

CURRICULUM VITAE
ANTONIO MONTALBÁN

Department of Mathematics,
University of California, Berkeley
970 Evans Hall,
Berkeley, CA 94720,
USA.

Office: 721 Evans Hall
e-mail: antonio@math.berkeley.edu
web page: www.math.berkeley.edu/~antonio

RESEARCH INTEREST

Mathematical Logic: Computability theory, Computable mathematics and Computable Structure Theory.

EDUCATION

- Licenciatura (B.S.) en Matemáticas. Universidad de la República (UdelaR), Montevideo, Uruguay 2000.
- M.S. in Mathematics. Cornell University, 2002.
- M.S. in Computer Sciences. Cornell University, January 2005.
- Ph.D. in Mathematics. Cornell University, August 2005
Thesis adviser: Richard A. Shore. Thesis title: *Beyond the Arithmetic*.

EMPLOYMENT (post Ph.D.)

2005-2006. L. E. Dickson Instructor at the University of Chicago.
2006-2007. Postdoctoral position at the University of Victoria Wellington. New Zealand.
2007-2011. Assistant Professor at the University of Chicago.
2011-2012. Associate Professor at the University of Chicago.
2012-current. Associate Professor at the University of California, Berkeley.

AWARDS (POST PH.D.)

- **Sacks Prize 2005**, given to the best Ph.D. thesis in logic by the Association of Symbolic Logic.
- **AMS Centennial Fellowship 2009**, given to young researchers by the American Mathematical Society.
- **Packard Fellowship 2010**. Given to 17 scientists, and, in average, to one mathematician every year.

GRANTS (AS PRINCIPAL INVESTIGATOR)

- **NSF Grant** June 2006-May 2009. DMS-0600824.
- **NSF Grant** Sept 2009-Aug 2012. DMS-0901169.
- **NSF Grant** July 2014-June 2017. DMS-1363310.

PH.D. STUDENTS ADVISED AND CO-ADVISED

- Chris Conidis, 2009 (secondary advisor). Currently Assistant Professor at CUNY.
- Damir Dzhafarov, 2011 (secondary advisor). Currently Assistant Professor at U. of Connecticut.
- Noah Schweber, 2016. Currently NSF postdoc at the U. of Wisconsin, Madison.
- Matthew Harrison-Trainor, 2017. Currently has Banting Fellow at Waterloo, Canada

POSTDOCS MENTORED

- Asher Kach, 2011-2012.
- Alexander Melnikov, 2014.
- Takayuki Kihara, 2015- 2017.

OTHER ACTIVITIES

- Editor for the Transactions and Memoirs of the AMS. February 2012-2016.
- Member of the Council of the ASL 2011-2014.
- Editor for the Perspectives in Mathematical Logic Series. January 2012-current
- Write a column for the quarterly magazine *Uruguay Ciencia*.
- Referee and reviewer for various journals. Reviewer for NSF.

MEETINGS ORGANIZED OR CO-ORGANIZED

- Birthday conference for Richard Shore on January 2007.
- Special session on Computable Structures at the ASL annual meeting in Irvine, CA on May 2008.
- Midwest computability meeting, that meets 3 times a year in Chicago, IL.
- Workshop in Computability Theory, as a satellite for the LC10 in Paris, France, July 2010.
- Workshop in Computability Theory, as a satellite for the LC11 in Barcelona, Spain, July 2011.
- Workshop in Reverse Mathematics, Chicago, IL, September 2011.
- Oberwolfach Seminar in Proof Theory, Germany, October 2011.
- Special session in Algebraic Structures, Asian Logic Colloquium, Wellington, New Zealand, December 2011.
- Special session in Logic at the Latin-american Mathematics Meeting, Cordona, Argentina, August 2012.
- Program Committee, Symposium of Logical Foundations of Computer Science, San Diego, CA, January 2013.
- Special session in Computable structures at the Annual ASL meeting, Waterloo, Canada, May 2013.
- CCR Semester in Computability Theory, Buenos Aires, Argentina, January-June 2013.
- Workshop in Computable Model Theory at BIRS, Banff, Canada, November 2013.
- ASL Annual Meeting, Program committee. Urbana, IL, April 2015.
- Vaught's conjecture conference. Berkeley, CA, June 2015.
- ASL Annual Meeting, Program committee. Storrs, CT, May 2016.
- Workshop in Computability Theory. Ghent, Belgium, July 2016.
- Special Session in Proof Theory and Reverse Mathematics, Logic Colloquium, Leeds, UK, August 2016.
- XVII Simposio Latinoamericano de Lógica Matemática, Program committee. Puebla, Mexico, July 2017.
- Computability Complexity and Randomness, Program committee. Santiago de Chile, Chile, December 2018

