Curriculum Vitae
Farshid Hajir

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Professional Preparation

◦ Princeton University, Mathematics, AB, 1984—1988.
◦ Massachusetts Institute of Technology, Mathematics, PhD, 1988—1993. Thesis title "Unramified Elliptic Units."

Previous Appointments

◦ California Institute of Technology, Taussky-Todd Instructor, 1993—1996.
◦ UCLA, NSF Mathematical Sciences Postdoctoral Fellow, 24 months during 1996—2000.
◦ California State University, San Marcos, Assistant Professor (tenure track), 1996—2002.
◦ UNC, Chapel Hill, Visiting Assistant Professor, 2001—2002.
◦ University of Massachusetts Amherst, Assistant Professor, 2002—2006.
◦ University of Massachusetts Amherst, Associate Professor, 2007—2013.
◦ University of Massachusetts Amherst, Associate Department Head, 2011—2014.

Current Appointments

◦ University of Massachusetts Amherst, Professor, 2013—
◦ University of Massachusetts, Amherst, Department Head, 2014—

Research Interests

Number Theory, Algebra, Arithmetic Geometry.

Awards

◦ *The Goodwin Medal*, MIT, 1993, Awarded annually to one or two graduate teaching assistants at MIT for "conspicuously effective teaching".
◦ *Charles and Holly Housman Teaching Award for Excellence in Teaching*, MIT Mathematics Department, 1993.
◦ *Associated Students of Caltech Teaching Award, Honorable Mention* Caltech, 1994.
◦ *College of Natural Sciences and Mathematics Outstanding Teaching Award*, UMass Amherst, 2006.
◦ *University Distinguished Teaching Award*, UMass Amherst, 2011.
◦ *Massachusetts Association of School Committees All-State School Committee Award,* "in recognition of support for the children of and public education in the Commonwealth of Massachusetts," 2011.

Grants

◦ NSF Mathematical Sciences Postdoctoral Fellowship, 1996—2000, $75,000.
◦ CSUSM Faculty Development Grant, 2000—2001, $1,200.
◦ NSF Mathematical Sciences Grant, *Extensions of Global Fields with Restricted Ramification and the Fontaine-Mazur Conjecture*, DMS 0226869, 2002—2006, $95,603.

∘ NSA Grant for Five-College Number Theory Seminar, 2003—05, $10,000, co-PI along with R. Benedetto, G. Call, P. Gunnells, M. Robinson, Administered through Five Colleges.

∘ NSF DUE STEM Bridge for Noyce Scholars Grant 2004—2007, co-PI along with Allan Feldman (PI), Portia Elliott and Mort Sternheim, $499,991.

∘ NSA Grant for Five-College Number Theory Seminar, 2005—07, $15,000. co-PI along with R. Benedetto, G. Call, P. Gunnells, M. Robinson Administered through Five Colleges.

∘ NSA Mathematical Sciences Standard Research Grant, *Problems in Algebraic Number Theory*, 2008—2010, $66,819.

Publications

1. F. Hajir, Unramified Elliptic Units, PhD Dissertation, MIT, 1993.

2. F. Hajir, Elliptic units of cyclic unramified extensions of complex quadratic fields, *Acta Arithmetica* **64** (1993), 69-85.

3. F. Hajir, Some $\tilde{A}_n$-extensions obtained from generalized Laguerre polynomials, *J. Number Theory* **50** (1995), 206-212.

4. F. Hajir, Calculating the class number of certain Hilbert class fields, in "Algorithmic Number Theory, Proceedings of ANTS-I", L.M. Adleman, M.D. Huang (eds.), *Lecture Notes in Computer Science* **877**, Springer Verlag, Heidelberg, 1994.

5. F. Hajir, On units related to the arithmetic of elliptic curves with complex multiplication, *Archiv der Math.* **66** (1996), 280-291.

6. F. Hajir, On a theorem of Koch, *Pacific J. Math* **176** no. 1 (1996), 15-18. Correction **196** (2000), no. 2, 507–508.

7. F. Hajir, On the growth of p-class groups in p-class field towers, *J. Algebra* **188** (1997), 256-271.

8. F. Hajir and F. Rodriguez-Villegas, Explicit elliptic units I, *Duke Math. J.*, **90** (1997), no. 3, 495–521.

9. F. Hajir, On the class number of Hilbert class fields, *Pacific J. Math* Olga Taussky-Todd: in memoriam, Special Issue (1997), 177–187.

