Juan Armando Parra Flores

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Education

M.Sc. **Mathematics.** CIMAT (Mathematics Research Center). Aug 2024 - Dec 2026 (expected)

- Thesis. Non lifting problem of the mapping class group by diffeomorphisms of a surface with marked points (*spanish*).
- Advisor. Dr. Rita Jiménez Rolland.

B.Sc. **Mathematics.** University of Guanajuato. Aug 2019 – Dec 2023

Research Experiences

TDA of Neural Networks. Seminar in topology Workshop. Directed by Dr. Jose Luis Leon and partnership with Dr. José Calderón. Online, Feb - May 2026

10th Oaxacan School of Mathematics. Geometric Group Theory team. Directed by Dr. Porfirio León, Dr. Nestor Colin and Dr. Rita Jiménez. Oaxaca, Mex. Jan - Feb 2025

- Handlebody Group and Heegaard Splittings.

Topologycal Aspects of the Simetries in Surfaces Directed by Dr. Israel Morales Jiménez Online, Aug 2023 - Nov 2024

- CUBO University of La Frontera Chile (spanish) (paper).

MIT Summer Geometry Iniciative Worked in three projects: Online, July - Aug 2024

- Poisson Algorithm of Surface Reconstruction. Directed by Dr. Silvia Sellán and Dr. Oded Stein.
- Voronoi piecewise surrogates. Directed by Dr. Martin Jorgensen.
- Neural Networks for Swept Volumes. Directed by Dr. Silvia Sellán and Dr. Noam Aigerman (project uploaded to SGI 2024 project reports).

Fields Undergraduate Summer Research Program. Predicting Performance of Machine Translation over Low Resource Languages. Directed by Dr. En-Shuin Annie Lee. Toronto, CA, June - Aug 2023

- EACL 2024 (submission; arxiv).

8th Oaxacan School of Mathematics. Topological Surfaces group. Directed by Dr. Israel Morales Jiménez. Oaxaca, Mex. Jan - Feb 2023

- Topological properties of the Mapping Class Group. (notes in spanish).

Teaching

Highschool teacher. At the University of Guanajuato Highschool in Silao. ENMS Silao, Sept 2026 -

- Differential Calculus.
- Operations and Software Applications. *Basic introduction to informatic and office software.*

Teaching Assistantships

Reviewing and grading weekly homeworks; taking care of the grades; a weekly problem solving class; office hours one hour per week.

Differential and Integral Calculus III. Proof based differential calculus on several variables. University of Guanajuato, Aug-Dec, 2025

Aug-Dec, 2023
Aug-Dec, 2021

Modeling with Differential Geometry. Differential Geometry of Curves and Surfaces with applications. — CIMAT, Aug-Dec, 2024

Topology. Point set topology. — University of Guanajuato, Aug-Dec, 2022

Differential and Integral Calculus II. Proof based integral calculus on a single variable. — University of Guanajuato, Jan-July, 2022

Talks

CIMAT Students Seminar The Milnor-Wood inequality. — Guanajuato, Sept 25, 2026

Geometry Algebra and Topology Seminar at Oaxaca. An obstruction to the realization problem of the mapping class group of a surface with marked points. — Oaxaca, Apr 22, 2026

Seminar on Mapping Class Groups of 3-manifolds. The Mapping Class Group of $S^2 \times S^1$. — UNAM Oaxaca/Online, October 31, 2025

Mexican Mathematical Society National Congress. The Handlebody Group and Heegaard Splittings. — BUAP Puebla, October 23, 2025

CIMAT Students Seminar. Consequences of the Alexander's Method. — CIMAT Guanajuato, March 21, 2025

10th Oaxacan School of Mathematics. Final project presentation. — UNAM Oaxaca, February 5, 2025

Jr. Seminar in the Mathematics Department of the University of Guanajuato. Surfaces, their homeomorphisms and a brief introduction to the Mapping Class Group. — UG Guanajuato, Nov 22, 2023

Seminar of Combinatorial Group Theory. Workshop in Cayley Complexes (web page). — CIMAT Guanajuato, Nov 14, 2023

Fields Undergraduate Summer Research Program Presentation. Predicting Performance of Machine Translation over Low Resource Languages. — Fields Institute Toronto, Aug 9, 2023

8th Oaxacan School of Mathematics. Final project presentation. — UNAM Oaxaca, February 4, 2023

Computational skills

I'm confident in computing in some ways.

