

Simon Rubinstein-Salzedo

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Current position

Director and mathematics teacher at Euler Circle.

Education

2012	PhD Mathematics, Stanford University. Thesis: “Controlling ramification in number fields,” advisor Akshay Venkatesh.
2007	BS Mathematics, Minor Music, College of Creative Studies, University of California, Santa Barbara. Thesis: “Finitistic dimensions of monomial algebras,” advisor Birge Huisgen-Zimmermann.

Academic positions held

2013–2015	Stanford University, Department of Statistics. Postdoctoral fellow
2012–2013	Dartmouth College, Department of Mathematics. Visiting assistant professor

Research interests

Number theory, probability theory, combinatorial game theory

Papers

1. “Global Fibonacci nim.” In preparation. (With U. Larsson.)
2. “Noncrossing partitions, toggles, and homomesies.” In preparation. (With D. Einstein, M. Farber, E. Gunawan, M. Joseph, M. Macauley, and J. Propp.)
3. “Finite ramification for pre-image fields of PCF morphisms.” In preparation. (With A. Bridy, P. Ingram, R. Jones, J. Juul, A. Levy, M. Manes, R. Rumely, and J. H. Silverman.)
4. “A hands-on approach to origamis and origami curves.” In preparation.
5. “Why didn’t Euler conjecture the prime number theorem?” Submitted.

6. “ N -division points of hypocycloids.” Submitted. Preprint at <http://arxiv.org/abs/1503.00566>. (With N. Mani.)
7. “Curvature and concentration of Hamiltonian Monte Carlo in high dimensions.” Submitted. Preprint at <http://arxiv.org/pdf/1407.1114.pdf>. (With S. Holmes and C. Seiler.)
8. “Identities for field extensions generalizing the Ohno-Nakagawa relations.” To appear in *Compositio Mathematica*. Preprint at <http://arxiv.org/pdf/1405.1075.pdf>. (With H. Cohen and F. Thorne.)
9. “Grundy values of Fibonacci nim.” To appear in *International Journal of Game Theory*. Preprint at <http://arxiv.org/pdf/1410.0332.pdf>. (With U. Larsson.)
10. “Positive curvature and Hamiltonian Monte Carlo.” *Advances in Neural Information Processing Systems* (NIPS) **27**, 2014. (With S. Holmes and C. Seiler.)
11. “Analysis on surreal numbers.” *Journal of Logic and Analysis* **6**, no. 5, 2014, pp. 1–39. (With A. A. Swaminathan.)
12. “Invariants for A_4 fields and the Cohen-Lenstra Heuristics.” *International Journal of Number Theory* **10**, no. 5, 2014, pp. 1259–1276.
13. “Period computations for covers of elliptic curves.” *Mathematics of Computation* **83**, no. 289, 2014, pp. 2455–2470.
14. “Covers of elliptic curves with unique, totally ramified branched points.” *Mathematische Nachrichten* **286**, no. 14–15, 2013, pp. 1530–1536.
15. “A Hilbert space approach to bounded analytic interpolation.” *Complex Analysis and Operator Theory* **1**, no. 4, 2007, pp. 523–532. (With J. Danciger.)

Books

These are books for advanced high-school students.

1. *Abstract algebra*. In preparation.
2. *Algebraic topology*. In preparation. (With A. Butscher.)
3. *Cryptography*. In preparation.

Teaching

Academic year

2013–2014	Stanford University. Teaching fellow for Thinking Matters 3: breaking codes and finding patterns.
2012–2013	Dartmouth College. Instructor for Math 8 (calculus of one and several variables), Math 10 (elementary statistics), Math 11 (multivariable calculus), Math 20 (discrete probability).
2009–2012	Stanford University. Teaching assistant for Math 51 (linear algebra and multivariable calculus), Math 53 (ordinary differential equations).
2007–2012	Stanford University. Course assistant for Math 19 (differential calculus), Math 114 (advanced honors linear algebra), Math 121 (advanced undergraduate abstract algebra), Math 210A,B (graduate algebra), algebra qualifying exam preparation.
2007	University of California, Santa Barbara. Instructor for Math 10 (combinatorial game theory), a course entirely of my own design.
2006–2007	University of California, Santa Barbara. Instructor for Putnam seminar.
2003–2005	Art of Problem Solving. Taught and designed classes to help advanced middle-school and high-school students win mathematics competitions.

Summer teaching

2014–2015	Stanford University Mathematics Camp. Instructor for a four-week intensive course on algebraic topology for high-school students.
2013	Education Program for Gifted Youth. Instructor for a three-week intensive course on cryptography for high-school students.
2009–2013	Stanford University Mathematics Camp. Teaching assistant: teaching advanced high-school students about abstract algebra, number theory, and algebraic topology.
2012	Stanford Undergraduate Research Institute in Mathematics. Mentor for number theory group.

