Martin H. Weissman

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Interests

Research

The interaction between representation theory, geometry, and number theory: the Langlands program. Visualization of mathematics.

Teaching

Algebra and number theory, proof-writing, history of mathematics, mathematics for K-12 teachers, scientific inquiry, quantitative literacy, programming (Python).

Employment

- 2018-present: Professor, Department of Mathematics, UC Santa Cruz
- 2012-2018: Associate Professor, Department of Mathematics, UC Santa Cruz
- 2013-2016: Associate Professor, Division of Sciences, Yale-NUS College
- 2006-2012: Assistant Professor, Department of Mathematics, UC Santa Cruz
- 2003-2006: Postdoctoral fellow, Department of Mathematics, UC Berkeley

Education

- 2003: PhD, Mathematics, Harvard University
- 1999: AB *summa cum laude*, Mathematics, Princeton University

Honors and Awards

- 2020: Guggenheim Fellow in mathematics
- 2016-2021: Simons Foundation collaboration grant
- 2003-2006: National Science Foundation postdoctoral fellowship.
- 2003: Clay Mathematics Institute Liftoff fellowship
- 1999-2002: National Science Foundation graduate research fellowship
- 1999: Phi Beta Kappa, Princeton University
- 1999: Greenberg prize in mathematics, Princeton University

Publications

Research articles

- 2019: *Equivariant perverse sheaves on Coxeter arrangements and buildings*, Épijournal de Géométrie Algébrique **3**, (2019).
- 2019: *An induction theorem for groups acting on trees*, Representation Theory **23**.

- 2019: (with Suzana Milea and Christopher D. Shelley) *Arithmetic of arithmetic Coxeter groups*. PNAS **116**, No. 2.
- 2018: *A comparison of L-groups for covers of split reductive groups*. Asterisque **398**.
- 2018: *L-groups and parameters for covering groups*. (153 pages). Asterisque **398**.
- 2018: (with Fan Gao and Wee Teck Gan) *L-groups and the Langlands program for covering groups: a historical introduction*. Asterisque **398**.
- 2017: (with Fan Gao) *Whittaker models for depth zero representations of covering groups*, in International Mathematics Research Notices **2019**, No. 11.
- 2016: *Covers of tori over local and global fields*, in American Journal of Mathematics **138**, No. 6.
- 2016: *Covering groups and their integral models*, in Transactions of the American Mathematical Society. **368**, No. 5.
- 2014: *Split metaplectic groups and their L-groups*, in Journal für die reine und angewandte Mathematik (Crelle's journal). **696**
- 2011: *Managing Metaplectiphobia: Covering p-adic groups*, in "Harmonic analysis on reductive, p-adic groups," Contemp. Math. **543**
- 2011: (with Gordan Savin) *Dichotomy for generic supercuspidal representations of G_2*, in Compositio Mathematica **147**
- 2009: (with Tatiana Howard) *Depth-zero representations of nonlinear covers of p-Adic groups*, in International Mathematics Research Notices **21**.
- 2009: *Metaplectic tori over local fields*, in Pacific Journal of Mathematics **241**, No. 1
- 2008: *Multiplying modular forms*, in "Modular Forms on Schiermonnikoog," published by Cambridge University Press
- 2006: *D_4 modular forms*, in American Journal of Mathematics **128**, No. 4
- 2003: *The Fourier-Jacobi map and small representations*, in Representation Theory **7**

Book

- 2017: *An Illustrated Theory of Numbers*. 323 pages. Published by the American Mathematical Society.
    - 2018 PROSE Awards, Honorable Mention.
    - 2018 CHOICE Outstanding Academic Title.
    - Reviews: La Gazette des Mathématiciens, MathSciNet, zbMath, MAA Reviews, The Math Less Traveled, CHOICE.
    - Translations: Japanese (under contract)

