## CURRENT POSITION

Visiting Assistant Professor, Harvey Mudd CollegeJuly 2023 - presentDuties: Teaching, mentoring a thesis student and faculty advisor for capstoneClaremont, CA, USAclinic project.Research interests: Algebraic geometry and its interactions with combinatoricsand commutative algebra.State Claremont, CA, USA

# Previous appointments

<b>Visiting Assistant Professor</b> , University of California, Riverside Duties: Teaching 2 courses per quarter, leading reading courses and student research projects.	September 2020 - June 2023 Riverside, CA, USA
<b>Teaching Assistant</b> , University of British Columbia Classes: Pre-calculus, first-year calculus (differential, integral, both sin- gle and multivariate), proof-based linear algebra, proof-based number theory, mathematical logic, complex analysis. Responsibilities: Head TA, directing discussion sessions, grading, help- ing students at the Mathematics Learning Center.	August 2015 - June 2020 Vancouver, BC, Canada
<b>Teaching Assistant</b> , Universidad Nacional Autónoma de México Classes: Linear Algebra I and II, Modern Algebra: Modules and ho- mological algebra. Responsibilities: Designing discussion sessions and grading.	August 2012 - June 2015 CU, Mexico City, Mexico
EDUCATION	
<b>Ph.D. in Mathematics</b> , University of British Columbia Thesis: Negative curves in blowups of weighted projective planes.	August 2015 - June 2020 Vancouver, BC, Canada
M.Sc. in Mathematics, Universidad Nacional Autónoma de México (UNAM) Thesis: Study of the Lie algebra of vector fields that preserve the conformal structure of Minkowski spacetime.	August 2013 - June 2015 CU, Mexico City, Mexico
Licenciatura en Física, Universidad Nacional Autónoma de México (UNAM) Thesis: Maxwell equations, the Clifford algebra of Minkowski spacetime and the Dirac operator; with an associated generalization to the Lie al- gebra of the conformal transformations of a Lorentz metric.	August 2007 - June 2014 CU, Mexico City, Mexico
<b>Semester abroad</b> , Department of Physics, UC Berkeley Graduate classes: Quantum Field Theory. Undergraduate classes: Particle Physics, Modern Physics and Advanced Electrical Laboratory.	August - December 2011 Berkeley, CA, USA

#### PUBLICATIONS AND PREPRINTS

- 10. Polymatroids and moduli of points in flags. With P. Gallardo and J.L. González. Submitted. arXiv:2411.06816, 2024.
- 9. *P-nestohedra and toric compactifications of the moduli space of points in projective space.* With M. Bit (undergraduate coauthor), D. Karp, and J. Luo (undergraduate coauthor). In preparation, 2024.
- 8. Hypergraph associahedra and compactifications of moduli spaces of points. With J. Bown (undergraduate thesis student). Submitted. arXiv:2409.08611, 2024.
- Higher-dimensional Losev-Manin spaces and their geometry. With P. Gallardo, J.L. González and E. Routis. Submitted. arXiv:2308.07911.
- Enumeration of max-pooling responses with generalized permutohedra. With L. Escobar, P. Gallardo, J.L. González, G. Montúfar and A.H. Morales. Submitted, arXiv:2209.14978, 2022.
- Nonexistence of negative curves. With J.L. González and K. Karu. International Mathematics Research Notices (IMRN), Volume 2023, Issue 16, pp. 14368—14400, 2023.
- The geography of negative curves. With J.L. González and K. Karu. Michigan Mathematical Journal, Volume 1, Issue 1, 2023, pp. 1–30.
- 3. Curves generating extremal rays in blowups of weighted projective planes. With J.L. González and K. Karu. Journal of the London Mathematical Society, Volume 104, Issue 3, 2021, pp. 1342–1362.
- Constructing non-Mori Dream Spaces from negative curves. With J.L. González and K. Karu. Journal of Algebra, Volume 539, 2019, pp. 118–137.
- 1. On a family of negative curves. With J.L. González and K. Karu. Journal of Pure and Applied Algebra, Volume 223, Issue 11, 2019, pp. 4871–4887.

## TEACHING EXPERIENCE AS INSTRUCTOR OF RECORD

#### Lower Division Courses

Calculus and precalculus:

- Multivariable Calculus (HMC, Math 19, two sections, Fall 2024).
- Introduction to College Mathematics for Sciences II (Precalculus) (**UCR**, Math 6B, two sections, Spring 2021).
- First-year Calculus I (UCR, Math 9A, two sections in Fall 2021, two sections in Fall 2022).
- First-year Calculus III (UCR, Math 9C, two sections in Fall 2020).
- First-year Calculus I (UBC, Math 100, Fall 2018).

#### **Upper Division Courses**

- Ordinary Differential Equations (HMC, Math 82, Fall 2024).
- Ordinary Differential Equations (HMC, Math 82, two sections, Fall 2023).
- Linear Algebra (HMC, Math 073, two sections, Spring 2025).
- Linear Algebra (**HMC**, Math 073, two sections, Spring 2024).
- Linear Algebra I (UCR, Math 131, two sections, Winter 2021).
- Linear Algebra II (UCR, Math 132, Winter 2022).
- Topology: Introduction to Topology (UCR, Math 145, Winter 2022).