10. F. Hajir and F. Rodriguez-Villegas, On the Tate-Shafarevich group of certain elliptic curves, *Math. Res. Letters* **5** (1998), no. 5, 637–655.

11. F. Hajir and C. Maire, Tamely ramified towers and discriminant bounds for number fields, *Compositio Math.*, **128** (2001), 35–53. 2001.

12. F. Hajir and C. Maire, Asymptotically good towers of global fields, Proceedings of the 2000 European Congress, Progress in Math **202**, Birkhaüser, 2001, 207–218.

13. F. Hajir and C. Maire, Tamely ramified towers and discriminant bounds for number fields II, *J. Symbolic Computation*, **33** (2002), no. 4, 415–423.

14. F. Hajir and C. Maire, Unramified subextensions of tamely ramified towers, *J. Algebra*, **249** (2002), no. 2, 528–543.

15. F. Hajir and C. Maire, Extensions of number fields with wild ramification of bounded depth, *with Christian Maire*, *Internat. Math. Res. Notices*, **2002**, no. 13, 667–696.

16. W. Aitken, F. Hajir, and C. Maire, Finitely ramified iterated towers, *Internat. Math. Res. Notices* **2005:14** (2005) 855–880.

17. F. Hajir, Tame pro-p Galois groups: A survey of recent work, in "Arithmetic, Geometry and Coding Theory (AGCT 2003)," Yves Aubry - Gilles Lachaud (Ed.) Séminaires et Congrès **11**, 2005, Soc. Math. France, 111-124.

18. F. Hajir, On the Galois group of Generalized Laguerre polynomials, J. Théorie des Nombres, Bordeaux **17**(2005), no. 2, 517-525.

19. F. Hajir and S. Wong, Specializations of one-parameter families of polynomials, *Ann. Inst. Fourier (Grenoble)* **56** (2006), no. 4, 1127-1163.

20. F. Hajir, Galois groups with restricted ramification, Extended abstract for talk given at the workshop "Pro-p extensions of global fields and pro-p groups," *Oberwolfach Reports*, (2006) **3** no. 2, 1431-1432.

21. F. Hajir and M.R. Bush, An irreducibility lemma, *J. Ramanujan Math. Soc.* **23** (2008), no. 1, 33-41.

22. J. Cullinan, F. Hajir and E. Sell, Algebraic properties of a family of Jacobi polynomials, *J. Théorie des Nombres, Bordeaux* **21** (2009), no. 1, 97-108.

23. F. Hajir, Algebraic properties of a family of Generalized Laguerre Polynomials, *Cand. J. Math.* **61** (2009), no. 3, 583-603.

24. F. Hajir, Asymptotically Good Families, *Actes de la Conférence "Fonctions L et Arithmétique", 121-128,* Publ. Math. Besancon, Algèbre Théorie Nr., Lab. Math Besancon, 2010.

25. F. Hajir, Heuristics for p-class tower groups of imaginary quadratic fields, Extended abstract for the Workshop "Explicit Methods in Number Theory, August 2011", *Oberwolfach Reports*, **8** (2011) no. 3, 2036–2038.

26. F. Hajir and J. Cullinan, Ramification in iterated towers for rational functions, *with John Cullinan*, *Manuscripta Math.* **137** (2012), no. 3-4, 273-286.

27. J. Cullinan and F. Hajir, Primes of prescribed congruence class in short intervals, *joint with John Cullinan*, *Integers* **12**, (2012) Paper A56, 4 pp.

28. F. Hajir, Fundamental groups of number fields, Extended abstract for the Workshop "Low dimensional topology and number theory, August 2012", *Oberwolfach Reports*, **9**, no. 3 (2012), 2561-2564.

29. P. Gunnells, F. Hajir, and D. Yasaki, Elliptic curves and modular forms over $\mathbb{Q}(\zeta_5)$, *Exp. Math.*, **22** (2013), no. 2, 203-216.

30. J. Cullinan and F. Hajir, On the Galois groups of Legendre polynomials, *Indag. Math. (N.S.)* 25 (2014), no. 3, 534-552.

31. A.M. Barry, F. Hajir, and P.G. Kevrekidis, Generating functions, polynomials, and vortices with alternating signs in Bose-Einstein condensates, *J. Phys. A* **48** (2015), no. 15, Article 155205 (18pp.).

