

# Edgar Jaramillo Rodriguez

## Curriculum Vitae

University of California, Davis

Department of Mathematics

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<https://ejamillorod.github.io/>

## Education

In progress **Ph.D., Mathematics**, *University of California, Davis*, Advisor: Dr. Jesus De Loera.

2021 **M.A., Mathematics**, *University of California, Davis*.

2018 **B.A., Applied Mathematics**, *University of California, Berkeley*.

## Publications

Articles [1] J. De Loera, **E. Jaramillo Rodriguez**, D. Oliveros, and A. Torres Hernandez, “A Model for Birdwatching and other Chronological Sampling Activities,” arXiv:2205.05743 (2022). Scheduled to appear in *The American Mathematical Monthly*.

[2] N. Benjamin, G. Fickes, E. Fiorini, **E. Jaramillo Rodriguez**, E. Jovinelly, and T.W.H. Wong, “Primes and Perfect Powers in the Catalan Triangle,” *Journal of Integer Sequences*, Vol. 22 (2019), Issue 7, Paper 6

[3] S. D. Han, **E. Jaramillo Rodriguez** and J. Yu, “SEAR: A Polynomial- Time Multi-Robot Path Planning Algorithm with Expected Constant-Factor Optimality Guarantee,” 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (2018), pp. 1-9.

Pre-Prints [1] **E. Jaramillo Rodriguez** “Combinatorial Methods for Barcode Analysis,” arXiv:2206.05613 (2022). Under review.

## Presentations

2022 **Applied Topology in Albany Seminar**, University of Albany (remote), October 2022. *Combinatorial Methods for Barcode Analysis*.

Society for Industrial and Applied Math Conference on Discrete Mathematics 2022 (**SIAM-DM22**), Carnegie Mellon University, June 2022. *Barcode Posets: Combinatorial Properties and Connections*.

**Algebraic Statistics 2022**, University of Hawai’i at Manoa, May 2022. *A Model for Birdwatching and other Chronological Sampling Activities*.

2021 **AIM Latinx Mathematician Research Community Meeting** (virtual) December 2021. *New Methods for Mixture Model Analysis* with A. Chavez, J. De Loera, J. Simental Rodriguez, and A. Torres Hernandez.

**UC Davis Graduate Student Research Seminar**, University of California, Davis, April 2021. *Coupon Collecting, Bird Watching, and other Chronological Sampling Activities: A Random Interval Graph Model*.

2016 **Young Mathematicians Conference 2016**, The Ohio State University, August 2016. *Unique Integers on the Catalan Triangle* (poster presentation) .

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## Professional Experience

- 2022 **Graduate Student Intern in the Information Systems and Modeling Group (A-1)**, Los Alamos National Lab, Mentors: Dr. Sara Del Valle, Dr. Geoffrey Fairchild, & Dr. Nidhi Parikh,  
*Our project was to develop disease-surveillance strategies for epidemiological networks. I formulated the problem mathematically, developed novel algorithms to solve it, and programmed implementations of these methods that are scalable to massive networks (billions of edges). I also contributed to writing a forthcoming paper.*
- 2020 **NSF Mathematical Sciences Graduate Research Internship**, Lawrence Berkeley National Lab, Mentor: Dr. Nicole Sanderson,  
*Our project was to study the topological properties of artificial neural networks (ANN's) during training. I developed software to compute the persistent homology of Pytorch ANN's with respect to a novel filtration. I trained ANN's of various architectures on popular datasets (e.g. MNIST). I also contributed to writing a technical presentation.*
- 2017 **Research Experience for Undergraduates**, Center for Discrete Math and Theoretical Computer Science at Rutgers University, Mentor: Dr. Jingjin Yu,  
*Our project was to study the multi-robot path planning problem in continuous spaces. We developed a polynomial time algorithm with constant factor optimality in expectation. My main contributions were determining a lower-bound for the expectation of the optimal solution and showing a key step in our algorithm was guaranteed to avoid collisions..*
- 2016 **Research Experience for Undergraduates**, Muhlenberg College, Mentor: Dr. Eugene Fiorini,  
*Our project was to study integer sub-sequences in the Catalan triangle. I presented our work at the Young Mathematicians Conference (2016) and co-authored the related paper ?Primes and Perfect Powers in the Catalan Triangle?.*

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## Fellowships, Awards, and Other Funding

- 2022 Yueh-Jing Lin Fund Award Recipient, UC Davis.
- 2021-2022 NSF Alliances for Graduate Education and the Professoriate Graduate Research Supplement (AGEP-GRS), Project title: Two-Way Research Street: Geometric Algorithms in Optimization and Computer-Based Discrete Geometry.
- 2018-2020 Eugene Cota Robles Graduate Fellowship, UC Davis

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## Teaching Experience

- Teaching Assistant **Math 108: Introduction to Abstract Math**, Fall 2022, UC Davis. Lead Instructor: Dr. Orsola Capovilla-Searle.
- Math 21B: Integral Calculus**, Spring 2021, UC Davis. Lead Instructor: Dr. Ben Morris.
- Math 22A: Linear Algebra**, Winter 2021, UC Davis. Lead Instructor: Dr. David Marsico.
- Math 21A: Differential Calculus**, Fall 2020, UC Davis. Lead Instructor: Dr. Daniel Martin.
- Math 54: Linear Algebra**, Fall 2017, UC Berkeley. Lead Instructor: Dr. Michael Hutchings.
- Classroom Aid **Martin Luther King Jr Middle School**, Fall 2015, Berkeley, CA. Lead Instructor: Jay Cohen.

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## Mentoring Experience

2021 **Directed Reading Program Mentor**, UC Davis.

- **DRP Mentor**, *Led two undergraduate students in a directed reading program on mathematical optimization. I was responsible for creating the syllabus, compiling reading materials, producing exercises to guide readings, and facilitating discussions. Topics covered: Linear Regression/ Ordinary Least Squares, Ridge Regression, LASSO regression, Singular Value Decomposition/ Principle Component Analysis, and implementations of these methods in Python for real life data. In 2022 we are going to study recommender systems.*

2015-2017 **Bridging Berkeley Program Director**, UC Berkeley Public Service Center.

- **Program Director**, *Bridging Berkeley is a math mentoring program that matches UC Berkeley work-study students and volunteers with Berkeley middle school youth, especially those who will be first-generation college students. As director, I oversaw a team of roughly 30 mentors and 100 mentees while also mentoring a number of students myself.*

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## Service

Reviewer Boletin de la Sociedad Matemática Mexicana.

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## Workshops, Summer Schools, and Similar Activities

2021 Algorithmic Advances for Statistical Inference with Combinatorial Structure Workshop, Simons Insitute for the Theory of Computing (Virtual). October 11-15, 2021

VII Mexican Workshop in Geometric and Topological Data Analysis, Centro de Investigación en Matemáticas (Virtual). September 22-29, 2021

School on Modern Directions in Discrete Optimization, Hausdorff Center for Mathematics (Virtual). September 13-17, 2021

Geometric Methods in Optimization and Sampling Boot Camp, Simons Insitute for the Theory of Computing (Virtual). August 30-September 3, 2021

American Institute of Mathematics (AIM) Latinx Mathematicians Research Community Meeting (Virtual). June 7-11, 2021

2019 Mixed Integer Programming Workshop, Massachusetts Institute of Technology. July 15-18, 2019.

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## Skills

Computer Skills Expertise in Python, SQL, Git, Microsoft Office, LaTeX. Proficiency in Sage, Matlab.

Languages Fluency: English and Spanish. Proficieny: French.