Other teaching experience

2015	San Francisco Bay Area ARML Team. Coached the national champion A1 team.
2010–2015	Julia Robinson Mathematics Festival. Directed mathematical activities for middle-school students. (2–8 times per year)
2008–2012	Stanford Splash. Taught classes for students in grades 7–12 on various topics, including combinatorial games, cryptography, algebraic topology, prisoner puzzles, and chess. (1–2 times per year)

Talks

Research talks

August 2015	Games at Dalhousie. “Multi-pile Fibonacci nim.”
June 2015	Carl Pomerance 70th Birthday Conference. “Relations between counts of D_ℓ and F_ℓ fields.”
April 2015	UCSB Colloquium. “Dessins d’enfants and origamis.”
January 2015	Joint Mathematics Meeting. “Positive curvature and Hamiltonian Monte Carlo.”
December 2014	West Coast Number Theory. “Relations between counts of D_ℓ and F_ℓ fields.”
June 2014	Stanford Statistics Seminar. “Positive curvature and Hamiltonian Monte Carlo.”
December 2012	CMS Winter Meeting. “The Cohen-Lenstra Heuristics and roots of unity.”
October 2012	Dartmouth Colloquium. “Dessins d’enfants and origamis.”
October 2012	Dartmouth Number Theory Seminar. “Branched covers of algebraic curves.”
September 2012	Québec-Maine Number Theory Conference. “Explicit branched covers of elliptic curves.”
June 2012	Thesis Defense. “Branched covers of elliptic curves.”
June 2011	AIM Workshop on the Cohen-Lenstra Heuristics. “The Cohen-Lenstra Heuristics and roots of unity.”

Expository talks for mathematicians

July 2014	Stanford Undergraduate Research Institute in Mathematics Speaker Series. “Algebraic number theory by picture.”
May 2012	Student Algebraic Geometry Seminar. “Fundamental groups in characteristic p .”
May 2012	Area Exam. “Lifting invariants.”
February 2012	Stanford Graduate Student Colloquium. “Global arithmetic dynamics.”
December 2011	Student Algebraic Geometry Seminar. “Humbert surfaces.”
March 2011	Stanford Graduate Student Colloquium. “Lexicographic codes.”
February 2011	Student Algebraic Geometry Seminar. “Tschirnhaus transformations.”
November 2010	Student Algebraic Geometry Seminar. “The distribution of class groups of function fields.”
February 2010	Student Algebraic Geometry Seminar. “The Beilinson Conjecture for curves.”
October 2009	Stanford Undergraduate Mathematical Organization. “Integer partitions.”
October 2009	Student Algebraic Geometry Seminar. “Rigid p -adic geometry and Berkovich spaces.”
April 2009	Stanford Graduate Student Colloquium. “Preperiodic points of dynamical systems.”
November 2008	Stanford Undergraduate Mathematical Organization. “Combinatorial games.”
November 2007	Stanford Graduate Student Colloquium. “Error-correcting codes and the game of nim.”
January 2007	UCSB Math Club. “Consequences of the abc Conjecture.”
October 2006	UCSB Seminar on Operator Algebras and Functional Analysis. “A prelude to Pick-Nevalinna interpolation.”

Expository talks for younger audiences

May 2015	Stanford Math Circle. “Codes and games.”
May 2015	Stanford Math Circle. “Partitions.”
May 2015	Stanford Math Circle. “Promotion on Young Tableaux.”
November 2014	Stanford Math Circle. “Divide and conquer, and the inverse Ackermann function.”
February 2014	Stanford Math Circle. “Binary sequences, graphs, and card tricks.”
December 2013	Stanford Math Circle. “Generating functions and random walks.”
August 2013	SUMaC. “Games and codes.”
May 2013	Hartford High School. “Games and codes.”
March 2013	MoMath BNL Gifted Math Program. “Wishful thinking in mathematics.”
August 2012	SIYP Middle School Math League. “Binary sequences, graphs, and card tricks.”
August 2012	SIYP Singapore. “Behavioral economics, game theory, and rationality.”
August 2012	EPGY Games and Puzzles Class. “Games and codes.”
July 2012	SUMaC. “Wishful thinking in mathematics.”
July 2012	EPGY Game Theory Class. “Combinatorial games.”
March 2012	Stanford Math Circle. “Wishful thinking in mathematics.”
October 2011	Stanford Math Circle. “Mathematical games.”
July 2011	EPGY Number Theory Class. “Combinatorial games.”
July 2011	SUMaC. “Games and codes.”
December 2010	San Jose Math Circle. “Quadratic reciprocity.”

High school students mentored

- 2015– **Carina Zhang**, The Hotchkiss School. Research project on group cohomology.
- 2015– **Sohini Kar**, Saratoga High School. Research project on factorization of recurrence relations.
- 2015– **Meera Desai**, Crystal Springs Uplands School. Research project on generalizations of the truel problem and hyperplane arrangements.
- 2015– **Kai-Siang Ang**, The Harker School. Research project on octal games.
- 2015– **Rohan Joshi**, Evergreen Valley High School. Research project on surreal numbers.
- 2015– **Aditya Sivakumar**, Beaverton High School. Research project on primes represented by quadratic forms.
- 2015– **Allison Wang**, The Harker School. Research project on the mathematics of Celtic knots.
- 2014 **Ashwath Thirumalai**, The Harker School. Research project on the game of Sylver coinage.
- 2013– **Nitya Mani**, The Harker School. Research project and paper on constructing n -division points on algebraic curves. Grand prize, Synopsys Silicon Valley Science and Engineering Fair 2014 and 2015; 1st place and special prize, California State Science Fair 2014; 3rd place, International Science and Engineering Fair 2015; 1st place, Karl Menger Award 2014 and 2015.
- 2011–2013 **Ashvin Swaminathan**, The Harker School. Research project and paper on analysis on surreal numbers. Regional finalist in Siemens Competition 2012, semi-finalist in Intel Science Talent Search 2013.

Professional service

1. Served on PhD thesis committee for Avram Gottschlich, Dartmouth College, 2012.
2. Referee for *Games of No Chance 5*, *Involve*, *Electronic Journal of Combinatorics*, *Mathematics of Computation*, *INTEGERS*, and *Proceedings of the London Mathematical Society*.
3. Faculty advisor, Dartmouth Chess Club, 2012–2013.