

Molly Creagar

NSF Graduate Research Fellow
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RESEARCH INTERESTS

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

EDUCATION

PH.D., MATHEMATICS | University of Nebraska-Lincoln

August 2019 – Present

- Research areas: Game theory, mathematical ecology, population dynamics
- 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 for: Contemporary Mathematics (MATH 203) - Spring 2021, College Algebra (MATH 101) - Fall 2020
- Recitation Leader: Calculus I - Spring 2020, Fall 2019

GRADER AND CALCULUS TUTOR | University of San Francisco

January 2017 - May 2019

- Graded for: Linear Algebra (x4), Elementary Statistics (x3), Business Statistics
- Tutored Calculus I and II for the Math Department Homework Help Sessions - Fall 2018

PUBLICATIONS

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