Other writing and design

- 2021: *59 Tetrahedra* Tetrahedra generated for cover illustration by Olena Shmahalo, based on data of Kiran Kedlaya et al. Published in Quanta, February 2, 2021.
- 2021: *Tetrahedra with rational dihedral angles* Illustration published in the Dutch newspaper NRC, January 24, 2021, to accompany the article Piramides met buitenbeentjes
- 2020: *36 Epicycles*. Digital print on acrylic. Exhibited in Creativity Counts: Possibilities shaped by constraints of arithmetic, at the Jordan Schnitzer Museum, Eugene, Oregon.
- 2018: *Integer triangles*. 60cm x 40cm digital print. Exhibited at Bridges 2018: Mathematics, Art, Music, Architecture, Education, Culture, at the National Museum of Science and

Technology, Stockholm, Sweden.

- 2018: *Why prime numbers still fascinate mathematicians, 2,300 years later*. Analysis published in The Conversation. Republished in Smithsonian Magazine, Popular Science, Real Clear Science, Salon, San Francisco Chronicle. Translated and republished in Nexo Journal (Portuguese), Galileo (Italian).
- 2018: *Illustrating the theory of numbers*. Conference Proceedings of Bridges 2018: Mathematics, Art, Music, Architecture, Education, Culture, at the National Museum of Science and Technology, Stockholm, Sweden.

Lectures

- Number theory by design
  - 2019: Illustrating number theory and algebra workshop, ICERM
- An induction theorem for groups acting on trees
  - 2021: University of Utah, Representation Theory Seminar
    * 2019: Oregon State University, Number Theory Seminar
    * 2018: AMS Sectional Meeting, Ann Arbor, MI, Special Session on Representations of Reductive Groups over Local Fields and Related Topics.
- The arithmetic of arithmetic Coxeter groups
  - 2020: Boston College / MIT, Number Theory Seminar
    * 2020: San Jose State University, Math/stats Colloquium
    * 2019: University of Oregon, Number Theory Seminar
    * 2018: American University, Department Colloquium
    * 2018: University of Maryland, Lie group seminar
    * 2018: University of Michigan, Group, Lie and Number Theory Seminar
    * 2017: University of San Francisco, Department Colloquium
    * 2017: Oregon State University, Department Colloquium
- L-groups and the Langlands program for covering groups
  - 2018: California Institute of Technology, Number Theory Seminar
  - 2018: University of California, Berkeley, Arithmetic Geometry Seminar
  - 2018: University of Chicago, Number Theory Seminar
  - 2017: University of Oregon, Number Theory Seminar
  - 2017: Purdue University, Automorphic Forms and Representation Theory seminar
  - 2017: (1-hour seminar talk, 4-hour mini-course) Weizmann Institute of Science, Rehovot, Israel.
  - 2016: (3 lecture mini-course) Automorphic forms on metaplectic groups and related topics, Pune, India
  - 2016: New developments in representation theory, Institute for Mathematical Sciences, Singapore
  - 2015: Workshop on representation theory and automorphic forms, National University of Singapore
  - 2014: National University of Singapore, representation theory seminar
  - 2013: AIM workshop on automorphic forms and harmonic analysis on covering groups
  - 2013: National University of Singapore, representation theory seminar
  - 2013: Hanoi, Vietnam, Pan-Asian Number Theory Conference

