Molly Creagar

NSF Graduate Research Fellow
mcreagar2.github.io | mcreagar2@huskers.unl.edu

RESEARCH INTERESTS

Game theory, mathematical ecology, population dynamics, mathematical modeling, statistical modeling

EDUCATION

PH.D., MATHEMATICS | University of Nebraska-Lincoln
August 2019 – Present

- Advised by: Richard Rebarber and Brigitte Tenhumberg
    - Dissertation title: Game-theoretic optimal resource allocation and defense strategies in herbaceous plants
- Ph.D. Minor in Statistics
- Estimated Graduation: December 2023

M.S., MATHEMATICS | University of Nebraska-Lincoln
August 2019 - May 2021

B.S., MATHEMATICS | University of San Francisco
August 2016 - May 2019

- Minor in STEM Education
- Summa Cum Laude
- Overall GPA: 4.0
- Dean's Medal Finalist

POSITIONS HELD

GRADUATE TEACHING ASSISTANT | University of Nebraska-Lincoln
August 2019 - May 2021

- Instructor of Record: Contemporary Mathematics (MATH 203) - Spring 2021, College Algebra (MATH 101)
- Recitation Leader: Calculus I

GRADER AND CALCULUS TUTOR | University of San Francisco
January 2017 - May 2019

- Grader: Linear Algebra (x4), Elementary Statistics (x3), Business Statistics
- Tutor: Calculus I and II for the Math Department Homework Help Sessions

PUBLICATIONS

4. **Creagar, M.** , Rebarber, R., and Tenhumberg, B. (2023). "Game-Theoretic Optimal Resource Allocation and Defense Strategies in Herbaceous Plants". Submitted, under review.

3. Jones, R.M., **Creagar, M.** , Musty, M., Reynolds, R., Slone, S.M., and Barbato, R. (2022). "A k-Means Analysis of the Voltage Response of a Soil-Based Microbial Fuel Cell to an Injected Military-Relevant Compound (Urea)". USACE ERDC CRREL Technical Report. https://dx.doi.org/10.21079/11681/45940

2. **Creagar, M.** , Wakefield, N., Smith, W.M., Apkarian, N., and Voigt, M.K. (2022). "Validating the Student Postsecondary Instructional Practices Survey in Mathematics for Measuring Student Experiences in Introductory Mathematics Courses." Investigations in Mathematics Learning, 14 (2), pp. 151-165. https://doi.org/10.1080/19477503.2022.2060023

1. Devlin, S., Treloar, T., **Creagar, M.** , and Cassels, S. (2021) "An iterative Markov rating method." Journal of Quantitative Analysis in Sports, 17 (2), pp. 117-127. https://doi.org/10.1515/jqas-2019-0070.

RESEARCH EXPERIENCE

INTERNSHIP | USACE ERDC CRREL, NSF Mathematical Sciences Graduate Internship
June 2021 - August 2021
- Explored precision and capability of microbial fuel cells to detect the presence of and distinguish between substrates
- Investigated the application of canonical correlation analysis and partial least squares to quantify the relationship between plant and bacterial species in paleosol abundance data
- Supervised by Dr. Robyn Barbato and Mr. Robert Jones (CRREL)

RESEARCH PROJECT IN MATH EDUCATION | University of Nebraska-Lincoln , LINCOLN, NE
December 2020 - May 2021
- Analyzed survey data from students in first-year mathematics courses primarily using factor analysis
- Supervised by Dr. Nathan Wakefield (UNL)

DATA SCIENCE PRACTICUM | University of San Francisco, SAN FRANCISCO, CA
January 2019 - May 2019
- Statistical learning applied to marketing analytics data for a nonprofit organization
- Used forms of K-Nearest Neighbors and Random Forests to identify potential clients in the Bay Area
- Supervised by Dr. Nicholas Ross (USF)

REU | Dordt University , SIOUX CENTER, IA
June 2018 - August 2018
- Project 1: Extended work on developing an integrated metabolic regulatory model (iMRM) to explicitly model the statistical uncertainty in gene state activity inferences by using gene activity state estimates
- Project 2: Simulated data to demonstrate the aggregate effects of genotype uncertainty on downstream statistical analyses in biobank-style datasets and proposed two methods to adjust downstream data processing to mitigate the impact of these errors in order to appropriately control the type I error rate while maximizing statistical power
- Presented poster on iMRM work at the 5th Annual Conference on Constraint-Based Reconstruction and Analysis
- Supervised by Dr. Nathan Tintle (Dordt University)

