

CURRICULUM VITAE

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ADDRESS

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EDUCATION

1985 Ph. D., Harvard University, under the direction of Barry Mazur
1977 B. Sc., University of New South Wales, Sydney

EMPLOYMENT

2006– Director, Institute for Mathematics and Education
2006– University Distinguished Professor, University of Arizona
1996–2005 Professor, University of Arizona
1996–2000 Assoc. Head for Undergraduate Programs, University of Arizona
1990–1996 Associate Professor, University of Arizona
1986–1990 Assistant Professor, University of Arizona
1986–87 Fellow, Mathematical Sciences Research Institute, Berkeley
1984–86 Visiting Lecturer, University of California, Berkeley

VISITING POSITIONS

2006/1–5 Fellow of the Udall Center for Studies in Public Policy, University
of Arizona

2001/3	Prof. Invité, Université Joseph Fourier, Grenoble
2001/2	Prof. Invité, Université de Paris-Sud, Orsay
2000/9–12	Visitor, Institut des Hautes Études Scientifiques,
1996/7	Visitor, Institut des Hautes Études Scientifiques
1995–96	Fellow, Institute for Advanced Study
1995/7	Prof. Invité, Université de Bordeaux I
1993–94	Visitor, Institut des Hautes Études Scientifiques
1991/1–6	Visiting Lecturer, Macquarie University, Sydney

HONORS AND AWARDS

2006	University of Arizona College of Science Galileo Circle Fellow
2005	NSF Director's Award for Distinguished Teaching Scholars
1996	University of Arizona College of Science Innovation in Teaching Award
1995	American Mathematical Society Centennial Research Fellowship

PUBLISHED ARTICLES

1. (with Benjamin Levitt) Yet more elements in the Shafarevich-Tate group of the jacobian of a Fermat curve. In *Proceedings of the Special Session on Computational Algebraic Geometry, San Francisco, April 2006*, to appear.
2. (with Bjorn Poonen) The method of Coleman and Chabauty. In *Proceedings of the 2004 trimester on Explicit Methods in Number Theory, Institut Henri Poincaré*, to appear.
3. Assessing the strands of student proficiency in elementary algebra. In Alan H. Schoenfeld, editor, *Assessing Mathematical Proficiency*, volume 53 of *Mathematical Sciences Research Institute Publications*, New York, 2007. Cambridge University Press.
4. Computer algebra and human algebra. In Ki Hyoung Ko and Dean Arganbright, editors, *Enhancing University Mathematics*, volume 14 of *CBMS Issues in Mathematics Education*, pages 43–50, Rhode Island, 2007. American Mathematical Society.
5. Promoting work on education in mathematics departments. *Notices of the AMS*, pages 1093–1098, October 2003.

6. (with Pavlos Tzermias) On Shafarevich-Tate groups and the arithmetic of Fermat curves. In *Number theory and algebraic geometry*, volume 303 of *London Math. Soc. Lecture Note Ser.*, pages 203–226. Cambridge Univ. Press, Cambridge, 2003.
7. (with Romyar T. Sharifi) A cup product in the Galois cohomology of number fields. *Duke Math. J.*, 120(2):269–310, 2003.
8. (with Randall M. Richardson) The third R in literacy. In Bernard L. Madison and Lynn Arthur Steen, editors, *Quantitative Literacy: Why Numeracy Matters for Schools and Colleges*, pages 99–106, Princeton, 2003. NCED.
9. Thinking out of the box. In James T. Fey, editor, *Computer Algebra Systems in Secondary School Mathematics Education*. NCTM, 2003.
10. Greenberg’s conjecture and units in multiple \mathbb{Z}_p -extensions. *Amer. J. Math.*, 123:909–930, 2001.
11. Brauer points on Fermat curves. *Bull. Austral. Math. Soc.*, 63:393–406, 2001.
12. (with Sang Yook An, Seog Young Kim, David C. Marshall, Susan H. Marshall, and Alexander R. Perlis) Jacobians of genus one curves. *J. Number Theory*, 91(2):304–315, 2001.
13. The goals of the calculus course. In Susan L. Ganter, editor, *Calculus Renewal, Issues for Undergraduate Education in the Next Decade*, chapter 2, pages 11–22. Kluwer Academic, New York, 2000.
14. Will this be on the exam? In Steven G. Krantz, editor, *How to Teach Mathematics*, pages 233–240. American Mathematical Society, Providence, 1999.
15. A duality theorem in the multivariable Iwasawa theory of local fields. *J. reine angew. Math.*, 464:143–172, 1995.
16. On the method of Coleman and Chabauty. *Math. Ann.*, 299:565–596, 1994.
17. The arithmetic of Fermat curves. *Math. Ann.*, 294:503–511, 1992.
18. Rigor in the undergraduate calculus curriculum. *Notices of the AMS*, 38(9):1131–1132, 1991.
19. Kolyvagin’s work on Shafarevich-Tate groups. In J. Coates and M. J. Taylor, editors, *L-functions and Arithmetic, Proceedings of the Durham Symposium, July, 1989*, volume 153 of *LMS Lecture Note Series*, pages 295–316, Cambridge, 1991. Cambridge University Press.
20. Tate duality and wild ramification. *Math. Ann.*, 288:553–558, 1990.