32. N. Boston, M.R. Bush, and F. Hajir, Heuristics for p-class tower groups of imaginary quadratic fields, *Math. Annalen*, 37pp., in press, published online August 2016.

33. J. Cullinan and F. Hajir, Algebraic properties of Kaneko-Zagier lifts of supersingular polynomials, *Trans. AMS*, to appear, 9 pp.

34. M. Greene and F. Hajir, Elliptic units of abelian unramified extensions of complex quadratic fields, preprint, submitted, 19 pp.

35. F. Hajir and C. Maire, On the invariant factors of class groups in towers of number fields, submitted, 30pp.

36. F. Hajir and C. Maire, Prime decomposition and the Iwasawa μ-invariant, submitted, 21pp.

Graduate and Postgraduate Mentoring

◦ Linn Damon, Master's Thesis, CSUSM, 1999.
◦ Greg Larson, Master's Thesis, CSUSM, 2001.
◦ Elizabeth Wrobel Sell, Master's Thesis, UNC Chapel Hill, 2002. Currently: Lecturer, Dept. of Mathematics, Case Western Reserve University.
◦ Mairead Greene, PhD Thesis, UMass Amherst, 2007. Currently: Associate Professor, Dept. of Mathematics, Rockhurst University.
◦ Laura Hall-Seeling, PhD Thesis, UMass Amherst, 2009. Currently: Associate Professor, Dept. of Mathematics, Merrimack College.
◦ Michael Bush, Postdoctoral Visiting Assistant Professor, UMass Amherst, 2004-7. Currently: Associate Professor: Dept. of Mathematics, Washington and Lee University.
◦ Thomas Alden Gassert, PhD Thesis, UMass Amherst, 2014, Currently: Visiting Assistant Professor, Dept. of Mathematics, Western New England University.

Undergraduate Thesis/Research Experience for Undergraduate Students (REU)

◦ Manjari Goenka (Mt. Holyoke thesis *summa cum laude*, 2004)
◦ Mike Higgins (REU 2004)
◦ Christine Croll (REU 2005, thesis 2006)
◦ Colleen Swanson (Mt. Holyoke thesis *summa cum laude*, 2006)
◦ Daniel Arpino (thesis 2007)
◦ Guerdon Bennett (thesis 2007)
◦ Emily Braley (REU 2006, thesis 2007)
◦ Laura Beltis (REU 2006, thesis 2007)
◦ Tom Greene (thesis, 2007)
◦ Shaohan Hu (thesis 2007)
◦ Jonathan Klaucke (thesis 2007)
◦ Dillon McGovern (thesis 2007)
◦ Kathryn Sansom (thesis, 2007)
◦ Elizabeth Monahan (REU 2007, thesis 2008)
◦ Elyse Dostie (REU 2008)
◦ Peter Krafft (REU 2008)
◦ Elizabeth Rossolimo (REU 2008)
◦ Jacob Mitchell (REU 2008)
◦ Arthur Baines (REU 2008)
◦ Paula Lavalle (REU 2008)
◦ Greg Caswell (thesis 2012)
◦ John Harper (thesis 2012)
◦ Jared Post (REU 2012)
◦ Andrey Smirnov (REU 2012)
◦ Andrew Maurer (REU 2012, thesis 2012)
◦ Matthew Dobosz (REU 2012)
◦ Emma Dowling (REU 2012, thesis 2013)
◦ Benny Chavez (REU 2012)
◦ Samantha Bell (thesis 2013)

Courses taught at UMass Amherst

Undergraduate Classes

- Math 101 Precalculus I (took over for a colleague midway through the semester)
- Math 113 Mathematics for Elementary School Teaching I (×2)
- Math 127 Calculus for Life and Social Sciences
- Math 131 Calculus I
- Math 131 H Calculus I Honors
- Math 132 Calculus II
- Math 132H Calculus II Honors
- Math 235 Linear Algebra
- Math 300 Fundamental Concepts of Mathematics (×7; redesigned the course)
- Math 411 Abstract Algebra I (×2)
- Math 455 Discrete Mathematics (redesigned for Integrative Experience requirement)
- Math 461 Geometry I
- Math 471 Theory of Numbers (×3)
- Math 499 C+D Thesis Capstone (designed new TBL course, co-taught with M. Bush)

