

Curriculum Vitae of Gil Bor

Contact:

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Education:

- 1983, BSc: Mathematics and Physics, Hebrew U, Jerusalem, Israel.
- 1985, MSc: Mathematics, Hebrew U, Jerusalem, Israel. Thesis: *Cross-ratios on flag manifolds*. Advisor: Prof. H. Furstenberg.
- 1991, PhD: Mathematics, UC Berkeley, USA. Thesis: *Non self-dual Yang-Mills Fields*. Advisor: Prof. J. Marsden.

Mathematical specialization: Differential geometry, mathematical physics.

Appointments

- 1983-85: Teaching assistant, Hebrew U, Jerusalem, Israel.
- 1985-91: Teaching and research assistant, UC Berkeley, USA.
- 1991-1994: associate professor (post-doctoral position), U of Arizona, Tucson, USA.
- 1994-present: CIMAT (Centro de Investigación en Matemáticas), Guanajuato, Mexico. (Investigador titular “C”, SNI: nivel II).

Publications

Research

(Articles marked with * are in Q1 journals.)

1. *[SO\(3\)-invariant Yang-Mills fields which are not self-dual](#)* (with R Montgomery)
In: Harnad, J., Marsden, J.E. (eds.), *Hamiltonian systems, transformation groups, and spectral transform methods*. Proceedings, Montreal, 1989. Montréal: Les publications CRM 1990.
- 2.* *[Yang-Mills Fields which are not Self-Dual](#)*
Commun. Math. Phys. **145** (1992), 393–410. [DOI](#)
- 3.* *[Symmetric Instantons and the ADHM Construction](#)* (with J Segert)
Commun. Math. Phys. **183** (1997), 183–203. [DOI](#)
4. *[The canonical bundle of an hermitian manifold](#)* (with L Hernández)
Bol. Soc. Mat. Mexicana **5.1** (1999), 187–198.
5. *[Bochner formulae for orthogonal G-structures on compact manifolds](#)* (with L Hernández)
Diff. Geom. Appl. **15** (2001), 265–286. [DOI](#)
6. *[Bochner formula for almost-quaternionic-Hermitian structures](#)* (with L Hernández)
Diff. Geom. Appl. **21.1** (2004), 79–92. [DOI](#)