- 2012: University of Michigan, group, Lie, and number theory seminar
  - 2012: National University of Singapore, IMS conference on branching laws
  - 2012: Bay area number theory and algebraic geometry (BANTAAG) workshop
- Variations on a theme of Shimura and Waldspurger
  - 2010: University of California, Berkeley, number theory seminar
- Dichotomy for G_2
  - 2009: AMS Southeastern Meeting, Boca Raton, Florida, special session on modular forms and automorphic forms
  - 2009: University of Michigan, group, Lie, and number theory seminar
  - 2009: Stanford University, number theory seminar
  - 2009: University of California, Los Angeles, number theory seminar
  - 2009: University of Windsor, Ontario, algebra seminar
- Metaplectic tori
  - 2008: University of Michigan, group, Lie, and number theory seminar
  - 2008: University of Utah, representation theory seminar
  - 2008: University of Maryland, representation theory seminar
  - 2007: University of California, Berkeley, automorphic forms seminar
- Multiplying modular forms
  - 2007: Bonn, Germany, Hausdorff Institute for Mathematics, representation theory seminar
  - 2007: University of California, Santa Barbara, representation theory conference
  - 2007: University of Michigan, Lie theory seminar
  - 2006: Stanford University, representation theory seminar
- Paley-Wiener theorems and local L-functions
  - 2006: University of California, Berkeley, number theory seminar
  - 2005: University of Michigan, Midwest representation theory conference
  - 2005: University of California, Berkeley, number theory seminar
- D_4 modular forms
  - 2009: University of Georgia, SAGE Days 13, "Octonions, cubes and embeddings"
  - 2006: University of Utah, departmental colloquium, "Arithmetic embedding problems"
  - 2004: University of Minnesota, automorphic forms seminar
  - 2004: University of California, Los Angeles, number theory seminar
  - 2004: Harvard University, number theory seminar
  - 2004: University of Michigan, groups and geometry seminar
  - 2004: University of California, Santa Barbara, workshop on automorphic forms
  - 2004: Stanford University, number theory seminar
  - 2004: California Institute of Technology, number theory seminar
  - 2003: University of California, Berkeley, number theory seminar
  - 2003: University of California, San Diego, representation theory seminar
- The Fourier-Jacobi map and small representations
  - 2002: M.I.T. Lie groups and representation theory seminar
  - 2002: University of Michigan and Michigan State joint arithmetic seminar
  - 2001: Banff workshop on automorphic forms and representations of p-adic groups

Visiting research positions

- 2017: Weizmann Institute of Science, Rehovot, Israel
- 2015: University of California, Berkeley
- 2014: Harvard University
- 2010: Max Planck Institute for Mathematics, Bonn, Germany
- 2009: University of Michigan, Ann Arbor
- 2008: University of Michigan, Ann Arbor
- 2007: Hausdorff Institute, Bonn, Germany
- 2007: University of Michigan, Ann Arbor

Professional associations

- American Mathematical Society, Member
- National Association of Mathematicians, Member
- Association for Women in Mathematics, Member

Teaching

Courses taught

- 2021: UCSC Math 201, Algebra II (graduate linear algebra)
- 2021: UCSC Math 152, Programming for Mathematics (Python)
- 2020: UCSC Math 238, Elliptic functions and modular forms
- 2020: UCSC Math 11A, Calculus with applications
- 2020: UCSC Math 111T, Algebra (abstract algebra, for future K-12 teachers)
- 2020: UCSC Math 11A, Calculus with applications
- 2019: UCSC Math 111T, Algebra (abstract algebra, for future K-12 teachers)
- 2019: UCSC Math 222B, Algebraic number theory II
- 2018: UCSC Math 152, Programming for Mathematics (Python)
- 2018: UCSC Math 111A, Algebra (group theory)
- 2017: UCSC Math 203, Algebra IV (commutative algebra)
- 2017: UCSC Math 3, Precalculus
- 2017: UCSC Math 238, Elliptic functions and modular forms
- 2017: UCSC Math 19B, Calculus for Science, Engineering, and Mathematics
- 2016: UCSC Math 203, Algebra IV (commutative algebra)
- 2016: UCSC Math 110, Introduction to number theory
- 2016: Yale-NUS College, Proof
- 2015: Yale-NUS College, Scientific Inquiry (course coordinator)
- 2015: Yale-NUS College, Number Thory
- 2015: Yale-NUS College, Proof (course developer)
- 2014: Yale-NUS College, Number Theory
- 2014: Yale-NUS College, Scientific Inquiry (course coordinator)
- 2014: Yale-NUS College, Integrated Science 1
- 2013: Yale-NUS College, Symmetry (one-week "Learning Across Boundaries" course)
- 2013: Yale-NUS College, Scientific Inquiry