Undergraduate Seminars

- Honors 391D Epistolary Vignettes in History of Mathematics
- Univ 197 Freshman Seminar: Who are mathematicians and what do they do?
- Univ 190R RAP Freshman seminar "ICONS $\frac{1}{2}$" co-taught with S. Auerbach (×2)

Graduate Courses

- Math 597T Math Knowledge for Teaching (×2; new class based on Common Core)
- Math 611, 612 Graduate Algebra I & II
- Math 621 Complex Analysis (×4)
- Math 713 Algebraic Number Theory
- Math 791N Number Theory (co-taught with P. Gunnells, T. Weston, S. Wong)

Selected Service Activities at UMass Amherst

- Department Head, 2014—
- Associate Department Head, 2011—2014.
- Undergraduate Program Director and chair of the Undergraduate Affairs Committee, 2006—2011.
- General Education Council, appointed member, 2011—2016; GEC Integrative Experience Evaluation Group, member, 2013; GEC Subcommittee to Revise Quantitative Reasoning (R1/R2) Requirements, member, 2015—2016.
- Faculty Senate, elected member, 2015—.
- College of Information and Computer Sciences, Dean Search Committee, member, 2015—2016 and 2016—2017.
- Women in Science at CNS: Accomplishments, Challenges, and Next Steps, panel member, March 2016.
- UMass Amherst Strategic Planning Committee Phase 1, Subcommittee on "Student Success and Paths to Completion," member, Spring 2013.
- UMass Amherst Strategic Planning Committee Phase 1, Subcommittee on "Defining the UMass Amherst Student Experience," member, Spring 2013.

◦ UMass Amherst Distinguished Teacher Selection Committee, member, 2011—2014.

◦ Undergraduate ADVISOR (for approximately 10-17 students each semester), 2003—2016.

◦ Mathematics LIAISON to the School of Education, 2002—2016.

◦ Mathematics and Statistics Faculty Search Committee, MEMBER, 2003—2004 and 2004—2005.

◦ TWIGS (The "What Is ...?" Graduate Seminar), FOUNDER AND ORGANIZER, 2002—2007.

◦ Five College Number Theory Seminar, CO-ORGANIZER, 2002—

◦ Calculus Teaching Reform Committee, MEMBER, 2003—4.

◦ Colloquium Committee, MEMBER, 2002—4.

◦ Math 300 curriculum committee, MEMBER, 2005.

◦ AUTHOR of articles for the Mathematics & Statistics Newseltter (2003, 2005, 2009—2012).

◦ CO-CHAIR of Teacher Preparation Group, Western Massachusetts Mathematics Project, 2010-2012, an NSF-funded MSP Start project.

◦ Collaborated with other University of Massachusetts campuses to create a unified curriculum for training future elementary school teachers in mathematics content courses, 2010.

◦ Faculty Search Committee for Secondary Mathematics Education, MEMBER, 2003—2004.

◦ Faculty Search Committee for Elementary Mathematics Education, MEMBER, 2003—2004.

◦ Faculty Search Committee for Elementary Mathematics Education, MEMBER, 2011—2012.

◦ CO-PI on two NSF DUE grants, one funded for 2004—7.

◦ Thesis Committee MEMBER: A) Jennie D'Ambroise (undergraduate, 2002), B) Dana Costello (undergraduate, 2003); C) John Cullinan (PhD, 2005); D) Lara Thomas, University of Toulouse II (Le Mirail) France, (PhD, 2005); E) Janet Ginkus Allen (UMass Amherst School of Education, Doctoral Candidacy Exams, 2004; PhD, 2007); F) Penney Ridgill (PhD, 2009); G) Mary Grassetti (UMass Amherst School of Education, Doctoral Candidacy Exams, 2008; PhD, 2010); H) Adam Gamzon (PhD, 2012).

◦ Qualifying exams: A) Calculus/Linear Algebra committee, MEMBER (Fall 2003, Spring 2004, Fall 2012); B) Advanced Algebra committee (Fall 2011); C) Complex Analysis committee CHAIR (2004—2010, Spring 2012).

Brief Description of Service Activities Prior to 2002

While an Assistant Professor, from 1996 until 2002, at CSU San Marcos, I was heavily involved in the mathematics department's administrative activities: attending weekly meetings, serving on search committees, revising and creating new curricula, advising students. I also served on a number of University committees, including the Faculty Senate and the Committee on Revision of Tenure and Promotion Procedures.

