Cashous W. Bortner

Department of Mathematics
California State University, Stanislaus

Email: cbortner@csustan.edu **ORCiD:** 0000-0002-8471-5569 **Website:** cbortner.github.io

Employment

Assistant Professor of Mathematics **August 2022 - Present**
California State University, Stanislaus

Research Interests

Algebraic, combinatoric, and graph theoretic approaches to problems in biological and physical systems; parameter identifiability; algebraic statistics.

Education

Ph.D. in Mathematics, North Carolina State University **May 2022**
Thesis: "Identifiability Analysis of Two Families of ODE Models"
Advisor: Seth Sullivant

M.S. in Mathematics, North Carolina State University **May 2019**

B.S. in Mathematics, University of Nebraska-Lincoln **May 2017**

Publications & Preprints

1. **Bortner**, **C.** & Meshkat, N. Graph-Based Sufficient Conditions for Indistinguishability of Linear Compartmental Models. *Preprint available at https://arxiv.org/abs/2309.10861* (Sept. 2023).
2. **Bortner**, **C.**, Gross, E., Meshkat, N., Shiu, A. & Sullivant, S. Identifiability of Linear Compartmental Tree Models and a General Formula for the Input-Output Equations. *Advances in Applied Mathematics* **146** (May 2023).
3. **Bortner**, **C.** & Sullivant, S. Structural Identifiability of Series-Parallel LCR Systems. *Journal of Symbolic Computation.* **112,** 79–104 (Sept. 2022).
4. **Bortner**, **C.** & Meshkat, N. Identifiable Paths and Cycles in Linear Compartmental Models. *Bulletin of Mathematical Biology.* **84,** 53 (Mar. 2022).
5. Bernstein, P., **Bortner**, **C.**, Coskey, S., Li, S. & Simpson, C. The Set Splittability Problem. *The Australasian Journal of Combinatorics* **75,** 190–209 (Oct. 2019).

Undergraduate Research

- *Indistinguishability of Linear Compartmental Cycle Models Using Graph Theory*, Spring 2024
  Advising three undergraduate students on the problem of determining if two linear compartmental cycle models are indistinguishable using graphs.
- *Erdös-Ko-Rado Theorem on Graphs*, Spring 2023-Present
  Co-advising two undergraduate students with Dr. Jessica De Silva on a problem related to extending the Erdös-Ko-Rado Theorem from sets to graphs.
- *Indistinguishability of Linear Compartmental Cycle Models*, Fall 2023
  Advising two undergraduate students on the problem of determining if two linear compartmental cycle models are indistinguishable.

Invited Presentations

- AMS Central Sectional Meeting Special Session on Applications of Algebraic Geometry, University of Texas at San Antonio, San Antonio, TX, September 14-15, 2024.
- 2024 Workshop on Differential Algebra and Modeling, Raleigh, NC, July 20-22, 2024.
- Naval Postgraduate School Department of Operations Research Colloquium, May 28, 2024.
- AMS Western Sectional Meeting Special Session on "Research in Combinatorics by Early Career Mathematicians" introductory presentation, San Francisco, CA, May 4-5, 2024.
- CSU East Bay Math Department Colloquium, April 11, 2024.
- Bakersfield College *MATH Matters* Speaker Series, February 2, 2024.
- Algebraic Approaches to Mathematical Biology, American Mathematical Society Special Session, Joint Math Meetings, San Francisco, CA, January 3-6, 2024 (Unable to attend.)
- Discrete, Topological, and Algebraic Methods in Mathematical Biology Special Session, American Mathematical Society Central Sectional Meeting, Creighton University, Omaha, NE, October 7-8, 2023
- SIAM Conference on Applied Algebraic Geometry, Eindhoven University of Technology, Eindhoven, The Netherlands, July 10-14, 2023 (virtual)
- Differential Algebra and Related Topics XI Conference, School of Mathematical Sciences, Queen Mary University of London, June 5-9, 2023
- California State University Long Beach Math Department Colloquium, April 21, 2023 (virtual)
- Morehead State University Math Department Colloquium, April 14, 2023 (virtual)
- Santa Clara University Math Department Colloquium, October 11, 2022
- The Speaker Series for the Quantitatively Curious Colloquium, California State University, Stanislaus, September 23rd, 2022
- Algebraic Statistics 2022, University of Hawai'i at Manoa, May 16-20, 2022

Teaching Experience

MATH 4980: Independent Study on Machine Learning with Graphs	Spring 2024 (7 students)
MATH 3600: Theory of Numbers	Spring 2024 (26 students)
MATH 2460: Introduction to Differential Equations	Spring 2024 (28 students)
MATH 3400: Set Theory and Logic	Fall 2023 (20 students)
MATH 3400: Set Theory and Logic	Spring 2023 (21 students)
MATH 2300: Discrete Structures	Spring 2023 (27 students)
MATH 1070: College Algebra	Spring 2023 (35 students)
MATH 1420: Calculus II	Fall 2022 (16 students)
MATH 1410: Calculus I	Fall 2022 (25 students)

