer Externship

July 2020 | Online

Improved professional and personal skills through completing 80+ hours of the 2020 AT&T Summer Learning Academy self-paced online courses and live-event speaker workshops.

LEADERSHIP AND SERVICE

Graduate Women in Science Mid-Michigan Chapter

President
National Member

Jan 2022-Present | East Lansing, MI

Host and organize monthly executive board meetings. Oversee and assist where needed with all operations of the Mid-Michigan organization. Communicate with GWIS National. Organizing mentoring program for undergraduate students interested in pursuing STEM careers. Volunteer and coordinate STEM outreach events focused on science learning for K-12 students.

- *Past Positions: Co-Chair, Girls Math and Science Day Committee (June 2022- June 2024); Chair, Undergraduate Mentoring Program (June 2022 - June 2023)*

CMSE Graduate Student Diversity, Equity, and Inclusion Committee

Graduate Student Mentor
Minutes Moderator
Member

Aug 2020-May 2024 | East Lansing, MI

Meet with incoming graduate students and host regular check-ins to help them adjust to graduate school and the CMSE department. Manage and prepare biweekly meeting minutes. Participate in DEI discussions with grad students, post-docs, faculty, and staff on how to foster and promote belonging, diversity, equity, and inclusion within the CMSE environment.

Letters to a Pre-Scientist

Pen Pal

Aug 2022-May 2023 | East Lansing, MI

Exchange letters with a middle school student interested in learning more about STEM-related careers.

CMSE Graduate Student Organization

Admissions and Recruitment Liaison

Jan 2024 - May 2024 | East Lansing, MI

Organize and manage funds for events, including Graduate Student Seminars. Gather and respond to feedback from graduate students about their experiences.

- *Past Positions: Treasurer (Aug 2021-Aug 2022)*

Moravian College Math Society

President
Treasurer
Member

Aug 2016-May 2020 | Bethelehem, PA

Coordinated fundraisers, events, and conferences. Established inaugural STEM awareness workshop to incoming freshman focused on showcasing the research opportunities at the college. Attended and participated in math conferences and STEM outreach events at local K-8 schools throughout Pennsylvania.

Moravian College Dance Company

President
Treasurer/Secretary
Choreographer

Aug 2016-May 2020 | Bethelehem, PA

Led discussions with fellow collegiate board members as well as faculty members on dance program improvements. Negotiated bigger, newly renovated dance company rehearsal space. Managed various fundraising activities. Developed faculty-approved criteria and achieved inaugural formal dance minor at Moravian College.

PUBLICATIONS

Journal Articles

- Azodi, C. B., Bolger, E. G., McCarren, A., Roantree, M., de los Campos, G., & Shiu, S.-H. (2019). Benchmarking parametric and machine learning models for genomic prediction of complex traits. *G3: Genes|Genomes|Genetics*. doi:doi: 10.1534/g3.119.400498

In Proceedings

- Bolger, E., & Caballero, M. (2024). Using natural language processing to explore instructional change strategies in undergraduate science education literature. In *Proceedings of the 55th acm technical symposium on computer science education v. 2* (p. 1930). doi:10.1145/3626253.3635341
- Silvia, D. W., Caballero, M. D., Finzell, T., Frisbie, R., Hamerski, P., Bolger, E., … Tourangeau, P. (2023). Computing in support of disciplinary learning. In *Proceedings of the 54th acm technical symposium on computer science education v. 2* (p. 1247). doi:10.1145/3545947.3573341

Misc

- Bolger, E. (2020). Honors thesis: Nutrient intake of dancers: A measurement error analysis approach.

PRESENTED WORK

- *Developing Thoughtful Scientists through an Introduction to Data Science Course* 2024
  Electronic Conference On Teaching Statistics (eCOTS)
  Posters & Beyond
- *Using Natural Language Processing to Explore Instructional Change Strategies in Undergraduate Science Education Literature* 2024
  Symposium for Data Science and Statistics (SDSS)
  Oral Presentation & E-Poster
- *Using Natural Language Processing to Explore Instructional Change Strategies in Undergraduate Science Education Literature* 2024
  ACM Special Interest Group on Computer Science Education (SIGCSE)
  Lightning Talk
- *Characterizing Community Interactions Among Faculty Using Social Network Analysis* 2022
  2nd Annual CMSE Data Science Student Conference
  Poster
- *Analyzing Slack Messages of Physics Instructors Using Social Network Analysis* 2022
  Oslo Physics Education Research Summer Institute
  Poster
- *Nutrient Intake of Dancers: A Measurement Error Analysis Approach* 2020
  Annual Moravian College Honors Program
  Poster
- *Genomic Prediction of Traits Using Convolutional Neural Networks* 2019
  Mid-Michigan Symposium for Undergraduate Research Experiences
  Poster
- *Nutrient Intake of Dancers: A Measurement Error Analysis Approach* 2019
  The 15th Annual Student Scholarship and Creative Endeavors Day
  Moravian College Mathematics Society
  Epsilon Talk
- *Genomic Prediction of Traits Using Convolutional Neural Networks* 2019
  Moravian College Mathematics Society
  Epsilon Talk