Selected Professional Service Activities (since 2002)

◦ National Science Foundation Grant Review Panel MEMBER, Fall 2003 and Fall 2015.

◦ REVIEWER for grant applications, National Science Foundation and National Security Agency.

◦ ASSOCIATE EDITOR Publications Mathématiques de Besançon—Algèbre et Théorie des Nombres, Presses Universitaires de Franche-Comté, 2008—

◦ ASSOCIATE EDITOR Annales des Sciences Mathématiques de Québec, 2008—2012.

◦ REFEREE for A) Pacific J. Math , B) Journal of Algebra , C) Journal of Number Theory , D) Mathematical Research Letters, E) J. Théorie des Nombres de Bordeaux , F) Proceedings of the AMS, G) Compositio Math. , H) Math Zeitschrift, I) Math. Abhandlugen Seminar

Hamburg, J) Internat. J. Number Theory, K) Finite Fields and Appliations, L) Pacific J. Math., M) J. Ramanujan Math. Soc.

◦ AMS Reviewer for Mathematical Reviews.

◦ External Review Panel for Mathematics Department, Millersville University, Millersville PA, member (1 of 2), Spring 2013.

◦ External Review Panel of 7—12 Mathematics Program, Pioneer Valley Performing Arts Charter School, South Hadley, MA, member (1 of 2),Spring 2013.

◦ External Review Panel of 7—12 Mathematics Program, Williston-Northampton School, Easthampton MA, member (1 of 3),Spring 2014.

◦ External Review Panel of 9—12 Mathematics Program, Deerfield Academy, Deerfield MA, member (1 of 3),Fall 2015.

Selected outreach activities

◦ Leverett School Committee, member, 2007—2012; chair, 2008—2009, 2010—2012.

◦ Amherst-Pelham Regional School Committee, chair, 2009—2010.

◦ Amherst Regional Schools Mathematics Curriculum Council, member, 2008—2011.

◦ Multiple mathematics lessons taught at local public schools, grades 1, 2, 4, 10; 2002— .

◦ Appointed by Massachusetts Secretary of Education Paul Reville to serve as member of the Special Commission on Collaboration and Regionalization of public schools, created by Section 72 of the Massachusetts Legislature Acts of 2010 Chapter 188, 2010—2011.

A selection of invited lectures given (since 2002)

Colloquia

◦ UT Austin, "The tame Fontaine-Mazur conjecture," Spring 2002.

◦ UMass Amherst, "Fundamental Groups of Number Fields," Spring 2002.

◦ University of California San Diego, "Iteration of polynomials and tree representations of the absolute Galois group," Spring 2005.

◦ UMass Amherst, "Galois groups with restricted ramification: a survey," Fall 2005.

◦ McMaster University, Ontario, Canada, "Galois groups and dynamics on the projective line," Fall 2006.

◦ Emory University, "Recent advances in Galois theory," Spring 2007.

◦ Binghamton University, "From $D = B^2-4AC$ to non-abelian Cohen-Lenstra Heuristics," Spring 2013.

◦ University of Oregon, "Cohen-Lenstra conjectures on the distribution of class groups and their generalizations." Spring 2016.

Conferences and Workshops

◦ AMS Special Session on Number Theory and Arithmetic Geometry, Northeastern University, "An extension of the Fontaine-Mazur conjecture," Fall 2002.

◦ Algebraic Geometry and Coding Theory, 9th meeting, "Galois p-Groups Unramified at p , d apres Boston," Centre Internationale de Recherches Mathématiques, LUMINY, France, Spring 2003.

◦ Maine-Quebec Number Theory conference, "Fundamental Groups of Number Fields: A survey," University of Maine, Fall 2003.

◦ Conference in honor of Georges Gras, "Groupes Fondamentaux et Minoration des Discriminants," Université de Franche-Comté, Besancon, France, Fall 2003.

◦ Texel Island Conference on the analogy between number fields and function fields, "Tame Fundamental Groups of Number Fields", Texel, Netherlands, Spring 2004.

◦ Number Theory Conference in Honor of Harold Stark, "Iterated Monodromy Representations," Digital Technology Center, University of Minnesota, Minneapolis, Summer 2004.

