

Johan Benedict A. Cristobal

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EDUCATION

University of Nebraska - Lincoln (UNL)

- ▷ Ph.D. in Mathematics (Advisor: Dr. Yvonne Lai) expected May 2025
Minor in Teaching, Learning, and Teacher Education

Dissertation (Working) Title: *Culture and Context: How Frames of Teaching and Learning Mathematics Form and Change for Graduate Student Instructors*

- ▷ M.S. in Mathematics December 2021

University of California, Los Angeles

- ▷ B.S. in Mathematics of Computation June 2020

POSITIONS

Graduate Research Assistant for Various Projects

- Educating Undergraduate Students for STEM Career Opportunities in Nebraska: Networks, Experiential-learning, & Computational Thinking (STEM CONNECT)
NSF/S-STEM DUE-1930211; PI Jim Lewis

Spring 2024 to **Present** – I co-analyzed/conducted interviews of (previous) STEM CONNECT students to collect and report on narratives about perseverance within a STEM degree and undergraduate education, with careful consideration of how to help students finish their STEM degrees. These students are primarily of minority and/or first-generation identity.

- College of Arts & Sciences Strategies Priorities: *Understanding the experiences of underrepresented students in 300-level mathematics courses*; PI Amy Bennett

Fall 2023 to **Present** – I co-analyzed underrepresented undergraduate student narratives about their experiences leading up to and taking a real analysis course for the purpose of creating and running a follow-up study with post-secondary mathematics professors and how they notice and frame these narratives with respect to their practice.

- Mathematics of Doing, Understanding, Learning and Educating for Secondary Schools (MODULE(S²)) – NSF DUE-1726744; PI Yvonne Lai

Summer 2022 to Spring 2024 – I co-analyzed teachers' open-ended responses to survey data to identify qualitative signals of increased expectancy to succeed in teaching, doing, or learning mathematics, or value for inclusive teaching practices.

- Investigating the Role of Collaboration on the Development of Student Ideas using a Learning Progression for the Function Concept – NSF DRL-2101393; PI Edith Graf

Spring 2023 to Spring 2024 – I helped map the learning progressions to a Bottle filling activity made as a reality-based activity to learn the concept of functions. I participated and co-led the professional development meetings to learn about (virtual) talk moves.

- CSForAll: **A**dapt, **I**mplement and **R**esearch at Nebraska (AIR@NE)

NSF DRL-1837476; PI Leen-Kiat Soh

Summer 2021 – I conducted and analyzed interviews of the CSForAll: AIR@NE summer cohort. I also gave feedback on the K-12 computer science curriculum being developed.

Co-Organizer & Mentor for Research Experience for Undergraduates (REU)

Summer 2024 | Mathematics Department at UNL

- ▷ First Generation First Year Research Experience for Undergraduates
NSF/DMS-2236983; PI Eloísa Grifo

Working with another graduate student (Michael Pieper), I co-organized and co-led this REU for a group of four incoming first-generation freshman from an Upward Bound program. Building on recent work by Foss and Pieper (in-progress) which showed a classically ill-posed problem in calculus of variations becomes well-posed if we use its nonlocal analog, the project tackled the questions: *Can this result be used in practice in the context of signal processing? Under what kinds of conditions would it yield a computational result?* We also provided orientation-like experiences to students with touring campus and hosting panels. Link to recording of the students' presentation: (pending on upload)

Graduate Teaching Assistant

August 2020 to **Present** | Mathematics Department at UNL

- As an *Instructor of Record*, I taught a section of students, using active-learning and writing assessments for students.
- ◆ As a *Course Developer*, I reordered the sections of the textbook to better scaffold topics and made the corresponding updates for the course materials and online homework. I made videos for the Intermediate Algebra course and are embedded in the open-source textbook. I also co-developed the pedagogy seminar for mathematics learning assistants, embedding equity-oriented teaching practices into their learning.

TEACHING

Walter Mientka Teaching Award | Awarded 2021 by the UNL Math Department.