TEACHING

- TA at the UdelaR. From Fall 1999 to Spring 2000.
- TA at Cornell University. From Fall 2002 to Spring 2005.
- Instructor and Assistant Professor at the University of Chicago.
 - Analysis in \mathbb{R}^n , part I. Winter 2006. Fall 2007.
 - Analysis in \mathbb{R}^n , part III. Fall 2005. Spring 2006.
 - Mathematical Logic I. Fall 2007. Fall 2008.
 - Mathematical Logic II. Winter 2008.
 - Introduction to Analysis and Linear Algebra. Spring 2009. Spring 2011.
 - Topics in Logic; Higher Recursion Theory. Fall 2008.
 - Topics in Logic; Reverse Mathematics. Spring 2006. Fall 2010.
 - Topics in Logic; Computable Structures. Fall 2010.

4.6 over 5 is my average in teaching evaluations over the 5 undergrad courses I taught as Assistant Professor.
- Associate Professor at U.C. Berkeley.
 - Mathematical Logic (Grad). Fall 2012
 - Abstract Algebra. Summer 2013
 - Mathematical Logic (Undergrad). Fall 2013
 - Topics in Computability Theory. Turing degrees and Martin's conjecture. Fall 2013
 - Berkeley Connect in Mathematics. Spring 2014, Fall 2014, Spring 2015, Fall 2016, Spring 2017, Fall 2017
 - Analytic Geometry and Calculus. Fall 2014
 - Undecidability and Incompleteness. Fall 2015
 - Topics in Computability Theory. Computable Structures. Fall 2015
 - Analytic Geometry and Calculus. Fall 2016
 - Introduction to the Theory of Sets. Fall 2017