◦ Mathematics Knowledge for Teaching K-8, MSRI Conference, Participant, Asilomar, Pacific Grove, CA, Spring 2005.

◦ Algebraic Geometry and Coding Theory, 10th meeting, Invited Participant, Centre Internationale de Recherches Mathématiques, LUMINY, France, Fall 2005.

◦ Five College Number Theory Seminar, "One-parameter families of polynomials with few exceptional specializations," Invited Talk, Fall 2006.

◦ Pro-p Extensions of Global Fields and pro-p Groups, Workshop at Mathematisches Forschungsinstitut Oberwolfach, "Extensions with restricted ramification," Invited Lecture, Spring 2006.

◦ Maine-Quebec Number Theory conference, "An irreducibility lemma," Invited Plenary Lecture, Université Laval, Québec Canada, Fall 2006.

◦ AMS Special session on Automorphic Forms and Arithmetic Geometry, "On the central critical values of certain L-functions," Invited Lecture, Hoboken NJ, Spring 2007.

◦ Algebraic Geometry and Coding Theory, 11th meeting, "Asymptotically Good Families," Invited Lecture, Centre Internationale de Recherches Mathématiques, LUMINY, France, Fall 2007.

◦ Conference on *Arithmetic Topology,* invited lecture "Asymptotically Good Families and 3-manifolds," BANFF Research Station, Fall 2007.

◦ Conference in Honor of John Labute, McGill University, Montreal, Canada; Invited lecture "Asymptotically Good Families," Fall 2007.

◦ University of Wisconsin, Madison, Conference on pro-p groups in number theory, "Asymptotically Good Families," Invited Lecture, Spring 2008.

◦ Conference on L-functions and Arithmetic, Besancon, France Plenary Lecture "Asymptotically Good Towers," June 2009.

◦ AMS Conference in Worcester, Special Session on Number Theory, "Specializations of finitely ramified towers of self-maps of the projective line," invited lecture, April 2009.

◦ Number Theory and Representation Theory, a Conference in Honor of Benedict Gross, Harvard, invited participant, June 2-5 , 2010.

◦ Low-Dimensional Topology and Number Theory, Workshop at Mathematisches Forschungsinstitut Oberwolfach, Invited Participant, August 2010.

◦ Palmetto Number Theory Series XIII, University of North Carolina Greensboro, Invited 1-hour Plenary Lecture "Analogies between codes, curves, graphs, number fields, and 3-manifolds," September 2010.

◦ First Upstate Number Theory Conference, Cornell University, Invited One-Hour Plenary Lecture "Asymptotically Good Families," April 2011.

◦ Explicit Methods in Number Theory, Workshop at Mathematisches Forschungsinstitut Oberwolfach, "Non-abelian Cohen-Lenstra Heuristics for Imaginary Quadratic Fields," Invited lecture, July 2011.

◦ AMS Special Session, University of Nebraska, Lincoln, "Asymptotically Good Families," Invited 50-minute lecture, October 2011.

◦ University of Pennsylvania Algebra Seminar, "Non-abelian Cohen-Lenstra heuristics," Invited lecture, November 2011.

◦ Arithmétique et Applications (Number Theory and Applications), Invited Lecture "Non-abelian Cohen-Lenstra Heuristics," Centre International de Recherche Mathématique, LUMINY, France, January 2012.

◦ Golod-Shafarevich groups and algebras, and rank gradient, Worshop at the Erwin Schrödinger Institute, Vienna Austria, "Galois groups arising in arithmetic dynamics," Invited Lecture, August 2012.

◦ Low-Dimensional Topology and Number Theory, Workshop at Mathematisches Forschungsinstitut Oberwolfach, "Fundamental groups of number fields," Invited lecture, August 2012.

◦ Ateliers pro-p groupes et arithmètique, Laboratoire de mathématiques de Besanǫn, Université de Franche-Comté, "Heuristics for p-class tower groups, Invited Lecture, December 2013.

◦ Low-Dimensional Topology and Number Theory, Workshop at Mathematisches Forschungsinstitut Oberwolfach, Invited participant, August 2017.

Research Seminars

◦ UNC Analysis Seminar, "An application of the Wigner Transform in number theory," University of North Carolina, Chapel Hill, Spring 2002.

◦ Five College Number Theory Seminar, "On the L-function of certain elliptic curves," Amherst College, Fall 2002.

