

# JORGE ANTONIO CRUZ CHAPITAL PHD.

University of Toronto  
Department of Mathematics  
Bahen Center for information technology

[jorgeacruzchapital@gmail.com](mailto:jorgeacruzchapital@gmail.com)

## CURRENT POSITION

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Postdoctoral fellow, University of Toronto (July 2024-June 2027)

## ACADEMIC INTERESTS

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My areas of interest are always expanding. My main areas of research are Set Theory and Topology due to their interaction with several branches of Mathematics as well as Philosophy and Computer Science.

## EDUCATION

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### Universidad Nacional Autónoma de México y Universidad Michoacana de San Nicolás de Hidalgo

- Ph.D., Mathematics, *Honorific mention* (2020-2024).
- Advisors: Michael Hrušák and Osvaldo Guzmán González.
- Thesis: *Construction schemes-Building the uncountable from finite pieces.*

### Universidad Nacional Autónoma de México y Universidad Michoacana de San Nicolás de Hidalgo

- M.S, Mathematics (2018-2020).
- Advisor: Michael Hrušák.

### Universidad Nacional Autónoma De México

- B.S., Mathematics (2014-2018).
- Advisor: Natalia Jonard Pérez

## PUBLICATIONS AND PREPRINTS

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11. **All ordinals are cop-robber ordinals** (joint with Tomáš Flídr and Maria-Romina Ivan). Submitted.
10. **There may be an  $n$ -entangled set but no  $n+1$ -entangled sets.** Submitted.
9.  **$\kappa$ -barely independent families and Tukey types of ultrafilters.** Topology and its applications, 2026.
8. **Forcing Axioms and Construction schemes** (joint with Osvaldo Guzmán and Stevo Todorčević). Submitted.
7. **Some finitizations of club and CH.** Submitted.

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<sup>1</sup>Updated December 23, 2025

6. **Game-theoretic variants of the splitting number** (joint with Tatsuya Goto, Yusuke Hayashi and Takashi Yamazoe). Submitted.
5. **Construction Schemes: Transferring structures from  $\omega$  to  $\omega_1$ .** (joint with Osvaldo Guzmán and Stevo Todorcević). Annals of pure and applied logic, 2026.
4. **Game-theoretic variants of cardinal invariants.** (joint with Tatsuya Goto and Yusuke Hayashi). RIMS Kôkyûroku No.2315 (Recent developments in axiomatic set theory), 2024.
3. **The uniform convergence topology on separable subsets.** (joint with Alejandro Daró Rojas Sánchez, ángel Tamariz Mascarúa and Humberto Villegas Rodríguez). Topology and its Applications, 2024.
2. **Partition Forcing and Independent Families.** (joint with Vera Fischer, Osvaldo Guzmán and Jaroslav Supina). Journal of Symbolic Logic 2022.
1. **Continuous Selections and Prime Numbers.** Topology and its Applications, 2022.

## SELECTED TALKS

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6. *Que será de mi si estudio Topología? Mesa Redonda.* Ciudad de México, México, Taller Mexicano de topología, 2025.
5. *On a finitization of Club and CH.* Seattle, United States, Joints Mathematics Meeting, 2025.
4. On gaps, almost disjoint families and a Ramsey UltrafilterHejnice, Czcech republicWinter school in abstract analysis2024
3. *Transferring structures from  $\omega$  to  $\omega_1$ .* CMO, Oaxaca, México, BIRS workshop, 2023.
2. *Extensions of weak continuous selections.* Hejnice, Czcech republic, Winter school in abstract analysis, 2020.
1. *Extension de selecciones.* Durango, México, Jornadas de Topología, 2019.