21. On the Shafarevich-Tate group of the Jacobian of a quotient of the Fermat curve. *Invent. Math.*, 93(3):637–666, 1988.
22. (with Robert Coleman) Stable reduction of Fermat curves and Jacobi sum Hecke characters. *J. reine angew. Math.*, pages 41–101, 1988.
23. Duality theorems for Nèron models. *Duke Math. Journal*, 53:1093–1124, 1986.
24. The degenerate fibre of the Fermat curve. In *Number theory related to Fermat's last theorem (Cambridge, Mass., 1981)*, volume 26 of *Progr. Math.*, pages 57–70. Birkhäuser Boston, Mass., 1982.

BOOKS

1. *Algebra: Form and Function*, McCallum, Connally, Hughes-Hallett et al., John Wiley & Sons, New York, 2008, preliminary edition.
2. *Applied Calculus*, Fraser-Locke, Hughes-Hallett, Gleason et al., John Wiley & Sons, New York, three editions, 1999, 2002 and 2006.
3. *Multivariable Calculus*, McCallum, Hughes-Hallett, Gleason et al., John Wiley & Sons, New York, three editions, 1997–2005
4. *Calculus*, Hughes-Hallett, Gleason et al., John Wiley & Sons, New York, four editions, 1993–2005.
5. *Teaching Mathematics in Colleges and Universities: Case Studies for Today's Classroom*, by Solomon Friedberg. Contributor with many others, American Mathematical Society, 2001.
6. *Contemporary Issues in Mathematics Education*, proceedings of a conference held at MSRI in December 1996, co-editor with Steven Krantz and Estela Gavosto, Cambridge University Press, 1999

GRANTS

- 2006–2011 Math Science Partnership grant, *Arizona Teacher Initiative*, 20%, National Science Foundation (co-PI). Note: I convened the team of PIs and put together the proposal, but chose not to be PI.
- 2006 NSF conference grant, *Summer School in Iwasawa Theory*, PI
- 2005–2009 NSF Director's Award for Distinguished Teaching Scholars, *Making Connections: Joint Analysis of School Mathematics Problems. A national model for collaboration between Mathematicians, Teachers, and Mathematics Education Researchers*, 100%, National Science Foundation (PI).

- 2000–2003 Vertical Integration of Graduate Research and Education grant, 20%, National Science Foundation (co-PI 2000–2002, PI 2002–2005)
- 1999–2002 Course, Curriculum, and Laboratory Improvement grant, *The Mathematics of Decision-Making*, PI, 25%, National Science Foundation
- 1996–2000 Research grant, *The Method of Coleman and Chabauty*, PI, 100%, National Science Foundation
- 1993–96 Research grant, *Arithmetic Algebraic Geometry*, Co-PI, 50%, National Science Foundation
- 1993–98 Calculus and Bridge to Calculus Curriculum Development grant, Arizona subcontract to *Core Calculus Consortium: Precalculus and Multivariable Calculus*, PI, 50%, National Science Foundation
- 1992–95 Calculus reform dissemination grant, *Dissemination and Implementation of Calculus Reform in the Southwest*, Co-PI, 33%, National Science Foundation
- 1990–92 Research grant, *Shafarevich-Tate groups*, PI, 100%, National Science Foundation
- 1988–90 Research grant, *A new approach to Faltings’s metrics on cohomology*, PI, 100%, National Science Foundation
- 1989–94 Calculus Curriculum Development grant, Arizona subcontract to *Core Calculus Consortium*, PI, 50%, National Science Foundation,
- 1989 International conference: *Arithmetic of Algebraic Curves*, Jan 7–10, Co-PI, 75%, National Science Foundation,