7. [Orthogonal almost complex structures of minimal energy](#) (with L. Hernández, M. Salvai)
Geom. Dedicata **127.1** (2007), 75–85. [DOI](#)
8. [G₂ and the rolling distribution](#) (with R. Montgomery).
L'Enseignement Mathématique **55** (2009), 157–196. [DOI](#)
- 9.* [The dancing metric, G₂-symmetry and projective rolling](#) (with L. Hernandez Lamonedá, P. Nurowski).
Trans. Amer. Math. Soc. **370.6** (2018), 4433–4481. [DOI](#)
10. [Testing the Domino Theory of Gene Loss in *Buchnera aphidicola*: The Relevance of Epistatic Interactions](#)
(with D. Martínez-Cano, A. Moya, L. Delaye).
Life **8.2** (2018), 17. [DOI](#)
- 11.* [Tire track geometry and integrable curve evolution](#) (with M. Levi, R. Perline, S. Tabachnikov).
Int. Math. Res. Not. **2020.9** (2020), 2698–2768. [DOI](#)
- 12.* [Hill's equation, tire tracks and rolling cones](#) (with M. Levi).
Nonlinearity **33.4** (2020), 1424–1442. [DOI](#)
- 13.* [On the isometric conjecture of Banach](#) (with L. Hernandez, V. Jimenez, L. Montejano).
Geom. Topol. **25.5** (2021), 2621–2642. [DOI](#)
- 14.* [Bicycle paths, elasticae and sub-Riemannian geometry](#) (with A. Ardentov, E. Le Donne, R. Montgomery, Yu. Sachkov).
Nonlinearity **34.7** (2021), 4661–4683. [DOI](#)
- 15.* [Left-invariant CR structures on 3-dimensional Lie groups](#) (with H. Jacobowitz).
Complex Anal. Synerg. **7**, 23 (2021). [DOI](#)
16. [Variations on the Tait-Kneser theorem](#) (with C. Jackman, S. Tabachnikov).
Math. Intelligencer **43** (2021), 8–14. [DOI](#)
17. [Para-Kähler-Einstein 4-manifolds and non-integrable twistor distributions](#) (with O. Makhmali, P. Nurowski).
Geometriae Dedicata **216.9** (2022). [DOI](#)
18. [Self-Backlund curves in centroaffine geometry and Lamé's equation](#) (with M. Bialy, S. Tabachnikov).
Comm. AMS **2** (2022), 232–282. [PDF](#) | [DOI](#)
19. [Revisiting Kepler: new symmetries of an old problem](#) (with C. Jackman).
Arnold J. of Math. **9** (2023), 267–299. [DOI](#)
20. [On cusps of caustics by reflection: a billiard variation on Jacobi's Last Geometric Statement](#) (with S. Tabachnikov).
Am. Math. Monthly, **130.5** (2023), 454–467. [DOI](#)
- 21.* [Bicycling geodesics are Kirchhoff rods](#) (with C. Jackman and S. Tabachnikov).
Nonlinearity **36** (2023), 3572–3602. [DOI](#)
22. [Dancing polygons, rolling balls and the Cartan-Engel distribution](#) (with L. Hernández)
New York J. Math. **29** (2023), 981–1015.
- 23.* [Chains of path geometries on surfaces: theory and examples](#) (with T. Willse)
Israel J Math, TBD (2024), 1–39
- 24.* [Cusps of caustics by reflection in ellipses](#) (with M. Spivakovsky and S. Tabachnikov)
J. London Math. Soc. **2** (2024), 110:e70033. [DOI](#)

Preprints

25. [Bicycle tracks with hyperbolic monodromy – results and conjectures](#) (with M. Hernández-Lamoenda and S. Tabachnikov)
[ArXiv Preprint](#)

Expository

26. [Poincaré y el problema de \$N\$ -cuerpo](#) (with R. Montgomery)
Miscelanea Matemática, **58** (2014), 83–102.
27. [La geometría de trayectorias de bicicletas](#) (with S. Tabachnikov)
Ciencias (revista de divulgación de la UNAM), **135** (2020).

Invited research talks (since 2014):

1. *The dancing metric, rolling of the projective plane on its dual and G_2 symmetry*
Geometry seminar, Univ of the Republic, Montevideo, Uruguay. Apr 2014.
2. *The dancing metric, rolling of the projective plane on its dual and G_2 symmetry*
Vector Distributions and Related Geometries, Banach Center, Warsaw, Poland, June 2-6, 2014.
3. *Rolling of projective planes with G_2 -symmetry*
Equivalence, invariants, and symmetries of vector distributions and related structures : from Cartan to Tanaka and beyond, Institut Henri Poincare, Paris, France, December 10-12, 2014.
[Abstract](#)
4. *Rolling of projective planes with G_2 -symmetry*
Integrability in Mechanics and Geometry, ICERM, Brown Univ, USA, Jun 1-5, 2015.
5. *The dancing metric, rolling of the projective plane on its dual and G_2 symmetry*
Joint meeting of the Israeli and Mexican math societies: Oaxaca, Mexico, Sept 7-11, 2015.
6. *Projective rolling, the dancing metric and G_2 symmetry*
Math Dept Colloquium, Penn State Univ, State College, USA. Nov 2015.
7. *Bicycle mathematics in 3D*
Integrability and Near-Integrability in Mechanics and Geometry, Banff Oaxaca, Mexico, June 12-17, 2016.
[Video](#)
8. *Bicycling mathematics in 2 and 3 dimensions*
Workshop on graded algebra, geometry and related topics, Mérida, Mexico, November 15-18, 2016.
9. *The geometry of bike trajectories*
The Math Club (a student seminar), Technion, Haifa, Israel, Apr 26, 2017.
10. *Number theory, dynamical systems and Benford's law*
MASS Colloquium, Penn State Math Dept, State College, USA. Oct 22, 2017.
11. *A path geometry in 2D*
Symmetry and Geometric Structures, The Banach Centre, Warsaw, Poland, Nov 12-18, 2017.
[Abstract](#)
12. *Geometria de Trayectorias de Bicicleta*
Plenary speaker, Annual meeting of the Mexican Math Society, Villahermosa, Tabasco, Mexico, Oct 2018.
[Abstract](#) | [Video](#)
13. *El grupo $SL(2, \mathbf{R})$ en geometría*
Lie groups seminar, CIMAT, Guanajuato, March 21, 2019.
14. *Kepler's problem: new symmetries of an old problem*
Math colloquium, UNAM, Morelia, Mexico. Aug 9, 2019.
15. *La geometría de las trayectorias de Kepler-Newton* (3 talks)
1era Escuela Nacional de Geometría Diferencial, CIMAT, Guanajuato. Nov 4-8, 2019.
[Abstract](#)