PUBLICATIONS

- (1) *Embedding Jump Upper Semilattices into the Turing Degrees.*
Journal of Symbolic Logic, Vol. 68 (3), 2003, pp. 989-1014.
- (2) *Embedding and coding below a 1-generic degree.* With Noam Greenberg.
Notre Dame Journal of Formal Logic, Vol. 44 (4), 2003, pp. 200-216.
- (3) *Generalized High degrees have the complementation property.* With N. Greenberg and R. A. Shore.
Journal of Symbolic Logic, Vol. 69 (4), 2004, pp. 1200-1220.
- (4) *Teoría de Conjuntos Según Von Newman (Set Theory in the sense of Von Newman).* **Publicaciones Matemáticas del Uruguay**, Vol. 10, 2005, pp. 91-110. (Extracted from my undergraduate thesis.)
- (5) *Up to equimorphism, hyperarithmetic is recursive.*
Journal of Symbolic Logic, Vol 70 (2), 2005, pp. 360-378.
- (6) *A minimal pair of K -degrees.* With Barbara F. Csima.
Proceedings of the AMS, 134, (2006), 1499-1502.
- (7) *There is no order in the Generalized High/Low Hierarchy.*
Archive of Mathematical Logic Vol 45(2), 2006, pp. 215-231.
- (8) *Equivalence between Fraïssé's conjecture and Jullien's theorem.*
Annals of Pure and Applied Logic Vol 139 (1-3) 2006, pp. 1-42.
- (9) *Boolean Algebras, Tarski Invariants, and Index Sets.* With B. F. Csima and R. A. Shore. **Notre Dame Journal of Formal Logic** Vol 47 (1), 2006, pp. 1-23.
- (10) *Indecomposable linear orderings and Theories of Hyperarithmetic Analysis.*
Journal of Mathematical Logic Vol 6, (1), 2006, pp. 89-120.
- (11) *Equimorphism invariants for scattered linear orderings.*
Fundamenta Mathematicae Vol 191, 2006, pp. 151-173.
- (12) *A cappable almost everywhere dominating computably enumerable degree.* With George Barmpalias.
Proceedings of the Third International Conference on Computability and Complexity in Analysis (CCA 2006), Vol 167, 2007, pp. 17-31 (electronic).
- (13) *On the equimorphism types of linear orderings.*
Bulletin of Symbolic Logic Vol 13, 2007, pp. 71-99.
- (14) *Countably complementable linear orderings.*
Order Vol 23, 2006, pp321-331 (2007).
- (15) *Computable linearizations of well-partial-orderings.*
Order Vol 24, 2007, p 39-48.
- (16) *Ranked Structures and Arithmetic Transfinite Recursion.* With Noam Greenberg.
Transactions of the AMS Vol 360, 2008, pp. 1265-1307.
- (17) *Subspaces of Computable Vector Spaces.* With Rodney G. Downey, Denis R. Hirschfeldt, Asher M. Kach, Steffen Lempp, and Joseph R. Mileti.
Journal of Algebra Vol. 314, 2007, pp. 888-894.
- (18) *On the triple jump of the set of atoms of a Boolean algebra.*
Proceedings of the AMS, Vol 136, 2008, pp. 2589-2595
- (19) *A weakly 2-random set that is not generalized low.* With A. Lewis and A. Nies.
Proceedings of the CiE 2007, Vol 4497, 2007, pp. 474-477.
- (20) *Slender Classes.* With Rod Downey.
Journal of the London Math. Society, Vol 78, 2008, pp. 36-50.
- (21) *From Automatic Structures to Borel Structures.* With G. Hjorth and B. Khoussainov and A. Nies.
Proceedings of 23rd Annual IEEE Symp. on Logic in Computer Science (LICS 2008), (2008), pp. 431-441.
- (22) *The isomorphism problem for torsion-free Abelian groups is analytic complete.* With Rod Downey.
Journal of Algebra, Vol 320, 2008, pp. 2291-2300.
- (23) *On the Π_1^1 Separation Principle.*
Mathematical Logic Quarterly Vol 54 (6), 2008, pp. 563-578.
- (24) *Notes on the Jump of a structure.*
Mathematical Theory and Computational Practice, 2009, pp. 372-378.
- (25) *On Fraïssé's conjecture for linear orders of finite Hausdorff rank.* With Alberto Marcone. **Annals of Pure and applied Logic**, 160, 2009, pp. 355-367.