- 2013: UCSC Math 281, Topics in algebra (automorphic representations)
- 2012: UCSC Math 238, Elliptic functions and modular forms
- 2012: UCSC Math 100, Introduction to proof and problem solving
- 2012: UCSC Math 181, History of mathematics
- 2011: UCSC Math 110, Introduction to number theory
- 2011: UCSC Math 203, Algebra IV (commutative algebra)
- 2011: UCSC Math 19A, Calculus for engineering, science, and mathematics
- 2011: UCSC Math 201, Algebra II (graduate linear algebra)
- 2010: UCSC Math 4, Mathematics of choice and argument
- 2010: UCSC Math 220A, Representation theory I
- 2009: UCSC Math 203, Algebra IV (commutative algebra)
- 2009: UCSC Math 4, Mathematics of choice and argument
- 2009: UCSC Math 222A, Algebraic number theory
- 2008: UCSC Math 110, Introduction to number theory
- 2008: UCSC Math 203, Algebra IV (commutative algebra)
- 2008: UCSC Math 4, Mathematics of choice and argument (course developer)
- 2007: UCSC Math 100, Introduction to proof and problem solving
- 2007: UCSC Math 111B, Algebra II (rings and fields)
- 2007: UCSC Math 202, Algebra III (modules and Galois theory)
- 2007: UCSC Math 222A, Algebraic number theory

Outreach and education

- 2016-present: Co-PI for the Monterey Bay Area Math Project
- 2021: Presenter, Monterey Bay Area Math Project Summer Institute
- 2021: Presenter, Santa Cruz Math Teacher Circle
- 2017: Presenter, Santa Cruz Math Teacher Circle
- 2016: Bay Area Math Adventures, Santa Clara University
- 2016: Innovation in Liberal Arts and Science Curriculum Design, Yale University
- 2016: Judge, Singapore Science and Engineering Fair, for students at the secondary school and junior college level in Singapore
- 2013: Speaker at annual Knowledge and Inquiry (KI) Symposium, for secondary school teachers in Singapore
- 2010-2013: Founding organizer and instructor for the Santa Cruz Math Teacher Circle
- 2007-2013: Co-PI for the Monterey Bay Area Mathematics Project
- 2012: Sonoma State University, MATH Colloquium, "Conway's topographs"
- 2011: San Francisco, speaker at *Math Solutions* annual retreat, "The Euclidean algorithm and number sense"
- 2009: Participant in the AIM workshop on math teacher circles
- 2008: Instructor, Michigan Math and Science Scholars (high school) program
- 2007: Presenter, conference of the Alliance for Science and Monterey Bay area Mathematics Project

Service and mentorship

Service at Yale-NUS College, Singapore

- 2015-16: Member, Committee on Academic Standards
- 2015-16: Member, Committee on Teaching, Learning, and Advising
- 2015: Interim head of studies: Mathematical and computational sciences major
- 2014-16: Common Curriculum Self-Study Committee
- 2014-15: Chair of Committee on Teaching, Learning, and Advising
- 2014-15: Head of studies for the Science Common Curriculum
- 2014-15: Chair of hiring committee: Mathematical and computational sciences
- 2013-14: Committee on educational resources and technology

Service at UC Santa Cruz

- 2021: Graduate of UCSC Leadership Academy
- 2019-2020: Hiring committe, Department of Mathematics
- 2017-2018: Diversity liason for hiring, Department of Mathematics
- 2016-2017: Committee on precalculus and calculus
- 2012-2013: Academic Senate Committee on Teaching
- 2010-2012: Academic Senate Committee on Computing and Telecommunications
- 2009-2012: Undergraduate Vice-Chair, Department of Mathematics.
- 2010-2011: Postdoctoral hiring committee, Department of Mathematics
- 2007-2008: Tenure-track hiring committee, Department of Mathematics

