# Ian Jorquera

Colorado State University
Department of Mathematics
Weber 223

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Website

## Academic Interests

Frame Theory, Structure of frames over finite fields, Finite Fields, Algorithm Design, Quantum Computing, Functional Programming, Complexity Theory.

## Education

### Colorado State University

- Ph.D., Mathematics, Gem Fellow, (expected graduation: 2027).
- Advisor: Emily J. King

### University of Colorado Boulder

- B.A., Computer Science, *Summa Cum Laude* (2022).
- B.A., Mathematics, *with Honors* (2022).
- Minor, Applied Mathematics (2022)

## Positions

### Current

**Colorado State University**

- GEM Fellow, Graduate Teaching Assistant. 8/2022 - present

### Previous

**Oak Ridge National Laboratory**

- GEM Fellow, Research Intern, Programming Systems Group. 6/2022-8/2022
- Advisor: Pedro Valero-Lara

## Publications and Preprints

3. **On the Structure of Frames and Equiangular Lines over Finite Fields and their Connections to Design Theory** (joint with Emily J. King). preprint. (https://arxiv.org/abs/2505.12175)

2. **Evaluating performance and portability of high-level programming models: Julia, Python/Numba, and Kokkos on exascale nodes (2023)** (joint with William F. Godoy and Pedro Valero-Lara and T. Elise Dettling and Christian Trefftz and Thomas Sheehy and Ross G. Miller and Marc González Tallada and Jeffrey S. Vetter and Valentin Churavy). accepted. (https://doi.org/10.1109/IPDPSW59300.2023.00068)

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1. **Mixed-Precision S/DGEMM Using the TF32 and TF64 Frameworks on Low-Precision AI Tensor Cores(2023)** (joint with Pedro Valero-Lara and Frank Liu and Jeffrey S. Vetter). accepted. (https://doi.org/10.1145/3624062.3624084)

## REFEREED ABSTRACTS

1. **Efficacy analysis of the IdentiFlight avian anti-collision system using fatality monitoring data across 15 windfarms in 3 continents** (joint with Carlos Jorquera and Caleb Putnam and Nicholas Barendregt and Alejandro Haerter and Kylie Schnoor). accepted. Conference on Wild Energy & Wildlife Impacts 2025

## CONFERENCE TALKS

1. *Saturating the Welch Bound for Frames over Finite Fields.* Vanderbilt University, Nashville, Tennessee, USA, Minisymposium on Symmetric Subspace Configurations, Constructive Functions 2025, May 2025.

## ATTENDED CONFERENCE

3. Minisymposium on Symmetric Subspace Configurations, Constructive Functions 2025, Vanderbilt University, May 2025. Funded by Conference.

2. Recent Progress on Optimal Point Distributions and Related Fields, ICERM, Brown University, June 2024. Funded by Conference.

1. Groups, Nilpotence, and Tensors, Colorado State University, April 2023.

## SEMINAR TALKS

8. *Theorems for Free?.* Colorado State University, Applied Category Seminar, November 2024.

7. *What is Algebra? Why should you care? And what makes it so abstract anyways?.* Colorado State University, Greenslopes Mathematics and Statistics Seminar, October 2024.

6. *Composition, Categories, and Databases.* Colorado State University, Applied Category Theory Seminar, September 2024.

5. *Suboject Classifiers and Defining a Topos.* Colorado State University, Applied Category Theory Seminar, April 2024.

4. *F-Algebras and Catamorphisms in Scala.* Colorado State University, Applied Category Theory Seminar, November 2023.

3. *Simple Types.* Colorado State University, Applied Category Theory Seminar, January 2023.

2. *The DisCoCat (Distributional Compositional Categorical) model of meaning.* Colorado State University, Applied Category Theory Seminar, October 2022.

1. *Examples of Functors and Natural Transformations.* Colorado State University, Applied Category Theory Seminar, September 2022.

## SEMINARS ORGANIZED

1. *Greenslopes Graduate Seminar.* Co-Organizer, Colorado State University, August 2024 - Decmber 2024.

## Teaching Experience

**Colorado State University**

- Instructor, Math 160 (Fall 2025).

- Instructor, Math 160 (Spring 2025).

- Assistant Coordinator, Math 160 (Fall 2024).

- Assistant Coordinator, Math 160 (Spring 2024).

- Instructor, Math 160 (Fall 2023).

- Teaching Assistant, Math 369 (Summer 2023).

- Teaching Assistant, Math 155 (Spring 2023).

- Instructor, Math 160 (Fall 2022).

**University of Colorado Boulder**

- Undergraduate Course Assistant, CSCI 3104

## Outreach

- Editor, and co-founder of student run monthly mathematics newsletter, The Colorado State Torus (March 2025 - present).

- Volunteer, CSU Math Day (November 2025).

- Volunteer, CSU Math Day (November 2024).

- Volunteer, CSU Math Day (November 2023).

## Awards

- GEM PhD Fellow, Sponsored by Oak Ridge National Laboratory and Colorado State University (2022).