- (26) *Embeddability in the Turing Degrees.*
Logic colloquium 2006, **Lecture Notes in Logic**, 2009, pp. 229-246.
- (27) *A Computable \aleph_0 -categorical Structure Whose Theory Computes True Arithmetic.* With Bakhadyr Khoussainov. **Journal of Symbolic Logic**, 75 (2010), 728-740.
- (28) *Computability of Fraïssé limits.* With B. F. Csima; V. Harizanov and R. Miller.
Journal of Symbolic Logic, 76 (1), 2011, pp. 66-93.
- (29) *The Slaman-Wehner Theorem in higher recursion theory.* With N. Greenberg and T. A. Slaman.
Proceedings of the AMS, 139 (2011), pp. 1865-1869.
- (30) *Counting the back-and-forth types.*
Journal of Logic and Computability, (2010), DOI: 10.1093/logcom/exq048
- (31) *On the n -Back-and-Forth types of Boolean Algebras.* With Kenneth Harris.
Transactions of the AMS, 364 (2012), 827-866.
- (32) *The Veblen functions for computability theorists.* With Alberto Marcone.
Journal of Symbolic Logic, 76 (2011), 575-602.
- (33) *Cuts of Linear Orders.* With A. Kach.
Order, 28 (2011), 593-600.. DOI: 10.1007/s11083-010-9194-9
- (34) *K -Trivials are never continuously random.* With G. Barmpalias. N. Greenberg and T. A. Slaman.
Proceedings of the 11th Asian Logic Conference, (2011), 51-58.
- (35) *Isomorphism and Bi-Embeddability Relations on Computable Structures.* With E. B. Fokina, S. Friedman, V. Harizanov, J. F. Knight and C. McCoy. **Journal of Symbolic Logic**, 77 (2012), 122-132.
- (36) *Open questions in Reverse Mathematics.*
Bulletin of Symbolic Logic, 17 (2011), 431-454.
- (37) *Computing Maximal Chains.* with A. Marcone and R. A. Shore
Archive for Mathematical Logic, 51 (2012), 651-660.
- (38) *Rice Sequences of Relations.*
Philosophical Transactions of the Royal Society A, 370 (2012), 3464-3487.
- (39) *Extensions of Embeddings below computably enumerable degrees.* With R. Downey, N. Greenberg and A. Lewis. **Transactions of the AMS**, 365 (2013), 2977-3018..
- (40) *A fixed point for the jump operator on structures.*
Journal of Symbolic Logic, 78 (2013), 425-438.
- (41) *Relative to any non-hyperarithmetical set.* With N. Greenberg and T. A. Slaman.
Journal of Mathematical Logic, 13 (2013),.
- (42) *A computability theoretic equivalent to Vaught's conjecture.*
Advances in Mathematics, 235 (2013), 56-73.
- (43) *Borel structures: a brief survey.* With Andre Nies.
Lecture Notes in Logic 41, Effective Mathematics of the Uncountable (2013), 124-134.
- (44) *The limits of determinacy in Second Order Arithmetic.* With Richard A. Shore.
Proceedings of the London Math Society, 104 (2012), 223-252..
- (45) *Boolean Algebra Approximations.* With Kenneth Harris.
Transactions of the AMS, 366 (2014), 52235256.
- (46) *Copyable Structures.*
Journal of Symbolic Logic, 78 (2013), 1025-1346..
- (47) *The Limits of Determinacy in Second Order Arithmetic: Consistency and Complexity Strength*, with R. A. Shore.
Israel Journal of Mathematics, 204 (2014), 477-508.
- (48) *The complexity of computable categoricity.* With Downey, Kach, Lempp, Lewis-Pye and Turetsky.
Advances of Mathematics, 268 (2015), 423-466.
- (49) *Computability theoretic classifications for classes of structures.*
Proceedings of ICM 2014, Volume 2, 79-101.
- (50) *Priority arguments via true stages.*
Journal of Symbolic Logic, 79 (2014), 1315-1335 .
- (51) *Decidability and Undecidability of the Theories of Classes of Structures.* with A. Kach.
Journal of Symbolic Logic, 79 (2014), 1001-1019.
- (52) *Classes of structures with no intermediate isomorphism problems.*
Journal of Symbolic Logic, 81 (2016), 127-150.

- (53) *Analytic Equivalence Relations satisfying Hyperarithmetic-is-recursive.*
Forum of Mathematics, Sigma, 3 (2015), e8, 11.
- (54) *The Strength of Turing Determinacy within Second Order Arithmetic.* With R. A. Shore.
Fundamenta Mathematicae, 232 (2016), 249–268.
- (55) *A robust Scott rank.*
Proceedings of the American Mathematical Society, 143 (2015), 5427–5436
- (56) *Independence in Computable Algebra.* With M. Harrison-Trainor and A. Melnikov.
Journal of Algebra, 443 (2015), 441–468.
- (57) *Matemática Computable.*
Publicaciones Matemáticas del Uruguay, 15 (2016), 1–15.. (In Spanish.)
- (58) *Computable structures in generic extensions.* With J. F. Knight and N. Schweber.
Journal of Symbolic Logic, 81 (2016), 814–832.
- (59) *Coding and Definability in Computable Structures.*
To appear in the **Notre Dame Journal of Formal Logic**.
- (60) *The complements of lower cones of degrees and the degree spectra of structures.* With Andrews, Cai, Kalimullin, Lempp, and J. Miller.
Journal of Symbolic Logic, 81 (2016), 997–1006.
- (61) *Effectively existentially-atomic structures.*
Computability and Complexity, Lecture Notes in Computer Science, 10010 (2016), 221–237.
- (62) *Degree-invariant, analytic equivalence relations without perfectly many classes.*
Proceedings of the American Mathematical Society, 145 (2017), 395–398.
- (63) *Sex versus Asex: an analysis of the role of variance conversion.* With Andrew E. M. Lewis-Pye
Theoretical Population Biology, 114 (2017), 128135.
- (64) *Computable functors and effective interpretability.* With Harrison-Trainor, Melnikov and R. Miller.
To appear in the **Journal of Symbolic Logic**.
- (65) *Computable Polish group actions.* With A. Melnikov.
Submitted for publication.
- (66) *Borel functors and infinitary interpretations.* With M. Harrison-Trainor and R. Miller
Submitted for publication.
- (67) *Fraïssé’s conjecture in Π_1^1 -comprehension.*
Submitted for publication.
- (68) *Conservativity of ultrafilters over subsystems of second order arithmetic.* With R. A. Shore
Submitted for publication.
- (69) *The uniform Martin’s conjecture for many-one degrees.* With T. Kihara
Submitted for publication.
- (70) *On the structure of the Wadge degrees of BQO-valued Borel functions.* With T. Kihara
Submitted for publication.
- (71) *The Least Sigma-jump Inversion Theorem for n -Families.* With Faizrahmanov, Kalimullin, and Puzarenko
Submitted for publication.