RESEARCH IN SPORTS ANALYTICS | University of San Francisco, San Francisco, CA
January 2018 - May 2019
- Proposed a new rating method (the iterative Markov rating method) that converges over time to the global Markov rating method and has similarities to the Elo rating method
- Supervised by Dr. Stephen Devlin (University of San Francisco)

SKILLS
- Proficient in Python, R, MATLAB, LaTeX, Git/GitHub, SQL, and Tableau
- Experience with High Performance Computing resources, such as the Holland Computer Center and the XSEDE/ACCESS computer resources
- Some experience with HTML/CSS, SAS, Java, Perl

PROJECTS
- Music Listening History R Shiny App: https://mollyc.shinyapps.io/saam/
- Tableau Dashboard Example 1: New York Airbnb Data (click here for link)
- Tableau Dashboard Example 2: Oregon Fire History (click here for link)
- Git/GitHub Projects: https://github.com/stars/mcreagar2/lists/coding-projects-and-examples
- Personal Website: https://mcreagar2.github.io

HONORS AND AWARDS
2021-2024 | National Science Foundation Graduate Research Fellowship
2019-2021 | Chancellor's Fellowship/Larson Fund (UNL)
2018-2019 | Clare Boothe Luce Undergraduate Scholarship, University of San Francisco
May 2019 | Outstanding Senior in Mathematics, University of San Francisco
2016-2019 | University Merit Scholarship, University of San Francisco
2016-2019 | Dean's List, University of San Francisco

RESEARCH PRESENTATIONS
Game-Theoretic Optimal Resource Allocation and Defense Strategies in Herbaceous Plants
- JMM AMS Special Session on Mathematical Modeling of Ecology and Evolution – January 2023 [20 min.]
- UNL Mathematical Biology Seminar – October 2022 [50 min.]
- (Invited) AWM Research Symposium Special Session on Recent Developments in Ecological and Epidemiological Modeling – June 2022 [20 min.]

Bayesian Game Theory for Plant Ecology
- UNL Mathematical Biology Seminar – November 2021 [50 min.]
- Cold Regions Research and Engineering Lab (CRREL) Soil Microbiology Research Group Meeting – August 2021 [20 min.]

The Effect of Substrate Addition on the Electrogenic Potential of Terrestrial Microbial Fuel Cells
- NSF-MSGI Summer Cohort Research Presentations – August 2021 [20 min.]
- Cold Regions Research and Engineering Lab (CRREL) Soil Microbiology Research Group Meeting – August 2021 [20 min.]

An Iterative Markov Rating Method
- JMM Sports Analytics session – January 2019 [20 min.]
- Nebraska Conference for Undergraduate Women in Mathematics (poster session) – January 2019
- Dean's Circle event – January 2019
- USF Creative Activity and Research Day (poster session) – January 2019

Developing and Evaluating Integrated Metabolic Regulatory Models for Microbial Life
- 5th Annual Conference on Constraint-Based Reconstruction and Analysis (poster session) – October 2018
- University of Michigan Biostatistics Department – July 2018 [20 min.]
- Dordt University Summer Seminar – July 2018 [20 min.]

SERVICE
Invited Panelist
- Nebraska Conference for Undergraduate Women in Mathematics - 'Choosing a Graduate Program' – January 2023
- UNL School of Biological Sciences - Panel on Fellowships – October 2021
- UNL Mathematics Graduate Student Seminar - Panel on Fellowships – October 2021
- UNL Mathematical Landscapes - Panel on Finding an Advisor – January 2021
- USF Colloquium - Panel on Internships and REUs – November 2020
- UNL AWM - Panel on Internships and REUs – October 2020
- UNL Grad Recruitment Panel – March 2020

Volunteer Roles
- UNL Math Biology Seminar Co-Coordinator – August 2022 - present
- UNL Graduate Mentoring Program Mentor – August 2021 - present
- Nebraska Conference for Undergraduate Women in Mathematics Organizing Committee Member – August 2021 - present
- UNL Association for Women in Mathematics Graduate Volunteer Advisor – August 2020 - present
- Upward Bound Math and Science Bridge Research Program Mentor – June 2022 - August 2022
- Nebraska Conference for Undergraduate Women in Mathematics Volunteer – January 2021
- Math Department Graduate Student Advisory Board member – June 2020 - June 2022