“The Walter Mientka Award is given to students who demonstrate exceptional promise as a teacher based on their work during their first one or two years as a graduate teaching assistant in our department.”

Courses Taught as Instructor of Record / ◆ denotes courses I also worked on as Course Developer.

- ◆ Math 103 - College Algebra and Trigonometry Fall 2024
- ◆ Math 97 - Assisting Learning for University Mathematics Fall 2024
- Math 302 - Math Modeling Spring 2023
- ◆ Math 101C - College Algebra Corequisite Fall 2022
- ◆ Math 101 - College Algebra Spring 2022
- ◆ Math 100A - Intermediate Algebra Fall 2021

Courses Taught as Recitation Leader.

- Math 221 - Differential Equations Fall 2023
- Math 107 - Calculus II Spring 2021
- Math 106 - Calculus I Fall 2020

Qualifying Exam Workshop Review and Preparation Session

Summer 2022

Math 830/831 - Ordinary and Partial Differential Equations Workshop Leader

PAPERS

Peer-reviewed Conference Proceedings

- [1] **Cristobal, J. B.** (2024). Complicating the Relationship of Frames and Responses in Teacher Noticing. In Cook S., Katz B., Moore-Russo, D. (Eds.), *Proceedings of the 26th Annual Conference on Research in Undergraduate Mathematics Education*, Omaha, Nebraska (pp. 268-276). [Contributed Report]
- [2] Funk, R., Pai, L., & **Cristobal, J. B.** (2024). "Persistence in a S-STEM grant: Understanding the Intersectional Experiences of Women Pursuing STEM." Conference Paper for the 2024 *American Society for Engineering Education Annual Conference & Exposition*.
- [3] Funk, R., Pai, L., Rader, B., **Cristobal, J. B.**, & Lewis, J. (2024). "'Someone has invested in me to do this': Supporting Low-Income Students to Persist in STEM through a NSF S-STEM grant." Poster Paper for the 2024 *American Society for Engineering Education Annual Conference & Exposition*.
- [4] **Cristobal, J. B.** (Accepted). From "Struggle" to "Acceptance": Andy's Narrative of First-Time Teaching and Her Frames. Contributed Report for the 27th Annual Conference on Research in Undergraduate Mathematics Education (Feb. 27 - Mar. 1, 2025).
- [5] **Cristobal, J. B.** (Accepted). Aspects of Culture and Context which Shape Frames of Teaching and Learning. Contributed Report for the 27th Annual Conference on Research in Undergraduate Mathematics Education (Feb. 27 - Mar. 1, 2025).
- [6] Bennett, A. B., Lai, Y., **Cristobal, J. B.**, & Young, C. (Accepted). Real Analysis Professors' Noticing of Equity Gaps and Minoritized Students' Perspectives. Contributed Report for the 27th Annual Conference on Research in Undergraduate Mathematics Education (Feb. 27 - Mar. 1, 2025).

Submitted or ϵ -close to submission

- [7] Funk, R., Pai, L., **Cristobal, J. B.**, & Xie, N. (in-progress). "Just because I am the diversity quota": Understanding the Influence of Power on the Experiences and Identities of S-STEM Women Scholars.
- [8] **Cristobal, J. B.** (in progress). Looking Inside the Black Box: Frames in the Context of Teaching Mathematics.

FUNDING/GRANTS

- [1] **Title:** Conference: Accelerating Research in Graduate Mathematics Education (ARGME)
Role: Organizing Committee Member
Project Budget: \$50,000
Funded by: NSF Directorate for STEM Education
Solicitation: EDU Core Research (ECR:Core) **Status:** Submitted October 3, 2024
Description: A virtual conference consisting of a day-long event that initiates a year-long monthly series of seminars where research in graduate mathematics education is shared and discussed. The intent is to start a formal space for these works to be shared, and also to inspire future work and cross-institution collaborations.