16. *The geometry of orbits of the Kepler problem*
12th Americas Conference on DE & Nonlinear Analysis, CIMAT, Guanajuato, Mexico. Dic 10, 2019.
17. *Solving linear Hamiltonian ODE's by rolling cones in Minkowski's space*
Math Colloquium, Univ of Arizona, Tucson, US. May 7, 2020.
18. *Orbital symmetries and projective geometry of the Kepler problem*
AMS Sectional Meeting, Penn State, US, Oct 3, 2020.
19. *Geometry and new symmetries of the Kepler problem*
Differential Geometry, Billiards, and Geometric Optics, CIRM, Luminy, France. Oct 4-8, 2021.
[Abstract](#) | [Video](#)
20. *Paradoxes*
Student Seminar, Penn State Univ Math, State College, USA. Feb 11, 2021.
21. *Cusps of caustics by reflection in a convex billiard table*
Math Colloquium, UC Santa Cruz, USA. Jan 27, 2021.
22. *Bicycle Paths, Elasticae and Sub-Riemannian Geometry*
Analysis seminar, CIMAT, Mexico. May 12, 2022.
23. *Cusps of caustics by reflection in a convex billiard table*
Topology & Geometry seminar, Haifa Univ, Israel. June 12, 2022.
24. *Dancing pairs, rolling balls and the Cartan distribution*
Finite dimensional integrable systems, Tel Aviv Univ, Israel, June 20-24, 2022.
[Video](#)
25. *Dancing pairs, rolling balls and the Cartan distribution*
Geometry Seminar, Vienna Univ of Technology, Austria. Sept 15, 2022.
26. *Bicycling geodesics in 3D are Kirchhoff rods*
Finite dimensional integrable systems, Anwerp, Belgium, Aug 7-11, 2023.
27. *Cusps of caustics by reflection in a convex billiard table.*
Geometry seminar, Observatory of Paris, France, Aug 17, 2023.
28. *Cusps of caustics by reflection in a convex billiard table.*
Complex Geometry seminar, IMT, Toulouse, France. Sept 14, 2023.
29. *Bicycle tracks, their monodromy invariants and geodesics.*
Institute Colloquium, IMT, Toulouse, France. Sept 29, 2023.
30. *Cusps of caustics by reflection in a convex billiard table.*
Geometry seminar, Center for Complex Geometry, Daejeon, S Korea. Oct 16, 2023.
31. *Bicycle tracks, their monodromy invariants and geodesics.*
Geometry seminar, Center for Complex Geometry, Daejeon, S Korea. Oct 16, 2023.
32. *The Kepler problem - new symmetries via projective geometry.*
Workshop on Parabolic Geometry and Related Topics, Daejeon, S Korea. Oct 17-20, 2023.
33. *The Kepler problem - new symmetries of an old problem.*
Dynamical systems seminar, IMT, Toulouse, France. Nov 12, 2023.
34. *Cúspides de cáusticas por reflexión.*
Mini-meeting of differential geometry, CIMAT, Guanajuato, Mexico. Dec 4, 2023.
35. *Dancing pairs, rolling balls and the Cartan-Engel distribution.*
GRIEG meeting on Cartan Geometries, Laboratoire de Mathématique d'Orsay Université Paris-Saclay, France. March 4-9, 2024.

