



Curriculum Vitae

Carlos Vargas

Date / place of birth: 14 August, 1986, Zapopan, México

Nationality: Mexican.

E-mail: ei.turbomath@gmail.com

Personal Webpage: <https://carlos-vargas-math.github.io/>

SCOPUS-id: 55049143700

ORC-ID: 0000-0003-1080-5278

Employment history

Date	Employer	Position / description /tasks / Main achievements
2021 - present	Freelancer	Private tutor and content designer for topics in Mathematics research in Mathematics, thesis director, private tutor, content designer <ul style="list-style-type: none">• Publications: 1 article• Thesis direction: 2 graduate students (MSc)
Oct 2015 - Sep 2020	CONACYT - CIMAT, Mexico	Cátedra CONACYT at CIMAT full-time teaching and research position from CONACYT at CIMAT <ul style="list-style-type: none">• Publications: 4 articles• Thesis direction: 2 graduate students (MSc) + 2 undergraduate students• Teaching: 6 graduate courses + 3 high-school courses• Event organization: 4 international conferences + 1 school• Conference talks:
Feb 2015 - Oct 2015	Technische Universität Graz - Graz, Austria	Projektassistent (Project Assistant of Prof. Franz Lehner) <ul style="list-style-type: none">• Publications: 2 articles• TA: 1 undergraduate course• Conference talks:

2012 - 2015	Universität des Saarlandes, Saarbrücken, Germany.	Wissenschaftlicher Mitarbeiter TVL-13 (75%) (Research and teaching assistant of Prof. Dr. Roland Speicher) Publications: 2 articles TA: 2 courses Conference Talks:
2010 - 2011	Universität des Saarlandes, Germany.	Wissenschaftlicher Mitarbeiter TVL-13 (50%) (Research assistant of Prof. Dr. Roland Speicher)

Education

Date	Institution	Degree / Details	
Doktor der Naturwissenschaften			
2010 - 2015	Universität des Saarlandes. Saarbrücken, Germany	Thesis: Advisor: Honors: Date:	“Free probability: Deterministic Equivalents and Combinatorics” Prof. Dr. Roland Speicher. Magna Cum Laude. 05 / May / 2015.
2019 - 2010	Queen’s University Kingston, Canada	Master of Science: Mathematics and Statistics Advisor: Prof. Dr. Roland Speicher. Date: 17 / Sep / 2010	
2004 - 2009	Universidad de Guanajuato, Guanajuato, Mexico	Bachelor’s Degree (Licenciado en Matemáticas) Advisor: Dr. Víctor Pérez-Abreu. Date: 12 / Jun / 2009 Cédula Profesional: 09627621	

Research Interests

- Non-commutative probability, free probability, large random matrices, cumulants.
- Combinatorics, posets, lattices, incidence algebras, Möbius inversions.
- Large random graphs, large random topological spaces, topological and geometrical data analysis.
- Mathematical Olympiads and the outreach of topics in Mathematics.

Academic stays.

I attended the Focus Program on Non-commutative distributions in Free Probability Theory, at the Field's Institute in Toronto, July 2013.

I attended the workshop on Free Probability at the Mathematisches Forschungsinstitut Oberwolfach, March 2015.

List of main publications

For citation statistics, see: <https://www.scopus.com/authid/detail.uri?authorId=55049143700>

- Free Deterministic Equivalents, rectangular random matrix models and operator-valued free probability (with R. Speicher) Random Matrices: Theory and Applications, 1, (2012).
- Products of free random variables and k-divisible non-crossing partitions (with O. Arizmendi) Electronic Communications in Probability, 17, (2012).
- Analytic subordination theory of operator-valued free multiplicative convolutions and applications to random matrix theory (with S. Belinschi, R. Speicher and J. Treilhard). International Mathematical Research Notices, (2014).
- Relations between cumulants in non-commutative probability (with O. Arizmendi, T. Hasebe, and F. Lehner). Advances in Mathematics, vol. 282, 10, (2015).
- Norm convergence in Non-Commutative Central Limit Theorems: Combinatorial Approach. (with O. Arizmendi). Contemporary Mathematics (AMS), vol. 657, (2016).
- On the asymptotic distribution of block-modified random matrices. (with O. Arizmendi and I. Nechita) Journal of Math. Phys. 57, (2016).
- A general solution to (free) deterministic equivalents. Contemporary Mathematics (AMS) vol. 701, pp 28, (2018).
- Subordination methods for free deconvolutions (with O. Arizmendi and P. Tarrago). Annales de l'Institut Henri Poincaré, Probabilités et Statistiques, Vol 56, 4, pp 2565-2594 (2020).
- Combinatorics of NC-probability spaces with independent constants (with C. Díaz-Aguilera, T. Gaxiola and J. Santos) Inf. Dim. An. Quantum Prob. Rel. Top. pp 20 (2022).