CONFERENCES, WORKSHOPS AND PANELS ORGANIZED

- 2007/10 Making Sense of Testing in Arizona, IME policy retreat
- 2007/6 Revitalizing College Algebra, MAA PREP workshop (co-organizer)
- 2007/6 Making Connections, workshop for elementary school teachers, mathematicians, and educators
- 2007/7 Summer School in Iwasawa Theory, Fields Institute, McMaster University, Hamilton, Ontario
- 2007/3 Mathematics Courses for Teacher Education, IME workshop
- 2006/10–11 Planning retreats for the formation of the Institute for Mathematics and Education

- 2006/6 Making Connections, workshop for middle school teachers, mathematicians, and educators
- 2005/7 PMET workshop for instructors of prospective high school teachers, PCMI, Park City, Utah
- 2005/1 AMS Special Session on Mathematicians' work on Mathematics Education, Joint Mathematics Meetings, Atlanta
- 2005/1 AMS Committee on Education Panel, Joint Mathematics Meetings, Atlanta
- 2004/10 Annual meeting of the AMS Committee on Education, Washington
- 2001/1 MAA Session on Integrating Mathematics and Other Disciplines, Joint Mathematics Meetings, New Orleans (co-organizer)
- 2001/2 Curriculum Policy Workshop on Preparation of Math Majors in the First Two
- 2000/12 MSRI Workshop on Arithmetic Geometry (co-organizer) Years, MSRI (chair of organizing committee)
- 2000/10 CUPM Curriculum Foundations Workshop for Social Sciences, University of Arizona (CRAFTY representative)
- 2000/4 Chatauqua Short Course on Computer Algebra Systems in Mathematics Education (co-organizer)
- 2000/3 CUPM Curriculum Foundations Workshop for Engineers, Clemson University (CRAFTY representative)
- 2000/1 MAA Session on Integrating Mathematics and Other Disciplines, Joint Mathematics Meetings, Washington (co-organizer)
- 1999/10 CUPM Curriculum Foundations Workshop for Physics and Computer Science, Bowdoin (CRAFTY representative)
- 1999/3 Arizona Winter School, Local to Global principles in Arithmetical Algebraic Geometry (co-organizer)
- 1999/6 Chatauqua Short Course on Multivariable Calculus with Engineering Applications (organizer)
- 1999/1 MAA Session on Integrating Mathematics and Other Disciplines, Joint Mathematics Meetings, San Antonio (organizer)
- 1998/7 Panel at International Conference on the Teaching of Mathematics, Pythagorion, Samos, Greece (moderator)

- 1997/6 Panel on the Role of Rigor in the First-Year Curriculum, Sixth Conference on the Teaching of Mathematics, Milwaukee (organizer)
- 1996/6 Panel on Rigor, Mathematics, and Calculus, Fifth Conference on the Teaching of Mathematics Baltimore, (organizer)
- 1996/12 Symposium on The Future of Mathematics Education at Research Universities, MSRI (chair of organizing committee)
- 1989 Conference on the Arithmetic of Algebraic Curves, January 7-10, University of Arizona (co-organizer)