36. *Cusps of caustics by reflection in ellipses.*
Lie groups, geometry, integrability, hydrodynamics, Sophus Lie Conference Center, Nordfjordeid, Norway. July 1-5, 2024.
37. *Bicycle tracks with hyperbolic monodromy – results and conjectures.*
AMS Sectional Meeting, San Luis Obispo, Ca, USA. May 3-4, 2025.

Teaching: Graduate courses

Note: all graduate courses, unless otherwise noted, were given at the CIMAT.

1. Mecánica Clásica, ago-dic 1994.
2. Topología I, agto-dic 1995
3. Topología I, agto-dic 1996
4. Topología II, ene-jun 1997
5. Geometría Riemanniana, ene-jun 1998
6. Variable Compleja I, ene-jun 1999
7. Teoría de Representaciones, ene-jun 2001
8. Grupos de Lie, agsto-dic 2007
9. Teoría de Representaciones, ene-jun 2008
10. Mini-curso de introducción a grupos de Lie, 6-8 dic, 2010
11. Teoría de Morse, ago-dic, 2012
12. Topología de variedades diferenciales, ene-jun, 2013
13. Teoría de Representaciones, ago-dic 2013
14. Fibrados, conexiones y clases características, ene-jun 2014.
15. Álgebra Moderna (Galois Theory), ago-dic 2019.
16. Teoría de representaciones de grupos de Lie, ene-jun 2020.
17. Differential geometry of plane curves – Selected topics, Mar-Apr 2024, IMT, Toulouse, France.
18. Variable compleja, ago-dic 2024.

Teaching: undergraduate courses

Note: all undergraduate courses, unless otherwise noted, were given in the Math Dept of the U of Guanajuato.

1. Mecánica Clásica, Escuela de verano, CIMAT, jul 1999
2. Álgebra Superior, ago-dic 1999
3. Seminario de Problemas e Investigacion, ene-jul 2000
4. Mecánica Clásica, ago-dic 2000
5. Probabilidad y Estadística, Depto de Física, UG, ene-abr 2001
6. Mecánica Clásica, escuela de verano, ago 2001
7. Teoría de números, ago-dic 2001
8. Teoría de conjuntos y lógica matemática, ago-dic 2002
9. Álgebra lineal 1, ene-mayo 2003
10. Álgebra lineal 1, ago-dic 2003

11. [Álgebra lineal 2](#), ene-mayo 2004
12. [Teoría de números](#), Taller de Cálculo, CIMAT, jul 2005
13. [Cálculo 3](#), ago-dic 2005
14. [Cálculo 4](#), feb-jun 2006
15. [Teoría de números](#), Taller de Cálculo, CIMAT, jul 2006
16. [Cálculo 3](#), ago-dic 2006
17. [Cálculo 4](#), feb-jun 2007
18. [Matemáticas elementales y elementos de geometría](#), ago-dic 2008
19. [Álgebra lineal 1](#), ene-mayo 2009
20. [Álgebra lineal 2](#), ago-dic 2009
21. [Matemáticas elementales y elementos de geometría](#), ene-jun 2010
22. [Álgebra moderna 2](#), ago-dic 2010
23. [Álgebra lineal 1](#), ene-mayo 2011
24. [Cálculo 3](#), ago-dic 2011
25. [Cálculo 3](#), ago-dic 2014
26. [Geometría de curvas](#), Congreso nacional de la SMM, oct 2014
27. [Matemáticas elementales](#), ago-dic 2017
28. [Topología diferencial](#), ago-dic 2020
29. [Elementos de geometría](#), ago-dic 2021
30. [Geometría diferencial de curvas en el plano](#), Escuela temática de Topología y Geometría, CIMAT, 5-9 jun 2023