◦ BU Algebra Seminar, "Shallow Ramification and the Fontaine-Mazur Conjecture", Boston University, Fall 2002.

◦ Brown Algebra Seminar, "Asymptotically Good Towers of Global Fields," Brown University, Spring 2003.

◦ BC Algebra Seminar, "Asymptotically Good Towers of Global Fields," Boston College, Spring 2003.

◦ University of Wisconsin, Number Theory Seminar, "Shallow Ramification and the Fontaine-Mazur Conjecture," Masdison WI, Spring 2003.

◦ Five College Number Theory Seminar, "Newton polygons and irreducibility for one-variable polynomials," Amherst College, Fall 2003.

◦ Penn State Algebra Seminar, " Algebraic properties of Generalized Laguerre Polynomials," Penn State University, Fall 2003.

◦ École Polytechnique Federale de Lausanne, Switzerland, "Finitely ramified iterated extensions," Summer 2004.

◦ BU Algebra Seminar, "Iterated Monodromy Groups Attached to Dynamical Systems on the Projective Line," Boston University, Fall 2004.

◦ Quebec-Vermont Number Theory Seminar, "Finitely Ramified Iterated Monodromy Representations," McGill University, Montreal, Canada, Spring 2005.

◦ Cornell University Algebra Seminar, "Some tree representations of Galois groups," Cornell University, Fall 2005.

◦ Five College Number Theory Seminar, Amherst MA, "Asymptotically Good Towers," Invited Talk, Fall 2008.

◦ Brown University Algebra Seminar, invited lecture "Asymptotically Good Families" Nov. 2008.

◦ MIT Algebra Seminar, invited lecture "Non-abelian Cohen-Lenstra Heuristics for Imaginay Quadratic Fields," Fall 2011.

◦ Five College Number Theory Seminar, "Algebraic properties of Laguerre polynomials," Spring 2012.

◦ University of Oregon Number Theory Seminar "Growth of class groups in p-extensions," Spring 2016.

◦ Boston University Algebra Seminar "Growth of class groups in towers of number fields," Spring 2017.

Graduate/Undergraduate Colloquia

◦ UNC Graduate Number Theory Seminar (8 talks), University of North Carolina, Chapel Hill, Spring 2002.

◦ TWIGS "What is the ABC conjecture?" UMass Amherst, UMass Amherst, Fall 2002.

◦ TWIGS "What is the absolute Galois group of Q?" UMass Amherst, Fall 2002.

◦ TWIGS "What is an elliptic curve?" UMass Amherst, Spring 2003.

◦ TWIGS "What is a p-adic number?" UMass Amherst, Spring 2003.

◦ MIT Undergratduate Colloquium, "What is number theory?", Spring 2003.

◦ TWIGS "What is a Newton polygon?" UMass Amherst, Fall 2003.

◦ TWIGS "What is an L-function?" UMass Amherst, Fall 2003.

◦ TWIGS "What is the Riemann Hypothesis?" UMass Amherst, Spring 2004.

◦ TWIGS "What are the Weil conjectures?" UMass Amherst, Spring 2004.

◦ TWIGS "What is MathSciNet?" UMass Amherst, Fall 2004.

◦ TWIGS "What is the Herglotz trick?" UMass Amherst, Spring 2005.

◦ TWIGS "What is the Mahler measure of a polynomial?" UMass Amherst, Spring 2005.

◦ Undergraduate Colloquium, "Discriminants and Determinants, $ad - bc$, $b^2 - 4ac$ and all that," UMass Amherst, Spring 2005.

◦ Math 491 Seminar Presentation, "RSA Cryptography", UMass Amherst, Spring 2005.

◦ TWIGS "What is an elliptic curve?" UMass Amherst, Fall 2007.

◦ TWIGS "What is Wedderburn's Theorem?" UMass Amherst, Fall 2007.

◦ Smith College Seminar, Lecture for Undergraduates, "Codes and Graphs," Spring 2008.

◦ Boston University PROMYS (enrichment mathematics program for talented high school students) Invited Lecture: "What is the ABC Conjecture?," July 2009.

◦ Boston University PROMY Invited Lecture "What is Coding Theory?," August 2013.

◦ The Oregon Distinguished Math Lectures for Students, "The Jacobi-Legendre Correspondence - A vignette in the History of Mathematics," Spring 2016.