Workshops and Trainings

- Organized CSU Stanislaus Faculty Development Workshop *Strategies for Student Engagement in the College of Science An Open Exchange of Ideas*, May 9, 2024.
- Organized CSU Faculty Learning Community on Career and Professional Development in the Classroom, Spring 2024.
- Participant in CSU Faculty Learning Community on Transforming Student Experience & Success in Gateway STEM Courses, Spring 2024.
- Organized the *Algebraic Approaches to Mathematical Biology* AMS Special Session, Joint Math Meetings, San Francisco, CA, January 3-6th 2024
- Research Experience for Undergraduate Faculty (REUF) Workshop, American Institute of Mathematics(AIM)/Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, Rhode Island, August 7-11th, 2023
- CSUBIOTECH Planning Meeting, Office of the Chancellor, July 31st, 2023

- New Student Orientation Advisor, 4 Sessions, July 2023
- Central California Math Project Summer Institute: Social Justice in the Math Classroom - Putting Theory into Practice (40 hours), July 15, 17, 19, and 21st, 2023
- CSU Student Success Dashboard Workshop, April 26th, 2023
- MSRI Critical Issues in Mathematical Education: Mentoring for Equity, MSRI, March 22-24th, 2023
- STEM-NET: Becoming more than the sum of our parts conference, March 16-17th, 2023
- Measures of Teaching Effectiveness Workshop, FCETL via zoom, October 27th, 2022
- NSF S-STEM Grant Planning Meeting, October 11-12th, 2022
- Using Inquiry to Teach Mathematics and Thinking, MAA Workshop via zoom, September 29th, 2022
- MathFest, August 2022
  - Active Learning with Active Calculus Mini-course (4 hours)
  - The Role of Culturally Relevant Pedagogy and Identity Devel. in the Teaching and Learning of Math
  - Teaching with Inquiry: Growing our Practice Together
  - How to Create Safe and Community Responsive Outreach Programs
  - Teaching and Leading towards Institutional Change
  - Making Teaching Matter More: Active-learning Strategies and Barriers to Implementation
  - Townhall on Latinx Mathematicians

Mentorship

- Robert Noyce Teaching Scholarship Program Mentor, Fall 2023-Present
  - Mentoring two preservice K-12 teachers who are Robert Noyce Teaching Scholars.
- Cal-Bridge Mentor, Fall 2023-Present
  - Co-mentoring one Cal-Bridge student with Dr. Subir Ghosh (UC Riverside) on course selection, summer research experiences, and graduate school applications.
- Stanislaus State Math Club Faculty Advisor, Fall 2023-Present
- Faculty Mentor Program Mentor, Fall 2022-Present
  - Mentoring three, first-generation undergraduate students.

Professional Memberships and Fellowships

- Career and Professional Development Center Faculty Fellow, Fall 2023-Present
- CSUBIOTECH Faculty Consensus Group Representative, Summer 2023-Present
- CSU Stanislaus Grant Writing Cohort, Spring 2023-Fall 2023
- Mathematics Faculty Fellow: Catalyzing Ideas for the San Joaquin Valley: Innovating Mathematics and Chemistry Curriculum, Fall 2022-Present
- Mathematical Association of America Project NExT (New Experiences in Teaching) Fellow, Fall 2022-Fall 2023
- Mathematical Association of America (MAA), Fall 2019-Present
- American Mathematical Society (AMS), January 2022-Present
- Society for Industrial and Applied Mathematics (SIAM), Fall 2019-Present

Grants and Funding

- American Institute of Mathematics REUF Continuation Grant 2024
  - **Title:** *Maximum Likelihood Degrees of Stochastic Block Models*; **Date:** Summer 2024.
- CSU Stanislaus Faculty Development Committee Workshop Proposal
  - **Title:** *Strategies for Student Engagement in the COS: An Open Exchange of Ideas*; **Date:** Spring 2024; **Budget:** $1,250.

- 2024-2025 CSU Stanislaus Research, Scholarship, and Creative Activity Grant
  Title: *Standards-Based Grading Assessment Generating Application.* **Budget:** $10,000.
  Abstract: This internal research, scholarship, and creative activity grant will support PI Bortner's efforts to develop a web-based, artificial intelligence integrated application to generate exams using the Standards-Based Grading assessment technique. Support for this project comes in the form of 3 units of course release in the Fall 2024 semester, as well as the hiring of a software developer as a special consultant.
- CSU Louis Stokes Alliance for Minority Participation Undergraduate Research Assistant Funding
  - **Title:** *Indistinguishability of Linear Compartmental Cycle Models*; **Date:** Fall 2023; **Budget:** $1,800.
- CSU Stanislaus College of Science Faculty Development Travel Grant
  - Fall 2023 - Joint Mathematics Meetings $2,000
  - Spring 2023 - MSRI Critical Issues in Math Education $2,000
  - Fall 2022 - Joint Mathematics Meetings $2,000