Outreach (high/middle/primary school) – Summary

- Organization of activities (8 items)
- Talks, workshops, mini-courses (24 items)
- Semester long courses (27 items)

Outreach: Organization of activities

1. Math workshops for middle school (secundaria) students, 1997.
[Guanajuato](#) | [Dolores Hidalgo](#) .
2. [Taller de Ciencia para Jóvenes](#), 1997 – present
Science workshops for high school students that I started in CIMAT in summer 1997, which were then extended to many other institutes in Mexico (approx 10). I have given over the years numerous courses and lectures in this program in many institutes in Mexico. Here is a list of institutes I collaborated with to establish these workshops (not all keep a website):
 - (a) [INAOE](#), Puebla, since 2002.
 - (b) [UNAM-CICESE-UABC](#), Ensenada, BC., since 2003.
 - (c) [Taller ciencia viva](#), CINVESTAV-Irapuato, Gto., since 2003.
 - (d) [IRyA de la UNAM](#), Morelia, Mich.
 - (e) CIMAT, Mérida, Yuc.
 - (f) [Centro de Geociencias](#), UNAM, Qto.

- (g) Dept de matemáticas, Univ de Guerrero, Acapulco, Guer.
 - (h) [Fac de Ciencias](#), Colima
 - (i) Dept de Química, Univ de Guanajuato, Gto.
 - (j) [Ecosur](#), Campeche
 - (k) Ecosur, San Cristobal de las Casas, Chiapas
 - (l) Ecosur, Tapachula, Chiapas.
3. [VIBA](#), 1997
A workshop for high school students from rural areas of the state of Guanajuato.
 4. [Proyecto Post-Primaria de CONAFE](#), 2000
Workshops for teachers of middle schools (“post-primaria”) in rural areas of the state of Guanajuato.
 5. [Taller de Ciencia para niños de primaria](#), 2003 –
A science summer camp for primary school pupils that I helped start at CIMAT with Renato Iturriaga, then other people took over. It is still going, with other people from CIMAT organizing it.
 6. [Club de Ciencia para Jóvenes](#), 2004–2007
A science club I organized in the local highschool during 3 semesters (24 sessions)
 7. [Semana de la ciencia en Chiapas](#), 2006–2015
Summer science workshops for highschool students that I started in the state of Chiapas, Mexico, similar to the Taller de Ciencia para Jóvenes in Cimac. This was repeated every summer for 10 years. I have given courses in almost all the editions of this workshop.
 8. [Math classes in the CIMAT for high school students](#), 2011 – present
A program that I started in CIMAT for high school students interested in taking their regular math classes in CIMAT. I have given a course in this program almost every semestre since I started it.

Outreach: Talks, workshops, mini-courses

(Note: this is a partial list, I gave many more outreach talks over the years that I don’t have record of, in the Mexican states of Guanajuato, Colima, Chiapas, Yucatan, Campeche, Baja California Norte, Querétaro, Nayarit, Puebla, Vera Cruz, Michoacan, Mexico City, as well as many talks in a week long visit to Cuba in April 2009)

1. [Teoría de números](#) (a mini-course of 5 sessions, 2 hrs each)
[Taller de Ciencia para Jóvenes](#), CIMAT, 4-8 ago, 1997
2. [Teoría de números](#) (a mini-course of 5 sessions, 2 hrs each)
[Taller de Ciencia para Jóvenes](#), CIMAT, 20 - 31 de julio, 1998
3. [Teoría de números](#) (a mini-course of 5 sessions, 2 hrs each)
[La semana de la ciencia en Chiapas](#), San Cristóbal de las Casas, 26-30 junio, 2006
4. [Las matemáticas de pompas de jabón](#) (a mini-course of 5 sessions, 2 hrs each)
[La semana de la ciencia en Chiapas](#), San Cristóbal de las Casas, 1-7 julio, 2007
5. [La ciencia de pompas de jabón](#) (a mini-course of 5 sessions, 2 hrs each)
[La semana de la ciencia en Chiapas](#), San Cristóbal de las Casas, 6-12 julio, 2008
6. [La relación de la matemática y la biología](#) (1.5 hr talk, joint with Yuri Peña)
[La semana de la ciencia en Chiapas](#), San Cristóbal de las Casas, 6-12 julio, 2008
7. [Teoría de números](#) (a mini-course of 5 sessions, 2 hrs each)
[La semana de la ciencia en Chiapas](#), San Cristóbal de las Casas, 2-8 agosto, 2009

8. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), CIMAT, 19 - 25 julio, 2009
9. *Teoría de Códigos* (1 hr talk)
[Taller de Ciencia para Jóvenes](#), CIMAT, 17-23 jul, 2011
10. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each, see [material](#))
[Taller de Ciencia para Jóvenes](#), San Cristóbal de las Casas, 25-30 jul, 2011
11. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), San Cristóbal de las Casas, 6-10 agosto, 2012
12. *Matemáticas y paradojas* (1 hr talk)
[Taller de Ciencia para Jóvenes](#), CIMAT, 15-20 jul, 2013
13. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), Ecosur – Campeche, 28 jul - 2 ago , 2013
14. *Matemáticas y paradojas* (1 hr talk)
[Taller de Ciencia para Jóvenes](#), CIMAT, 21-26 julio, 2014
15. *Paradojas y Topología* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), Ecosur – Campeche, 28 jul - 1 ago , 2014
16. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), CIMAT, 27 jul - 1 ago, 2015
17. *Matemáticas y paradojas* (1 hr talk)
[Taller de Ciencia para Jóvenes](#), CIMAT, 27 jul - 1 ago, 2015
18. *The Mathematics of internet search*
 Student Math Colloquium (MASS), Penn State Univ, State College, USA. Nov 2015.
19. *Criptología* (a 3 hr workshop)
[Taller de Ciencia para Jóvenes](#), CIMAT, 25-31 jul , 2016
20. *Juegos matemáticos* (a 3 hr workshop)
[Taller de Ciencia para Jóvenes](#), CIMAT, 16-23 julio, 2017
21. *Juegos matemáticos* (2 sessions of 2 hrs each)
[Taller de Ciencia para Profes](#), Ecosur – Campeche, 18-21 ene, 2018
22. *Geometría e imaginación* (a mini-course of 5 sessions of 2 hrs each)
[Taller de Ciencia para Jóvenes](#), CIMAT, 22-29 julio, 2018
23. *Juegos matemáticos* (a 3 hr workshop)
[Taller de Ciencia para Jóvenes](#), CIMAT, 22-29 julio, 2018
24. *Redes eléctricas* (a 3 hr workshop, joint with H Chang)
[Taller de Ciencia para Jóvenes](#), CIMAT, 21-28 julio, 2019
25. *Juegos matemáticos* (2 sessions of 2 hrs each)
[Taller de Ciencia para Profes](#), Ecosur – Campeche, 16-19 ene, 2020
26. *Paradojas* (1 hr talk)
[Taller de Ciencia para Jóvenes](#), CIMAT, 11-18 dic, 2022
27. *Taller de juegos matemáticos* (3 hrs workshop)
[Taller de Ciencia para Jóvenes](#), CIMAT, 21-28 jul, 2024
28. *Matemáticas en la vida cotidiana – la Ley de Benford* (1 hr talk)
 Universidad Tecnológica del Norte de Guanajuato, 7 nov, 2024.

Outreach: Semester long courses (mostly highschool)

Note: all courses, unless otherwise noted, were given in CIMAT.