## TEACHING EXPERIENCE

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- Instructor, MAT137 Calculus with proofs, University of Toronto, Undergraduate Course (Fall 2025 and Winter 2026).
- Instructor, MAT337 Introduction to Real Analysis, University of Toronto, Undergraduate Course (Winter 2025).
- Instructor, MAT309 Introduction to Mathematical logic, University of Toronto Undergraduate Course (Fall 2024).
- Instructor, Seminario de Topología A: Combinatoria infinita con una introducción al forcing (Infinite combinatorics with an introduction to forcing), Facultad de Ciencias, UNAM, Undergraduate Course (2024-2, Winter 2024)
- Teaching Assistant, Seminario de Topología B: Introducción a la topología de dimensión infinita (Introduction to infinite dimensional topology), Facultad de Ciencias, UNAM, Undergraduate Course (2024-2, Winter 2024)
- Teaching Assistant, Geometría Analítica (Analytic Geometry), ENES Morelia, UNAM, Undergraduate Course (2023-1, Fall 2022)
- Instructor, Seminario de Topología B: Algebras Booleanas (Boolean Algebras), Facultad de Ciencias, UNAM, Undergraduate Course (2022-2, Winter 2022)

- Teaching Assistant, Calculo Diferencial e Integral II, (Differential and Integral Calculus II), Facultad de Ciencias, UNAM, Undergraduate Course (2022-1, Fall 2021)
- Instructor, Análisis Matemático I (Mathematical Analysis I), Facultad de Ciencias, UNAM, Undergraduate Course (2022-1, Fall 2021)
- Teaching Assistant, Análisis Matemático II (Mathematical Analysis II), Facultad de Ciencias, UNAM, Undergraduate Course (2021-2, Winter 2021)
- Teaching Assistant, Conjuntos y Lógica (Sets and Logic) Facultad de Ciencias, UNAM, Undergraduate Course (2021-2, Winter 2021)
- Teaching Assistant, Análisis Matemático I, Facultad de Ciencias, UNAM, Undergraduate Course (2021-1, Fall 2020)
- Teaching Assistant, Análisis Matemático II, Facultad de Ciencias, UNAM, Undergraduate Course (2021-1, Fall 2020)
- Teaching Assistant, Topología General (General Topology) Centro de Ciencias Matemáticas, UNAM, Graduate Course (2020-2, Winter 2020)
- Teaching Assistant, Topología II (Topology II), Facultad de Ciencias, UNAM, Undergraduate Course (2018-2, Winter 2018)
- Teaching Assistant, Teoría de Conjuntos II (Set Theory II), Facultad de Ciencias, UNAM, Undergraduate Course (2018-1, Fall 2017)
- Teaching Assistant, Topología I (Topology I), Facultad de Ciencias, UNAM, Undergraduate Course (2018-1, Fall 2017)
- Teaching Assistant, Álgebra Lineal I (Linear Algebra I), Facultad de Ciencias, UNAM, Undergraduate Course (2017-2, Winter 2017)
- Teaching Assistant, Álgebra Superior II (Superior Algebra II), Facultad de Ciencias, UNAM, Undergraduate Course (2017-2, Winter 2017)

## SUPERVISED THESES

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- *La hipótesis del cardinal singular*, Sebastián Rosas Ayala, Facultad de Ciencias, UNAM (Thesis defense expected before February, 2026)

## OTHER ACADEMIC ACTIVITIES

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- Founding Member and Co-organizer of *Seminario Junior de Matemáticas*, Facultad de Ciencias, UNAM, 2017.
- Reviewer for academic Journals such as: Topology and its applications and Journal of symbolic logic.
- Several participations in divulgation events for the general public such as "Feria matemática de Morelia" and "Fiesta de las Ciencias y las Humanidades" during my graduate studies.

## AWARDS

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- *F. V. Atkinson Teaching Award for Postdoctoral Fellows*, University of Toronto.

This award celebrates outstanding teaching by postdoctoral fellows and junior research faculty not on the tenure track. Named in memory of former Chair Frederick V. Atkinson—respected mathematician and beloved mentor—this award acknowledges instructors who demonstrate excellence in teaching and have made a meaningful impact in the classroom.

## LANGUAGE

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Spanish (native), English (fluid), Italian (basic) and French (basic).