TALKS SINCE 1998

- 2007/11 Plenary and panel at “A Day of Mathematics”, Boston University Tyngsboro conference center
- 2007/3 “The Role of Mathematicians and Scientists in the Preparation of Mathematics Teachers”, Hablando de la Formación de Profesores de Ciencias, Chile
- 2007/3 “How does technology affect what we teach?”, invited address, Learning Technologies and Mathematics Middle East Conference Sultan Qaboos University, Muscat, Oman
- 2007/3 “Collaboration between mathematicians and educators”, NCTM invited address, Atlanta
- 2007/2 “How should elementary mathematics be taught?”, AAAS Symposium, San Francisco
- 2007/2 “Introduction to Explicit Chabauty Methods”, two hours of invited talks at a workshop on Explicit Methods for Rational Points on Curves, Banff International Research Station
- 2007/1 “Writing Problems for Algebra: Don’t just do something, stand there!”, workshop, Educator Appreciation Day, Tucson, Arizona
- 2006/6 “What can mathematicians and mathematics educators communicate about?”, invited plenary panel, Third International Conference on the Teaching of Mathematics, Istanbul, Turkey
- 2006/5 3-hour mini-course on algebra at PMET workshop, El Paso
- 2006/5 “Shafarevich-Tate groups of Jacobians of Fermat Curves: A Survey of Old and New Results”, number theory seminar, UCLA

- 2006/4 “Yet more elements in the Shafarevich-Tate group of the Jacobian of a Fermat curve”, invited 20-minute talk, AMS special session, San Francisco
- 2006/4 “Algebraic manipulation”, invited panel, MAA Southwestern Sectional Meeting
- 2005/12 “Great issues of our time: the quadratic formula,” talk for middle school teachers, Boston University.
- 2005/11 “Jacobians of Fermat curves”, research seminar, Purdue University.
- 2005/10 “Things that go without saying in elementary algebra,” education colloquium, Stony Brook University.
- 2005/10 “How would you Google and algebraic Number?”, research colloquium, Stony Brook University.
- 2005/10 “Things that go without saying in elementary algebra,” education colloquium, Purdue University.
- 2005/4 “The National Math View and the Achieve Standards,” invited panel presentation at the NCTM annual meeting, Anaheim.
- 2005/2 “Arithmetic Fundamental Groups”, colloquium, McMaster University.
- 2005/1 Invited panelist for a special session on the Algebra Project, Joint Meetings, Atlanta.
- 2004/9 “Successful institutional collaborations between mathematics faculty and mathematics education faculty,” invited panel presentation at Mathematical Preparation of Middle School Mathematics Teachers Conference
- 2004/7 “Structure of arithmetic pro- p fundamental groups and applications”, invited lecture at Congrès Iwasawa 2004, Besançon
- 2004/3 “Assessing Student Proficiency in Algebra”, invited panel presentation at MSRI Workshop on “Assessing Students’ Mathematics Learning: Issues, Costs and Benefits”
- 2004/1 “The Ideas of Algebra”, contributed presentation to the MAA Session on Courses below Calculus, joint meetings, Phoenix
- 2004/1 “Mathematics Education in a research intensive department: What makes it work?”, panel discussion at joint meetings, Phoenix
- 2003/11 “ConceptTests: Putting the Concepts Back into Testing”, Workshop, AMATYC, Salt Lake City

- 2003/11 “Where has the Algebra Gone?”, 50 minute talk, AMATYC, Salt Lake City
- 2003/11 “Arithmetic Fundamental Groups”, Colloquium, University of Michigan
- 2003/11 “The Ideas of Undergraduate Mathematics”, Math Ed Seminar, University of Michigan
- 2003/11 “The Skills of Undergraduate Mathematics”, Math Ed Seminar, Michigan State University
- 2003/10 “Spreadsheets and Algebra: What’s the Connection?”, 20 minute talk, International Conference on Technology in Collegiate Mathematics, Chicago
- 2003/7 “Mathematical Reasoning in a Business Mathematics Course”, International Conference on Industrial and Applied Mathematics, Sydney
- 2003/2 “Promoting Work on Mathematics Education in Mathematics Departments”, plenary address, conference on Mathematics Education and Mathematics in the 21st Century: The Role of Mathematics Educators in a Research I Mathematics Department, University of Arizona
- 2002/9 Testimony before a panel on evaluating curriculum reform projects, National Academy of Sciences
- 2002/7 “Jacobians of quintic genus one curves”, invited 50 minute address, Workshop in Arithmetic Geometry and Applications, Sydney University
- 2002/7 “The Fundamental Group of the 37th Cyclotomic Field”, Algorithmic Number Theory Symposium, Sydney University
- 2002/5 “The Structure of Fundamental Groups of Number Fields”, invited 30 minute address, Canadian Number Theory Association, VII Meeting, Montreal
- 2002/4 “Fundamental Groups of Number Fields”, invited 50 minute lecture, Barrett Lectures, University of Tennessee
- 2001/9 “The Mathematics of Decision Making”, Special Session on Mathematics Education, Australian Mathematical Society Annual Meeting
- 2001/9 “Structure of Arithmetic Fundamental Groups”, Special Session on Algebraic Geometry and Number Theory, Australian Mathematical Society Annual Meeting