Supervised Students

- 2021 Marcos Torres Vivanco (MSc. CIMAT).
- 2021 Jorge Luis Santos Silva (MSc. CIMAT).
- 2019 Saúl Rogelio Mendoza Jacobo (MSc. CIMAT).
- 2019 Carlos Eduardo Díaz Aguilera (MSc. CIMAT).
- 2019 Gustavo Adolfo García Gutiérrez (BSc. Universidad de Guanajuato).
- 2017 Saúl Rogelio Mendoza Jacobo (BSc. Universidad de Sinaloa).

Grants and Awards

2016-2019	Sistema Nacional de Investigadores (SNI 1)
11.2011-05.2012	CONACYT-DAAD grant for doctoral studies.
08.2008-07.2009	SNI-Research Assistant of Dr. Victor Pérez-Abreu.
08.2004-06.2009	CIMAT Scholarship for undergraduate studies.

Teaching Experience

g = graduate course, ug = undergraduate course, h = high school course

2019-II	Topological Data Analysis, g.
2019-II	Free Probability, g.
2019-I	Combinatorics and Probability, g.
2018-II	Random Matrices, g.
2018-I	Introduction to Probability and Statistics, h.
2018-I	Algebra II, h.
2017-II	Algebra, h.
2017-II	Random Matrices and Random Graphs, g.
2016-II	Combinatorics and Probability, g.

Experience as Tutor / Grader

g = graduate course, ug = undergraduate course

2015-I	Linear algebra at TU, Graz, ug.
2014-I	Free entropy and random matrices at Universität des Saarlandes, g.
2013-II	Funktionentheorie (complex analysis) at Universität des Saarlandes, ug.
2010-I	Math Help Centre assistant at Queen's University, ug.
2009-II	Linear algebra and Calculus TA/Grader at Queen's University, ug.
2009-I	Calculus IV TA/Grader at Universidad de Guanajuato, ug.
2008-II	Calculus III TA/Grader at Universidad de Guanajuato, ug.
2008-I	Complex Analysis TA/Grader at Universidad de Guanajuato, ug.
2007-I	Number Theory TA/Grader at Universidad de Guanajuato, ug.

Organization of Events

01.2020	6 th School-Winter Workshop on Geometric and Topological Data Analysis.
Co-organizers	A. Martín del Campo and A. Rieser.
Venue	CIMAT, Guanajuato, Mexico.
11.2018	5 th . School on Topological Data Analysis.
Co-organizers	A. Martín del Campo and A. Rieser.
Venue	CIMAT, Guanajuato, Mexico.
12.2017	Simposio de Probabilidad y Procesos Estocásticos.
Co-organizers	S. López, A. Rocha-Arteaga and V. Rivero.
Venue	Faculty of Science, UNAM. CDMX.
09.2017	Homotopy Probability Theory (ERC Mini-workshop).
Co-organizers	R. Friedrich.
Venue	Universität des Saarlandes.
03.2017	XV School on Probability and Statistics.
Co-organizers	E. Diaz-Francés and J.C. Pardo.
Venue	CIMAT, Guanajuato, Mexico.

Mathematical Olympiads

I have collaborated with the Mexican Mathematical Olympiad for several years by helping with various tasks during the time periods 2005-2009 and 2016-2019: as state and national team trainer-grader, as part of the organizing committee and as member of the jury for several national and international contests.

I was part of the Mexican national team for the IMO 2004 and 2003. I obtained:

- Bronze Medal (IMO 2004)
- Bronze Medal (Iberoamerican Mathematical Olympiad, 2003)
- Gold Medal (Centro-Caribbean Mathematical Olympiad, 2002)

Language Proficiency

Spanish (native).
English (fluent).
German (intermediate).