#### Teacher Preparation Courses

- History of Mathematics (UCR, Math 153, Spring 2022).
- Polynomials and number systems (UCR, Math 140, Spring 2022).

#### Graduate Level Courses

- Toric Geometry: Problem and discussion sessions for week-long mini-course in the 2022 Pan-American School in Commutative Algebra (CIMAT, Guanajuato, Mexico, June 2022).
- Sheaf theory: Reading course on sheaf theory (UCR, Math 194, Winter 2021).

#### Training

- MAA OPEN Math course "Team-based Inquiry Learning," 2023.
- UCR Mathematics Teaching Workshop, UCR, 2021
- UCR Mathematics Teaching Workshop, UCR, 2020
- Instructional Skills Workshop, UBC, 2018.
- Semester-long course: Mathematics Teaching Techniques, UBC, Fall 2015

#### Mentorship

<b>2024 Summer REU.</b>	June - July 2024
10 week long project with two students studying novel combinatorial aspects of moduli spaces in algebraic geometry.	Harvey Mudd College
<b>Thesis advisor.</b>	August 2023 - June 2024
Directing a senior thesis. The project involved studying novel combinatorial aspects of algebraic-geometric objects (moduli spaces). Outcomes include a research paper submitted for publication at the Journal of Algebraic Combinatorics.	Harvey Mudd College
<b>Clinic advisor.</b>	August 2023 - June 2024
Faculty mentor for Clinic capstone project. In this role I advice a group of five seniors in solving real-world, technical problems for a company.	Harvey Mudd College
Faculty Mentor for the National Science Foundation funded Califor- nia Alliance for Minority Participation (CAMP) Summer Scholars program. The program provided the student a \$5,000 stipend to work full time through- out a 10-week program on a research project supervised by me. I am still working with this student. The student was invited to attend the Math Al- liance's Fields of Dreams Conference 2022. Outputs of the mentorship are:	June - August, 2022 UC Riverside
• Poster presentation at the Summer Research in Science and Engineering (RISE) Undergraduate Research Symposium at UC Riverside 2022.	
<ul> <li>Poster presentation at the Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) 2022.</li> <li>Research Mentor - Summer REU (3 students).</li> <li>Co-organized with Patricio Gallardo. The project is about the mathematics of machine learning, stemming from our paper "Enumeration of max-pooling responses with generalized permutohedra". A research paper is under prepa- ration.</li> </ul>	June - December, 2022 UC Riverside

#### Research Mentor - Reading course.

## Awards and scholarships

<b>Excellence in Teaching: Outstanding Visiting Assistant Pro-</b> <b>fessor Award</b> , Mathematics Department, UC Riverside. Yearly recognition to 2 or 3 VAPs for their teaching performance. Award includes a \$500 prize.	June 2023
Candidato al Sistema Nacional de Investigadores (SNI), Consejo Nacional de Ciencia y Tecnología (CONACyT).	November 2022
Excellence in Teaching: Outstanding Visiting Assistant Pro- fessor Award, Mathematics Department, UC Riverside. Yearly recognition to 2 or 3 VAPs for their teaching performance. Award includes a \$500 prize.	June 2022
<b>Structured Quartet Research Ensembles (SQuaRE) grant</b> . The American Institute of Mathematics (AIM) provides both the re- search facilities and the financial support for our research group to spend a week at AIM in San Jose, California. The project originated in the Latinx Mathematicians Research Community (LMRC) Research Work- shop and is a collaboration with L. Escobar, P. Gallardo, J.L. González, G. Montúfar, A.H. Morales with name "Neural network polytopes."	December 2021
Latinx Mathematicians Research Community (LMRC) Re- search Workshop. The LMRC, sponsored by AIM and the NSF, is a year long program for early-career Latinx mathematicians which provides tiered mentor- ing research opportunities, professional development opportunities, and establishes a large research network of Latinx mathematicians.	June 2021
<b>International Doctoral Scholarship</b> , Consejo Nacional de Ciencia y Tecnología (CONACyT) Full tuition, medical insurance and a 1,000 CAD monthly stipend.	September 2015 - August 2019
<ul> <li>National Masters Scholarship, Consejo Nacional de Ciencia y Tec- nología (CONACyT)</li> <li>UNAM - UC Semester Abroad Scholarship</li> <li>Full scholarship to study a semester abroad at the Department of Physics at UC Berkeley as part of an exchange program between the University of California and UNAM.</li> </ul>	August 2013 - May 2015 August - December 2011
PROFESSIONAL SERVICE	
Organizer of a special session at the 2024 Joint Mathematics Merings: "Combinatorial Insights into Algebraic Geometry." The meeting featured a roster of 16 speakers from all career stages and divebackgrounds. Our goal was to help the participants showcase their worstrengthen and widen their professional network.	et- January, 2024 San Francisco, CA rse rk,

Co-organizer of the Western Algebraic Geometry Symposium (WAGS)

Largest algebraic geometry conference in the Western United States and Canada. Raised a total of \$14,000 from different UCR offices in addition to the base \$30,000 allocated by the conference's NSF grant. Other duties included inviting speakers, organizing a poster session, publicity, hiring catering services, creating and moderating a Discord channel, etc.