1. [Física 3](#), preparatoria oficial de la UG, ene-mayo 2005
An ordinary physics class in a local high-school
2. [Pensamiento matemático para amantes de las matemáticas](#), feb-jun 2009
For middle school students
3. [Otra cara de las matemáticas](#), mar-jun 2011
For high school students
4. [Matemáticas 5 en el CIMAT](#), ago-dic 2011.
Highschool (5th semestre)
5. [Teoría de códigos](#), may-jun 2011 (4 sessions)
For high-school/undergraduate students
6. [Cálculo en el CIMAT](#), ene-jun 2012
Highschool (6th semestre)
7. [Cálculo en el CIMAT](#), ago-dic 2012
Highschool (5th semestre)
8. [Cálculo integral](#), ene-jun 2013
Highschool (6th semestre)
9. [Álgebra I](#), ago-dic 2013
Highschool (1st semestre)
10. [Álgebra II](#), ene-jun 2014
Highschool (2nd semestre)
11. [Álgebra I](#), ago-dic 2014
Highschool (1st semestre)
12. [Álgebra II](#), ene-jun 2015
Highschool (2nd semestre)
13. [Álgebra I](#), ago-dic 2015
Highschool (1st semestre)
14. [Álgebra II](#), ene-jun 2016
Highschool (1st semestre)
15. [Informática aplicada II](#), ene-jun 2016
Highschool (6th semestre)
16. [Geometría y trigonometría](#), ago-dic 2016
Highschool (3rd semestre)
17. [Geometría analítica](#), ene-jun 2017
Highschool (4th semestre)
18. [Geometría y trigonometría](#), ago-dic 2017
Highschool (3rd semestre)
19. [Geometría analítica](#), ene-jun 2018
Highschool (4th semestre)
20. [Álgebra I](#), ago-dic 2018
Highschool (1st semestre)

21. [Álgebra II](#), ene-jun 2019
Highschool (2nd semestre)
22. [Álgebra I](#), ago-dic 2019
Highschool (1st semestre)
23. [Álgebra II](#), ene-jun 2020
Highschool (2nd semestre)
24. [Álgebra I](#), ago-dic 2020
Highschool (1st semestre)
25. [Álgebra I](#), ago-dic 2022
Highschool (1st semestre)
26. [Álgebra II](#), ene-jun 2023
Highschool (2nd semestre)
27. [Cálculo diferencial](#), ago-dic 2024
Highschool (5th semestre)

Thesis students:

- Undergraduate: Homero Gallegos, *Galois theory and Riemann surfaces*. Graduated 2007.
- M.A: Roger Fernando Tun , *Spherical harmonics*. Graduated 2022, currently a PhD student in Cimat.
- Ph.D: Richard Muñiz Manasliski, *Yang-Mills instantons with symmetry*. Graduated 2006, currently a tenured math professor in the Universidad de la República, Uruguay.

Service:

- Review committee for [study plans of the math and computer science undergraduate programs of the University of Guanajuato](#) (2000).
- Judge in the Mexican National Math Olympiad (1999, 2001).
- Geometry seminar coordinator in the CIMAT, 2009-2010, 2019-2022.
- Colloquium coordinator in the CIMAT, 2010-2012.
- Graduate admissions committee in the CIMAT, 2014.
- Organization of an international math conferences:
 - Sub-Riemannian Geometry and Celestial Mechanics, CIMAT, 2016.
 - [VIII Conference on Finite Dimensional Integrable Systems in Geometry and Mathematical Physics \(FDIS\)](#), CIMAT, August 4-8, 2025, Guanajuato, Mexico
- Coordination of the program [Taller de Ciencia para Jóvenes](#) (summer program for highschool students), 1997-present.
- Coordination of the program [Math Courses in CIMAT for Highschool Students](#), 2011-present.
- Departmental committee (mostly hiring and promotions), CIMAT, 2020 - present.
- Referee: Nonlinearity, Arnold Math J, Sigma, European J of Math, The American Math Monthly, Math Intelligencer, NY Journal of Math, Bulletin of the Mexican Math Society.
- Journal Editor: Reviews of The Association for Mathematical Research, Arnold Math J.

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