Javier González Anaya
Email: javiergo@ucr.edu
url: javiergoa.github.io

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Current Position

Visiting Assistant Professor, University of California, Riverside — *July 2020 - present*
Areas of interest: Algebraic geometry and its interactions with commutative algebra and combinatorics. — Riverside, CA, USA

Previous appointments

Teaching Assistant, University of British Columbia — *September 2015 - June 2020*
Classes: Pre-calculus, first-year calculus (differential, integral, both single and multivariate), proof-based linear algebra, proof-based number theory, mathematical logic, complex analysis.
Responsibilities: Head TA, directing discussion sessions, grading, helping students at the Mathematics Learning Center. — Vancouver, BC, Canada

Teaching Assistant, Universidad Nacional Autónoma de México — *August 2012 - June 2015*
Classes: Linear Algebra I and II, Modern Algebra: Modules and homological algebra. Responsibilities: Designing discussion sessions and grading. — CU, Mexico City, Mexico

Education

Ph.D. in Mathematics, University of British Columbia — *September 2015 - June 2020*
Thesis: *Negative curves in blowups of weighted projective planes.* — Vancouver, BC, Canada

M.Sc. in Mathematics, Universidad Nacional Autónoma de México (UNAM) — *August 2013 - May 2015*
Thesis: *Study of the Lie algebra of vector fields that preserve the conformal structure of Minkowski spacetime.* — CU, Mexico City, Mexico

Licenciatura en Física, Universidad Nacional Autónoma de México (UNAM) — *August 2007 - May 2013*
Thesis: *Maxwell equations, the Clifford algebra of Minkowski spacetime and the Dirac operator; with an associated generalization to the Lie algebra of the conformal transformations of a Lorentz metric.* — CU, Mexico City, Mexico

Semester abroad, Department of Physics, UC Berkeley — *August - December 2011*
Graduate classes: Quantum Field Theory.
Undergraduate classes: Particle Physics, Modern Physics and Advanced Electrical Laboratory. — Berkeley, CA, USA

Publications and preprints

6. *Enumeration of max-pooling responses with generalized permutohedra.* With L. Escobar, P. Gallardo, J.L. González, G. Montúfar and A.H. Morales. In revision for SIAM Journal on Discrete Mathematics (SIDMA), arXiv:2209.14978, 2022.

5. *Non-existence of negative curves.* With J.L. González and K. Karu. To appear in International Mathematics Research Notices, arXiv:2110.13333, 2021.

4. *The geography of negative curves.* With J.L. González and K. Karu. Very positive referee report at the Michigan Mathematical Journal - Revised version under review, arXiv:2104.03950, 2021.

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.

2. *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.

Awards and scholarships

Excellence in Teaching: Outstanding Visiting Assistant Professor Award, Mathematics Department, UC Riverside. *June 2022*
Yearly recognition to 2 or 3 VAPs for their teaching performance. Award includes a $500 prize.

Structured Quartet Research Ensembles (SQuaRE) grant. *December 2021*
The American Institute of Mathematics (AIM) provides both the research 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 Workshop and is a collaboration with L. Escobar, P. Gallardo, J.L. González, G. Montúfar, A.H. Morales with name "Neural network polytopes."

Latinx Mathematicians Research Community (LMRC) Research Workshop. *June 2021*
The LMRC, sponsored by AIM and the NSF, is a year long program for early-career Latinx mathematicians which provides tiered mentoring research opportunities, professional development opportunities, and establishes a large research network of Latinx mathematicians.

International Doctoral Scholarship, Consejo Nacional de Ciencia y Tecnología (CONACyT) *September 2015 - August 2019*
Full tuition, medical insurance and a 1,000 CAD monthly stipend.

National Masters Scholarship, Consejo Nacional de Ciencia y Tecnología (CONACyT) *August 2013 - May 2015*

UNAM - UC Semester Abroad Scholarship *August - December 2011*
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.

Teaching experience

Lower Division Courses

Precalculus:

- Introduction to College Mathematics for Sciences II (UCR, Math 6B, Spring 2021, two sections).

Calculus:

- 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

Teacher Preparation Courses:

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

Other:

- Linear Algebra (Proof-based): First course (UCR, Math 131, two sections, Winter 2021), Second course (UCR, Math 132, Winter 2022).
- Topology: Introduction to Topology (UCR, Math 145, Winter 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

- 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

Faculty Mentor for the National Science Foundation funded California Alliance for Minority Participation (CAMP) Summer Scholars program. *June - August, 2022* *UC Riverside*

The program provided the student a $5,000 stipend to work full time throughout 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 Alliance's Fields of Dreams Conference 2022. Outputs of the mentorship are:

- Poster presentation at the Summer Research in Science and Engineering (RISE) Undergraduate Research Symposium at UC Riverside 2022.
- Poster presentation at the Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) 2022.

Research Mentor - Summer REU (3 students). *June - December, 2022* *UC Riverside*

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 preparation.

Research Mentor - Reading course. *January - March, 2022* *UC Riverside*

Supervised one undergraduate student on a reading course about graduate-level sheaf theory.

Professional Service

Co-organizer of the Western Algebraic Geometry Symposium (WAGS) *November, 2022* *UC Riverside*

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

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. — *June 2019*
Algebraic Geometry Seminar, UC Riverside — Riverside, CA, USA

Constructing Mori dream spaces and non-Mori dream spaces via prime characteristic methods. — *December 2018*
AG session of the Winter Meeting of the Canadian Math. Soc. — Vancouver, BC, Canada

Programming languages

Python, SageMath, C++