SELECT PRESENTATIONS (Reverse chronological)

- [1] *One graduate students' experience teaching for the first time Students Teaching* (Accepted)
Joint Mathematics Meeting 2025 in the AMS Contributed Papers, Mathematics education.
- [2] *Success, Struggle, Surprise, and Short-term Goals: Reflections from Mathematics Graduate Students Teaching* – A dissertation reflection (Accepted)
Joint Mathematics Meeting 2025 in the AMS Special Session: Research Presentations by Math Alliance Scholar Doctorates.
- [3] *Successes, Struggles, Surprises and Short-term Goals of Mathematics Graduate Student Instructors Teaching for the First Time*
Mathematical Association of America's MathFest 2024 in the Research in Undergraduate Mathematics Education session. <https://youtu.be/1TYHb2xk5Hg>
- [4] *Understanding the Intersectional Experiences and Identities of Women Who Persist in STEM*
2024 Nebraska Mathematical Association of Two Year Colleges, with Dr. Rachel Funk.
- [5] *Coloring the Relationship of Frames and Responses in Teacher Noticing*
26th Annual Conference on Research in Undergraduate Mathematics Education (Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, SIGMAA on RUME). <https://youtu.be/HE6XIPJRokY>
- [6] *Before and during teaching: New graduate student instructors' frames of teaching*
7th Northeastern Conference on Research in Undergraduate Mathematics Education.
- [7] *Bridging Frames and Sociomathematical Norms*
6th Northeastern Conference on Research in Undergraduate Mathematics Education.

SERVICE

Graduate Student Teaching Table Fall 2022 - Present
Co-founder and organizer

Seminar designed for and by graduate students to discuss education or teaching issues we face at UNL as GSIs, using education literature to organize conversations.

Research in Graduate Mathematics Education (RGME) Summer 2024 - Present
Website Manager, Member on the Organizing Committee <https://www.johanmath.com/RGME>
Writer for the Working Group Proposal

UNL Math Department Recruitment — Graduate Student Volunteer (various dates)
Math Alliance Field of Dreams Conference (November 2022)
Joint Mathematics Meeting (January 2024)
2024 AMS Online Fall Graduate School Fair (October 2024)

UNL Math Department Orientations Summer 2024
Speaker in the First Year and the Returning Graduate Student Orientation,
Organizer of the Mathematics Learning Assistant Orientation

UNL Math Day Organizing Committee Fall 2023 - Present
Graduate Student organizer for Volunteer outreach/management

Outreach event for Nebraskan high school students that encourage them to pursue a career in a mathematics-based trajectory: math.unl.edu/math-day-university-nebraska-lincoln

Session Moderator and Volunteer for RUME 26 February 2024
26th Annual Conference on Research in Undergraduate Mathematics Education at Omaha, NE

Guest Peer-Reviewer for PRIMUS Fall 2023
Problems, Resources, and Issues in Mathematics Undergraduate Studies – Volunteer

NOTABLE CONFERENCES & PROFESSIONAL MEETINGS

◇ = Spoke , ★ = Invited , † = Department Volunteer , \$ = Travel funded

1. Joint Mathematics Meetings | Virtual January 2021
2. KUMUNI-ISU Conference on PDE, Dynamical Systems, and Applications | UNL, Lincoln, NE October 2021
3. ◇ 6th Northeastern Conference on Research in Undergraduate Mathematics Education | Virtual October 2022
4. † Field of Dreams Conference | Minneapolis, MN November 2022
5. 25th SIGMAA on RUME | Omaha, NE February 2023
6. ◇ 7th Northeastern Conference on Research in Undergraduate Mathematics Education | Virtual November 2023
7. † Joint Mathematics Meetings | San Francisco, CA January 2024
8. ◇ 26th SIGMAA on RUME | Omaha, NE February 2024
9. \$ **Workshop:** Critical Issues in Mathematics Education 2024: Bringing Innovation to Scale: Teaching-Focused Faculty as Change Agents | Berkeley, CA April 2024
10. *JimFest:* What, where, and for what purpose is the mathematics in mathematics teacher education? | Lincoln, NE May 2024
11. ◇ \$ MAA Mathfest | Indianapolis, IN August 2024