INVITED TALKS AT CONFERENCES OR WORKSHOPS

- (1) ASL annual meeting. **Chicago**, IL, May 2003. (20m)
- (2) Computability and Logic Workshop, **Heidelberg**, Germany, June 2003. (20m)
- (3) Southeastern Logic Symposium. **Gainesville**, FL, March 2004 (20m)
- (4) Fall 2004, AMS Central Section Meeting. **Evanston**, IL, October 2004. (20m)
- (5) Joint Mathematics meetings. **Atlanta**, GA, January 2005. (20m)
- (6) ASL Annual Meeting Stanford, **Palo Alto**, CA, March, 2005. (20m)
- (7) Computational Prospects of infinity. **Singapore**, July-August 2005. (1hr)
- (8) Southeastern Logic Symposium. **Gainesville**, FL, March 10-12 of 2006. Plenary talk (1hr)
- (9) AMS Central Section Meeting. **Notre Dame**, IN, April, 8,9 of 2006. (20m)
- (10) Greater Boston Logic Conference, **Boston**, MA, May 12-14 of 2006. (1hr)
- (11) Annual Meeting of the ASL, **Montreal**, Canada, May 17-21 of 2006. Plenary talk (1hr)
- (12) ASL Summer Meeting "Logic Colloquium '06". **Nijmegen**, Netherlands, July 2006. Plenary talk (1hr)
- (13) Proof Theory of arithmetic, **Kyoto**, Japan, August 21st-23rd of 2006. (1hr) (1hr)
- (14) Workshop on Computability, Randomness and Model theory, **Auckland**, New Zealand, Nov 2006. (1hr)
- (15) Logic, Combinatorics and Independence Results, **Oberwolfach**, Germany, November 2006. (1hr)
- (16) Joint Meeting of AMS-NZMS. **Wellington**, New Zealand, Dec 12-15, 2007. (20m)
- (17) Computability, Complexity and Randomness, **Nanjing**, China, May 19-23, 2008. (1hr)
- (18) Effective Mathematics of the Uncountable, Cuny, **New York** NY. Aug 18-22 of 2008. (1hr)
- (19) AMS Fall Eastern Section Meeting, **Middletown**, CT. Oct 11-12 of 2008. (20m)
- (20) Computability, Reverse Mathematics and Combinatorics, **Banff**, Canada. December 7-12, 2008. (1hr)
- (21) A Conference in Honor of Harvey Friedmans 60th Birthday, **Columbus**, OH. May 15-17, 2009. (40m)
- (22) ASL annual meeting. **Notre Dame**, IN, May 20-23, 2009. (30m)
- (23) Computability in Europe, **Heidelberg**, Germany, July 2009. (40m)
- (24) Workshop on Computability Theory, **Sofia**, Bulgaria, August 2009. (1hr)
- (25) Ramsey Theory in Logic, Combinatorics and Complexity, **Bertinoro**, Italy, October 2009. (1hr)
- (26) 2do Coloquio Uruguayo de Matemática, **Montevideo**, Uruguay, December 2009. **Tutorial**. (4.5 hrs)
- (27) Mal'tsev Meeting, **Novosibirsk**, Russia, May 2010. Plenary talk (1hr)
- (28) AMS fall Sectional meeting at **Notre Dame**, November 2010. (20min)
- (29) ASL annual meeting. Special Session for L. Harrington. **Berkeley**, CA, March 2011. (30 min)
- (30) Computability in Europe, **Sofia**, Bulgaria. June-July 2011. Plenary talk (1hr)
- (31) Infinity Meeting, **Barcelona**, Spain, July 2011, (1hr)