1. Artificial Intelligence, Data Science and Optimization. I know the basic theory, I'm able to build simple models with experimental purposes or for a scholar project.
2. I have some experience solving competitive programming problems, for instance in `codeforces.com`. Also because of the Algorithms classes I took during my undergrad studies.
3. I am familiar with computational complexity concepts like the ones related to the "word problem" for groups. I took a course during my undergraduate studies that also covered topics in computation like finite automata and Turing Machines.
4. I always try to manage my computer carefully. I use Linux to automate my system in a secure way.

Workshops and schools

Colombian meeting of geometry and topology (ECOGyT). — Cali, Col. Aug 2026

- Obstructions to the realization of subgroups of mapping classes by diffeomorphisms.

(Poster).

5th School of Geometric Group Theory. Oaxaca, Mex. Jul 2026

School "Fico González Acuña" of knots and 3-manifolds. UNAM Oax., Dec 2025; UNAM Cuer., Dec 2024; CIMAT Gto., Dec 2022

1st Meeting in Geometry, Algebra and Topology. UNAM Oaxaca June 2025

1st Research School in Geometry at Cuernavaca. Workshops and courses in Heegard Splittings, Quandles, Algebraic Geometry and Homogeneous Spaces. Cuernavaca , Mex. June 2025

EMALCA (School of Mathematics of Latin America and the Caribbean) (web page). UNAM Cuernavaca June 2024

CIMAT Thematic School. Topology and Differential Geometry. CIMAT Guanajuato April 2024, Dec 2023, June 2023

Mathematical Semesters at CIMAT. Data Science Summer Course. CIMAT Guanajuato July 2022

Tutoring

Tutor in Calculus Problem Solving Workshop. Lead a group of first-year undergraduate students during a week to solve hard calculus problems and present their work. CIMAT July, 2024

Independent Math Teacher. Guanajuato Jan-Aug 2024

Tutor in Math Writting Workshop. Assisting first-semester students to understand and reproduce proofs in mathematics. University of Guanajuato Aug-Sep, 2020

Service

Alumni Society of the University of Guanajuato Mathematics Department. President. University of Guanajuato May 2023-Apr 2024

Campus Guanajuato Council Member of the University of Guanajuato. Substitute. University of Guanajuato Feb 2021-Feb 2023

Homeworks workshop tutor for elementary school students. At the *Buen Pastor*'s Convent. Guanajuato Jan-July 2022

Coach in the Guanajuato Mathematical Olympiad. For elementary and middle school levels. Guanajuato Jan-July 2021

Matemorfosis Team at CIMAT. CIMAT's divulgation of math and science team. CIMAT Aug 2019-July 2020

Skills

Programming Languages. Python, C++, C#, Bash, LaTeX.

Algorithms. Data structures and algorithms; Multilayer Perceptron; Optimization.

Software. Linux (Debian and Arch based distributions); git; makefile; vim.

Languages. Spanish (native); English (TOEFL iBT score 90/120).

Scholarships

Master's studies scholarship. Given by the CONAHCYT to students enrolled in a science graduate program. — CONAHCYT, Aug 2024 - July 2026

Excellence Academic Scholarship. Awarded by a joint agreement of CIMAT with the University of Guanajuato. — CIMAT-UG, Aug 2019 - Dec 2023

Highschool Merit Acknowledge Scholarship. — University of Guanajuato, Aug 2018 - July 2019

Honors and awards

Trajectory Merit Acknowledge at University of Guanajuato. Awarded by the University of Guanajuato to students with the highest grades during their whole trajectory. — University of Guanajuato, 2024

Annual Merit Acknowledge by the University of Guanajuato. Awarded by the University of Guanajuato to students with the highest grades of their program during their academic year. — University of Guanajuato, 2020, 2022 and 2023

Highschool Merit Acknowledge by the University of Guanajuato. Awarded by the University of Guanajuato to students with the highest grades of their program during their academic year. — University of Guanajuato, 2019

Attendance to conferences and courses

VIII Conference on Finite Dimensional Integrable Systems in Geometry and Mathematical Physics (FDIS). — CIMAT Guanajuato, Aug 2025

Little Conference of Differential Geometry. CIMAT Guanajuato. — CIMAT Guanajuato, Dec 2023