Emily Bolger

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Education

Michigan State University **East Lansing, MI (Aug 2020 - Present)**
Graduate Student, Doctorate of Philosophy in Computational Mathematics, Science, and Engineering (CMSE)

Moravian College **Bethlehem, PA (Aug 2016 - May 2020)**
Bachelor of Science in Mathematics, Minors in Economics, Informatics, and Dance (self-designed)
Summa Cum Laude with Honors in Statistics, GPA: 3.90, Dean's List 2016-2020

Honors and Awards

The College of Engineering Graduate Travel Fellowship **Michigan State University (March 2023)**
The Raymond P. and Marie M. Ginther Graduate Fellowship **Michigan State University, CMSE Dept (April 2020)**
The Schattschneider Mathematics and Computer Science Prize **Moravian College, Math & CS Dept (April 2020)**
$O\Delta K$ Unsung Hero Award **Moravian College (April 2020)**
$O\Delta E$ National Economics Honors Society **Moravian College (April 2019)**
PME National Mathematical Honors Society **Moravian College (April 2018)**
$\Phi H\Sigma$ National Honors Society **Moravian College (Feb 2018)**

Research Experience

Graduate Research Assistant **Michigan State University (May 2021 - Present)**
Using Natural Language Processing and Social Network Analysis 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.
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)**
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)**
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)**
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)**

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. Take 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.

Research Mentor to Undergraduate Student **Michigan State University (May 2022 - Present)**

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)**

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)**

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)**

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)**

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 at Los Alamos National Laboratory (LANL) **Los Alamos (June 2023-Aug 2023)**

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 Dr. Jim Ahrens.

Summer Intern at Willis Towers Watson **New York City (June 2018-Aug 2018)**

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.

AT&T Summer Externship **Online (July 2020)**

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

Co-President

Chair, Undergraduate Mentoring Program

Co-Chair, Girls Math and Science Day Committee

Member, Graduate Women in Science Mid-Michigan Chapter **Michigan State University (Jan 2022-Present)**

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.

Graduate Student Mentor, Member

CMSE Graduate Student Diversity, Equity, and Inclusion Committee **Michigan State University (Aug 2020-Present)**

Meet with incoming graduate students and host regular check-ins to help them adjust to graduate school and the CMSE department. Participate in DEI discussions with other grad students on how to foster and promote belonging, diversity, equity, and inclusion within the CMSE environment.

Pen Pal, Letters to a Pre-Scientist **Michigan State University (Aug 2022-May 2023)**

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

Treasurer, CMSE Graduate Student Organization **Michigan State University (Aug 2021-Aug 2022)**

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

President, Treasurer, Member, Moravian College Math Society **Moravian College**

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.

President, Treasurer/Secretary, Choreographer, Moravian College Dance Company **Moravian College**

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 and Pre-Prints

† Indicates text is not published or peer-reviewed.

* Silvia, Devin W.; Caballero, Marcos D.; Finzell, Thomas; Frisbie, Rachel; Hamerski, Patti; Bolger, Emily; Castle, Sarah; Roca, Rachel, and Tourangeau, Paige. "Computing in Support of Disciplinary Learning." *Association for Computing Machinery, Proceedings of the 54th ACM Technical Symposium on Computer Science Education V. 2*, March. 2023, p.1247, doi:10.1145/3545947.3573341

* Azodi, Christina B., Bolger, Emily G., et al. "Benchmarking Parametric and Machine Learning Models for Genomic Prediction of Complex Traits." *G3: Genes|Genomes|Genetics*, Sept. 2019, p. g3.400498.2019, doi:10.1534/g3.119.400498.

* † Honors Thesis: Bolger, Emily. "Nutrient Intake of Dancers: A Measurement Error Analysis Approach." May 2020.

Presented Work

Talks:

Nutrient Intake of Dancers: A Measurement Error Analysis Approach **Bethlehem, PA 2020**

The 15th Annual Student Scholarship and Creative Endeavors Day

Moravian College Mathematics Society Epsilon Talk

Genomic Prediction of Traits Using Convolutional Neural Networks **Bethlehem, PA 2019**

Moravian College Mathematics Society Epsilon Talk

Posters:

Characterizing Community Interactions Among Faculty Using Social Network Analysis **East Lansing, MI 2022**

2nd Annual CMSE Data Science Student Conference

Analyzing Slack Messages of Physics Instructors Using Social Network Analysis **Oslo, Norway 2022**

Oslo Physics Education Research Summer Institute

Nutrient Intake of Dancers: A Measurement Error Analysis Approach **Bethlehem, PA 2020**

Annual Moravian College Honors Program Poster Session

Genomic Prediction of Traits Using Convolutional Neural Networks **East Lansing, MI 2019**

Mid-Michigan Symposium for Undergraduate Research Experiences