# Co-organizer of the Teaching Workshop of UCR's Department of Mathematics

September, 2022

UC Riverside

Teaching workshop for incoming VAPs and graduate students.

### INVITED TALKS AND POSTERS

What is a moduli space.	March 2025
Mathematical Pathways to an Excellent Future Conference at UC Riverside	Riverside, CA, USA
Moduli spaces of points in flags of affine spaces and polymatroids.	March 2025
IPAM's LatMath 2025 Conference	Los Angeles, CA, USA
What is a moduli space?	December 2024
Amherst College Mathematics Colloquium	Amherst, MA
Moduli spaces of points in flags of affine spaces and polymatroids.	December 2024
Birational Geometry Seminar (BGS), organized by Joaquín Moraga	Online
The hidden structure of negative curves, poster presentation.	November 2024
Western Algebraic Geometry Symposium (WAGS), University of Arizona	Tucson, AZ, USA
Moduli spaces of points in flags of affine spaces and polymatroids.	October 2024
2024 Fall Western Sectional Meeting at University of California, Riverside	Riverside, CA, USA
Moduli spaces of points in flags of affine spaces and polymatroids.	September 2024
2024 Fall Central Sectional Meeting at University of Texas, San Antonio	San Antonio, TX, USA
Moduli spaces through a combinatorial lens.	September 2024
Mathematics Colloquium of the Claremont Colleges	Claremont, CA, USA
Blow-ups of weighted projective planes at a point: Exploring the parameter	April 2024
space of triangles and the MDS property. Commutative Algebra and Algebraic Geometry in TUcSon (CAAGTUS), University of Arizona	Tucson, AZ, USA
Higher-dimensional Losev-Manin spaces and their geometry.	March 2024
AG@PUI Online Seminar	Online
What is a moduli space?	March 2024
Algebraic Geometry Seminar, UC Riverside	Online
Enumerating linearity regions of max-pooling layers in convolutional neural	February 2024
networks. Pomona College Applied Math Seminar	Claremont, CA
Exploring combinatorial aspects of max-pooling layers with undergraduates.	January 2024
Joint Mathematics Meetings 2024	San Francisco, CA
Higher-dimensional Losev-Manin spaces and their geometry.	January 2024

Joint Mathematics Meetings 2024	San Francisco, CA
What is a moduli space?	October 2023
Mathematics Colloquium of the Claremont Colleges	Claremont, CA, USA
The hidden structure of negative curves.	November 2023
Algebra/Number Theory/Combinatorics Seminar of the Claremont Colleges	Claremont, CA, USA
Blow-ups of weighted projective planes at a point: Exploring the parameter space of triangles and the MDS property.	February 2023
Algebraic Geometry Seminar, University of Utah	Salt Lake City, UT, USA
The hidden structure of negative curves, poster presentation.	November 2022
Western Algebraic Geometry Symposium (WAGS), UC Riverside	Riverside, CA, USA
The geography of negative curves, poster presentation.	October 2022
Texas Algebraic Geometry Symposium (TAGS), Texas A&M	College Station, TX, USA
Symbolic Rees algebras and negative curves.	September 2022
Commutative algebra seminar, UN–Lincoln	Lincoln, NE, USA
Una breve historia sobre la notación matemática.	September 2022
Matemáticas en español seminar, UN–Lincoln	Lincoln, NE, USA
Introduction to divisors.	January 2022
Algebraic Geometry Seminar, UC Riverside	Online
Negative curves in blowups of weighted projective planes.	December 2021
Algebraic Geometry Seminar, UC Riverside	Online
Curvas negativas en blowups de espacios proyectivos ponderados.	September 2021
Seminario de Álgebra Conmutativa y Geometría Algebraica, CIMAT	Online
The geography of negative curves.	April 2021
Western Algebraic Geometry Symposium (WAGS)	Online
A review of the theory of varieties.	April 2021
Algebraic Geometry Seminar, UC Riverside	Online
Finite generation of symbolic Rees algebras from a geometric perspective.	March 2021
Commutative Algebra Seminar, UC Riverside	Online
Estudiando anillos de Cox mediante una reducción a característica prima.	August 2019
Seminario Guillermo Torres. Institute of Mathematics, UNAM	CU, Mexico City, Mexico
Constructing examples and non-examples of Mori Dream spaces via a prime characteristic method. Algebraic Geometry Seminar, UC Riverside	June 2019 Riverside, CA, USA
Constructing Mori dream spaces and non-Mori dream spaces via prime char- acteristic methods. AG session of the Winter Meeting of the Canadian Math. Soc.	December 2018 Vancouver, BC, Canada

## Affiliations

# PROGRAMMING LANGUAGES

Python, SageMath, C++