K-16 Outreach Presentations and Publications

◦ Presentation on Graduate Studies in Mathematics and Statistics at UMass Amherst (Recruitment activity, followed by reception), MIT Mathematics Department, Spring 2003.

◦ UMPETS 4-hour mini-course for high school students, "Number theory and Cryptography," UMass Amherst, Spring 2005. (6 students in attendance).

◦ Presentation and hands-on activities for First Grade Students, "Moebius Bands," Leverett Elementary School, Spring 2005.

◦ Presentation and hands-on activities for First Grade Students, "Polygons and Polyhedra," Leverett Elementary School, Spring 2005.

◦ Farshid Hajir and Nicholas D. Young, In Consolidation Debate, Who Decides Children's Best Interests? *The School Administrator,* Vol. **67**, Number 7, 2010, p. 39

◦ Massachusetts Department of Elementary and Secondary Education Workshop for K-12 Administrators and Teachers in Western Massachusetts, co-presenter and co-facilitator of 2-hour workshop for 100 participants on the implementation of 2011 Massachusetts State Frameworks, incorporating the Common Core, Westfield State University Readiness Center, Spring 2011.

◦ Presentation and Hands-On Lesson on Polyhedra for 4th graders, Leverett Elementary School, Spring 2011.

◦ Mini-course (20 hours) on Mathematics Knowledge For Teaching K-2 Mathematics, Lower Pioneer Valley Collaborative, West Springfield, MA, June 2012.

◦ Training session (Professional Development) for K-12 teachers at Pioneer Valley Regional Schools, Presentation on Instructional Demands of the Mathematics Curriculum Frameworks for Massachusetts (2011) including the Common Core, November 2011.

K-12 Education Conferences

CSUSM Conference for High School Teachers, Summer 2000, Spring 2001 and Spring 2002.

Participant, Critical Issues in Mathematics Education: Mathematical Knowledge for Teaching (K-8): Why, What and How?, Asilomar CA, Spring 2005.

AGAMOCR Conference at University of Connecticut, Storrs, "A capstone course in coding theory," Summer 2007.

Conerence Board of the Mathematical Sciences Forum on Content-Based Professional Development For Teachers of Mathematics, Participant, Fall 2010.

Invited Participant, Workshop on *Teaching Mathematical Knowledge for Teaching (TMKT)*, School of Education, University of Michigan, Dec. 2010.

Invited Participant, Workshop on *Teaching Mathematical Knowledge for Teaching (TMKT)*, School of Education, University of Michigan, May 2011.

Co-leader of Teacher Preparation Group, Western Massachusetts Mathematics Partnership, a START project of the Math Science Partnership funded by the NSF, 2011-2012.

Invited Speaker, Critical Issues in Mathematics Education: Teacher education in view of The Common Core, Mathematical Sciences Research Institute, Berkely CA, Spring 2012; Session leader for "Sense making in problem solving."

Conferences Organized

Southern California Number Theory Day, CSU San Marcos, Spring 2000.

AMS Special Session on "Arithmetic Geometry," Univeristy of New Hampshire, 2003, (with Paul Gunnells).

AMS Special Session on "Arithmetic Dynamics and Arithmetic Topology," WPI, Worcester MA, 2010 (with Michael Bush and Rafe Jones).

AMS Special Session on "Arithemetic Dynamics and Galois Theory," Boston College, 2013 (with John Cullinan and Siman Wong).

Selected Invited Lectures (prior to 2002)

Colloquia

SUNY at Buffalo (1993), Boston College (1994), Cal State San Marcos (1996), Santa Clara University (1999), UC Santa Cruz (2000).

Research Seminars

Boston University (1992,1993,1995), Boston College (1993), Harvard University (1992, 1993, 1995), University of Texas at Austin (1993), University of Illinois at Urbana-Champaign (1995, 2000), Caltech (1993, 1994, 1995, 1996, 1997, 1998, 1999), UCLA (1994, 1996), Concordia University (1995), USC (1996), University of Arizona (1996), Princeton University (1996), Institut Fourier, Grenoble, France (1996), Univ. de Franche-Comté, Besancon, France, (1996) (These two talks in France were delivered in French); UC Santa Barbara (1998); UC Santa Cruz (2000); UC San Diego (2000), UNC Chapel Hill (2001), Duke University (2001).