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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. *Nonexistence of negative curves.* With J.L. González and K. Karu. International Mathematics Research Notices, 2023. https://doi.org/10.1093/imrn/rnac355

4. *The geography of negative curves.* With J.L. González and K. Karu. Accepted. To appear in the Michigan Mathematical Journal. 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

Candidato al Sistema Nacional de Investigadores (SNI), Consejo Nacional de Ciencia y Tecnología (CONACyT). *November 2022*

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

Blow-ups of weighted projective planes at a point: Exporing the parameter space of triangles and the MDS property. — *February 2023*
Geometry & Topology Seminar, University of Waterloo — Waterloo, ON, CA

Blow-ups of weighted projective planes at a point: Exporing 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. — *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

Affiliations

Mentor for the Math Alliance

Programming languages

Python, SageMath, C++