- (32) Prospects of infinity, **Singapore**, August 2011, (1hr)
- (33) Packard Meeting, **Monterey**, CA, September 2011. (15 min)
- (34) Seminar in Proof Theory, **Oberwolfach**, Germany, October 2011. (tutorial, 3hr)
- (35) 3er Coloquio Uruguayo de Matemática, **Montevideo**, Uruguay, December 2011. Plenary talk (1 hrs)
- (36) Workshop in Computability Theory, **Oberwolfach**, Germany, February 2012.
- (37) AMS Sectional Meeting at **Washington**, DC. March 2012 (20 min)
- (38) Annual ASL meeting, **Madison**, WI, April 2012. (Plenary talk, 1hr)
- (39) Latin American Symposium on Mathematical Logic, **Bogota**, Colombia, June 2012. (Plenary talk, 1hr)
- (40) The incomputable, **Cambridge**, UK, June 2012. (1hr)
- (41) Logic Colloquium, **Manchester**, UK, July 2012. (Tutorial 3 hrs)
- (42) Mamls, **New Brunswick**, NJ, October 2012 (1hr).
- (43) Workshop on Computable stability theory, **Palo Alto**, CA, August 2013. (1hr)
- (44) Computability Theory and Foundations of Mathematics, **Tokyo**, Japan, February 2014. (1hr)
- (45) AMS Sectional Meeting, **Albuquerque**, NM, April 2014. (20min)
- (46) Infinity Workshop, **Vienna**, Austria, July 2014. (1hr)
- (47) Latin American Symposium of Math. Logic, **Buenos Aires**, Argentina, August 2014. (Tutorial 4 hrs)
- (48) **International Congress of Mathematicians**, Section in Logic, **Soul**, Korea, Aug 2014. (Special session talk 45 min)
- (49) Congreso Latinoamericano de Algebra, **Lima**, Peru, December 2014. (Plenary talk 50 min)
- (50) Very Informal Gathering, **Los Angeles**, CA, January 2015 (50 min).
- (51) AMS Sectional Meeting, **Washington D.C.**, March 2015 (20 min).
- (52) Sets and Computations, **Singapore**, April 2015 (50 min).

- (53) Packard Meeting, **Monterey**, CA, September 2015 (16 min).
- (54) Workshop on “Measuring the Complexity of Computational Content”, **Dagstuhl**, Germany, September 2015 (20 min)
- (55) Tercera Escuela de Lógica y Conjuntos, **Mexico City**, Mexico, December 2015. Tutorial (3hs).
- (56) 5to Coloquio Uruguayo de Matemática, **Montevideo**, Uruguay, December 2015. Plenary talk (1 hrs)
- (57) Sendai Logic School 2016, **Sendai**, Japan, January 2016. (2hs).
- (58) Foundational Impact of Recursion Theory, **Stors**, CT, May 2016. (30min)
- (59) V Congreso Latinoamericano de Matemáticos, **Barranquilla**, July 2016. Colombia. (30 min)
- (60) Computability and Complexity Symposium, **Raumati**, New Zealand, January 2017. (35 min)
- (61) NZMRI summer meeting, **Napier**, New Zealand, January 2017. Tutorial (4hs).
- (62) Dagstuhl Seminar in Computability theory. **Dagstuhl**, Germany, February 2017. (1hr)

Future talks:

- (63) Panhellenic Logic Symposium. **Delphi**, Greece, July 2017.