- 2001/3 “Points de Brauer sur courbes de Fermat”, number theory seminar, Université Joseph Fourier, Grenoble
- 2001/3 “Théorie d’Iwasawa à plusieurs variables”, number theory seminar, Université Joseph Fourier, Grenoble
- 2001/1 “Greenberg’s Pseudo-Null Conjecture”, workshop on Théorie d’Iwasawa des Motifs, Univ. Paris-Nord.
- 2001/1 “Brauer points on Fermat curves”, contributed paper, Special Session on the Arizona Winter School, Joint Meetings, New Orleans
- 2000/12 “L’accouplement de Cassels pour les courbes de Fermat”, Séminaire Variétés Rationnelles, E.N.S./Paris-Sud,
- 2000/11 “Conjecture de Greenberg”, number theory seminar, Université de Strasbourg
- 2000/10 “Brauer Points on Fermat Curves”, number theory seminar, Cambridge University
- 2000/10 “On Greenberg’s Pseudo-Null Conjecture”, number theory seminar, Cambridge University
- 2000/6 “Computer Algebra Systems in Mathematics Education”, invited address, MAA Regional Meeting, British Columbia
- 2000/4 Panel on the future of calculus reform, NCTM pre-session, Chicago
- 1999/11 Mathematics Education Colloquium, University of Washington
- 1999/11 Panel on computer algebra systems in teaching mathematics, ICTCM, San Francisco
- 1999/7 Panel on mathematics education, Park City/IAS Institute
- 1999/3 Series of talks on the Hasse Principle and the Method of Coleman and Chabauty at the second Arizona Winter School
- 1998/11 “Balancing Theory and Applications in Multivariable Calculus”, contributed paper, AMS Regional Meeting special session, University of Arizona
- 1998/4 “Curves of Genus One and Their Jacobians”, invited address, Mountain West Geometry Workshop, Oklahoma State University
- 1998/1 “Teaching a Conceptual Applied Calculus Course”, Joint Mathematics Meetings, contributed paper, Baltimore,

SELECTED SERVICE

- 2007 Chair-elect of Conference Board of the Mathematical Sciences
- 2007 Revisions committee for Arizona state standards
- 2007 writing group for NCTM high school curriculum focal points
- 2005/7 Co-organizer of PMET workshop at Park City Mathematics Institute
- 2005/3 Co-organizer of Arizona Winter School, Albuquerque
- 2005/1 Special session on “Mathematicians’ work on education”, Joint meetings, Atlanta
- 2005/1 AMS Committee on education panel on “Mathematicians’ work on education”, Joint meetings, January, Atlanta
- 2005– Consultant to Achieve on two projects: (a) NAEP recommendations and (b) American Diploma Project 9-12 recommendations.
- 2004– Chair, AMS Committee on Education, organize October meeting and January panel at Joint Meetings
- 2004– Advisory Board, Center for the Study of Mathematics Curriculum, Michigan State University
- 2003– Mathematics working group for University of Michigan School of Education project, Learning Mathematics for Teaching
- 2002– Advisory Board for revisions to the NSF funded high school curriculum, Contemporary Mathematics in Context
- 2002– AMS Committee on Education
- 2000– Advisory Board for revisions to the NSF funded elementary school curriculum, Investigations in Number, Data, and Space
- 1995–2001 MAA committee on Calculus Reform and the First Two Years
- 2002– Editorial Board, Walter Rudin Student Series in Advanced Mathematics