SKILLS

Mathematics \LaTeX , curriculum development

Statistical Methods RStudio

Programming C, C++, Python, Matlab, LISP, SQL, and HTML/CSS (Web-design)

Languages English (fluent), Filipino/Tagalog (native fluent), Spanish (intermediate)

Microsoft Suite Word, Excel, Powerpoint

Adobe Creative Suite Acrobat, Photoshop, Illustrator, Premiere Pro, InDesign, Lightroom

Video/Content Creation <https://www.youtube.com/@johango>, textbook videos, and conference or presentation videos

GRADUATE COURSE WORK in Mathematics

These 14 courses are listed in the order I took them

◆ indicates courses I would be comfortable to teach at the graduate-level

◇ indicates courses I would be comfortable to teach at an (advanced) undergraduate-level

◆ 825 and 826 - Mathematical Analysis I/II

Text: *Real Analysis and Applications: Theory in Practice* by A. P. Donsig and K. R. Davidson
(passed the Qualifying Exam for this Sequence)

- ◆ 830 and 831 - Ordinary/Partial Differential Equations
 Texts: *Ordinary Differential Equations with Applications, 2nd edition* by C. Chicone.
Introduction to Partial Differential Equations with Applications by E. C. Zachmanoglou and D. W. Thoe
A first course in the numerical analysis of differential equations by C. Iserles
 (passes the Qualifying Exam for this Sequence)
- ◇ 850 and 852 - Discrete Mathematics I/II (Combinatorics, Coding Theory, Graph Theory)
 Text: *Combinatorial Mathematics* by D. B. West
- ◇ 817 and 818 - Abstract Algebra
 Text: *Abstract Algebra, Third Edition* by D. S. Dummit and R. M. Foote
- ◇ 921 and 922 - Real Analysis I/II (Measure Theory)
 Text: *Real Analysis: Modern Techniques and Their Applications, 2nd ed.* by G. B. Folland
- ◇ 934 - Topics in Partial Differential Equations (Fluid Dynamics)
 Text: *Partial Differential Equations* by L. C. Evans (and other notes)
- ◇ 833 - Nonlinear Optimization
 Text: *Linear and Nonlinear Optimization, 2nd ed.* by I. Griva, S. G. Nash, and A. Sofer
- ◆ 941 - Partial Differential Equations (Distributions, Sobolev Spaces, and Elliptic BVPs)
 Text: *Functional Analysis, Sobolev Spaces and Partial Differential Equations* by H. Brezis
 (passed the Comprehensive Exam based on this course)
- ◆ 928 - Functional Analysis
 Text: *A course in functional analysis, 2nd ed.* by J. B. Conway
 (passed the Comprehensive Exam based on this course)
- ◆ 958 - Topics in Combinatorics (Geometry and Probability in High Dimensions for Data Science)
 Text: Primarily used notes provided by instructor

Other Relevant Courses from Undergraduate: **Machine Learning** (in the Mathematics Department and in the Computer Science Department), **Probability Theory** (in the Mathematics Department), and **Artificial Intelligence** (in the Computer Science Department).

RELEVANT GRADUATE COURSE WORK for Education Research

Supplementary courses taken that are not part of the Mathematics Ph.D. program.

■ Educational Psychology Department:

859 - Statistical Methods

900K - Qualitative Approaches to Education Research

Quantitative Methods

Qualitative Methods

■ Teaching, Learning, and Teacher Education Department:

801 - Curriculum Inquiry

807C - Equitable Practices in Mathematics Education: Mathematics Classroom Discourse

861 - Education for a Pluralistic Society: Foundation and Issues

880E - Teaching with Technology: Instructional Technology in Mathematics

949B - Critical, Anti-colonial, & Decolonizing Theories in Education