Mentorship and supervision

- 2020-2021: Undergraduate research supervisor for Ian Wallace, BA at UCSC.
- 2020-2021: Mentor for Andrew Kobin, postdoctoral fellow at UCSC
- 2020: Undergraduate research supervisor for Aviv Brook, BA at UCSC
- 2019: Undergraduate research supervisor for Diana Sernas
- 2018-present: PhD supervisor for Philip Barron, UCSC
- 2017-2020: PhD supervisor for Natalya Jackson, UCSC (PhD at UCSC received 2020)
- 2016-2020: PhD supervisor for Suzana Milea, UCSC (PhD at UCSC received 2020)
- 2017-2019: Mentor for Edmund Karasiewicz, postdoctoral fellow at UCSC
- 2018-19: Undergraduate research supervisor for Harrison Henningsen, BA at UCSC.
- 2016-17: Undergraduate research supervisor for Alec Dektor, BA at UCSC.
- 2015-16: Faculty mentor for assistant professors Anthony Lin and Andreas Heinecke, Yale-NUS College.
- 2015: Thesis examiner for Angus McAndew, MA at University of Melbourne.
- 2014-2015: Dissertation committee for Gao Fan, PhD at National University of Singapore received 2015.
- 2010-2013: Advisor for Chris Shelley, PhD at UCSC received 2013.
- 2013: Thesis supervisor for Gary Kirby, MA at UCSC.
- 2013: Thesis supervisor for Samuel Hilkey, BA at UCSC.
- 2013: Thesis supervisor for Claire Dodson, BA at UCSC.

- 2012: Thesis supervisor for Travis Morrison, BA at UCSC. (Dean's undergraduate research award)
- 2010-2012: Advisor for Frederick Nitz, PhD at UCSC received 2012.
- 2010-2012: Advisor for Paul Tokorcheck, PhD at UCSC received 2012.
- 2009-2011: Mentor for Scott Crofts, NSF postdoctoral fellow at UCSC
- 2010: Thesis supervisor for Mitchell Owen, BA at UCSC.
- 2009: Thesis supervisor for Adam Chavin, BA at UCSC.
- 2009: Thesis supervisor for Christopher Lee, BA at UCSC
- 2008: Thesis supervisor for Megan Appold-Peterschmidt, MA at UCSC.
- 2007: Thesis supervisor for Andreas Weinert, MA at St Andrews University.
- 2007: Thesis supervisor for Paul Spiegelhalter, BA at UCSC

Journal and grant service

- Referee: The Michigan Mathematical Journal, Annales de la Faculte de Toulouse, Journal of the Ramanujan Mathematical Society, International Mathematics Research Notices, Springer Verlag UTM, Transactions of the American Mathematical Society, American Journal of Mathematics, Pacific Journal of Mathematics, Journal de Théorie des Nombres de Bordeaux, Rose-Hulman Undergraduate Mathematics journal
- Reviewer: Austrian Science Fund, Netherlands Organisation for Scientific Research (NWO)

References

- Benedict H. Gross
    - George Vasmer Leverett Professor of Mathematics
    - Department of Mathematics, Harvard University
    - gross@math.harvard.edu
- Solomon Friedberg
    - James P. McIntyre Professor of Mathematics
    - Department of Mathematics, Boston College
    - solomon.friedberg@bc.edu
- Wee Teck Gan
    - Distinguished Professor of Mathematics
    - Department of Mathematics, National University of Singapore
    - matgwt@nus.edu.sg
- Stephen DeBacker
    - Arthur F. Thurnau Professor of Mathematics
    - Department of Mathematics, University of Michigan
    - smdbackr@umich.edu
- Charles Bailyn
    - A Bartlett Giamatti Professor of Astronomy and Physics, Yale University
    - Inaugural Dean of the Faculty, Yale-NUS College
    - charles.bailyn@yale.edu