

John Voight

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(802) 656-2271
Born in Georgia, USA, November 25, 1977

Education

- ▶ **University of California, Berkeley**
Ph.D. in Mathematics, May 2005
Thesis title: *Quadratic forms and quaternion algebras: algorithms and arithmetic*
Thesis advisor: Hendrik W. Lenstra, Jr.
- ▶ **Gonzaga University**, Spokane, Washington
B.S. (*Summa cum laude*, 4.0 GPA), May 1999
Major: Pure mathematics, Minor: Computer science

Employment

- ▶ **University of Vermont**
Assistant Professor, September 2007–present
- ▶ **McGill University**
Visiting Scholar, January–April 2010
- ▶ **University of Minnesota**
Postdoctoral Fellow, Institute for Mathematics and its Applications (IMA),
September 2006–August 2007
- ▶ **University of Sydney**, Australia
Visiting Scholar, Magma Computational Algebra Group,
August 2005–June 2006, July 2007, May 2009

Honors and Awards

- NSF Division of Mathematical Sciences Award, Algebra, Number Theory, and Combinatorics, *Quaternion algebras, Shimura curves, and modular forms: Algorithms and arithmetic* (DMS-0901971), \$74,775, July 2009–June 2011
- NSA Young Investigator Grant, *Topics in number theory: Geometry, cohomology and algorithms* (H98230-09-1-0037), \$30,000, January 2009–December 2010
- NSF Graduate Research Fellowship, Fall 2000–Spring 2003
- NSF International Travel Award, Summer 2002
- NSF VIGRE Award, Fall 1999–Spring 2000
- Ranked 107 in William Lowell Putnam Competition, 1999
- William A. Garrigan, S.J. Award, Gonzaga University, May 1999
Top academic achievement of a graduating senior
- Rhodes Scholarship finalist, Washington state, 1998
- National Merit Presidential Scholarship, Gonzaga University, 1995–1999

Research Interests

► **Arithmetic algebraic geometry**

Modular and Shimura curves, moduli spaces, elliptic curves, modular and automorphic forms, zeta functions of varieties over finite fields, computational and algorithmic aspects

► **Number theory**

Algebraic number theory, quaternion algebras, quadratic forms, elementary number theory, cryptography and coding theory

Publications

- (21) *Nondegenerate curves of low genus over small finite fields* (with Wouter Castryck), submitted.

In a previous paper, we proved that over a finite field k of sufficiently large cardinality, all curves of genus at most 3 over k can be modeled by a bivariate Laurent polynomial that is nondegenerate with respect to its Newton polytope. In this paper, we prove that there are exactly two curves of genus at most 3 over a finite field that are *not* nondegenerate, one over \mathbb{F}_2 and one over \mathbb{F}_3 . Both of these curves have remarkable extremal properties concerning the number of rational points over various extension fields.

- (20) *Nonsolvable number fields ramified only at 3 and 5* (with Lassina Dembélé and Matthew Greenberg), submitted.

For $p = 3$ and $p = 5$, we exhibit a finite nonsolvable extension of \mathbb{Q} which is ramified only at p via explicit computations with Hilbert modular forms.

- (19) *Rings of low rank with a standard involution and quaternion rings*, submitted.

We consider the problem of classifying (possibly noncommutative) R -algebras of low rank over an arbitrary base ring R . We first classify algebras by their degree, and we relate the class of algebras of degree 2 to algebras with a standard involution. We then investigate a class of exceptional rings of degree 2 which occur in every rank $n \geq 1$ and show that they essentially characterize all algebras of degree 2 and rank 3. Finally, we subdivide the class of algebras of rank 4 and degree 2 between exceptional rings and quaternion rings, those algebras defined by an even Clifford algebra construction.

- (18) *Computing systems of Hecke eigenvalues associated to Hilbert modular forms* (with Matthew Greenberg), submitted.

We utilize effective algorithms for computing in the cohomology of a Shimura curve together with the Jacquet-Langlands correspondence to compute systems of Hecke eigenvalues associated to Hilbert modular forms over a totally real field F .

- (17) *Algebraic curves uniformized by congruence subgroups of triangle groups* (with Pete Clark), in preparation.

We construct certain subgroups of hyperbolic triangle groups which we call “congruence” subgroups. These groups include the classical congruence subgroups of $\mathrm{SL}_2(\mathbb{Z})$, Hecke triangle groups, and 19 families of Shimura curves associated to arithmetic triangle groups. We determine the field of moduli of the curves associated to these groups and thereby realize the Galois groups $\mathrm{PSL}_2(\mathbb{F}_q)$ and $\mathrm{PGL}_2(\mathbb{F}_q)$ regularly in many cases over explicitly given abelian number fields.

- (16) *Computing zeta functions for sparse hypersurfaces using Dwork cohomology* (with Steven Sperber), in preparation.

- (15) *Algorithmic identification of quaternion algebras and the matrix ring*, in preparation.

We discuss the following basic algorithmic problem: given an algebra B of rank 4 over a commutative ring R , determine if B embeds in the 2×2 -matrix ring $M_2(R)$, and, if so, compute an explicit R -embedding $B \hookrightarrow M_2(R)$. When $R = F$ is a field, we give an algorithm to determine if B is a quaternion algebra over F , and we see that the difficulty of this problem depends on the field F . We then consider the case of more general rings R , and treat in detail the case where R is a Dedekind domain.

- (14) *Algorithmic enumeration of ideal classes for quaternion orders* (with Markus Kirschmer), accepted to Siam J. Comput. (SICOMP).

We provide algorithms to count and enumerate representatives of the (right) ideal classes of an Eichler order in a quaternion algebra defined over a number field. We analyze the run time of these algorithms and consider several related problems, including the computation of two-sided ideal classes, isomorphism classes of orders, connecting ideals for orders, and ideal principalization. We conclude by giving the complete list of definite Eichler orders with class number at most 2.

- (13) *The Gauss higher relative class number problem*, Ann. Sci. Math. Québec **32** (2008), no. 2, 221–232.
 Assuming the 2-adic Iwasawa main conjecture, we find all CM fields with higher relative class number at most 16: there are at least 31 and at most 34 such fields, and exactly one is not abelian.
- (12) *Shimura curves of genus at most two*, Math. Comp. **78** (2009), 1155–1172.
 We enumerate all Shimura curves $X_0^2(\mathfrak{N})$ of genus at most two: there are exactly 858 such curves, up to equivalence.
- (11) *Computing fundamental domains for Fuchsian groups*, J. Théorie de Nombres de Bordeaux **21** (2009), no. 2, 467–489.
 We exhibit an algorithm to compute a Dirichlet domain for a cofinite Fuchsian group Γ . As a consequence, we compute the invariants of Γ , including an explicit finite presentation for Γ .
- (10) *On nondegeneracy of curves* (with Wouter Castryck), Algebra & Number Theory **3** (2009), no. 3, 255–281.
 We study the conditions under which an algebraic curve can be modelled by a Laurent polynomial that is nondegenerate with respect to its Newton polytope. We prove that every curve of genus $g \leq 4$ over an algebraically closed field is nondegenerate in the above sense. More generally, let $\mathcal{M}_g^{\text{nd}}$ be the locus of nondegenerate curves inside the moduli space of curves of genus $g \geq 2$. Then we show that $\dim \mathcal{M}_g^{\text{nd}} = \min(2g + 1, 3g - 3)$, except for $g = 7$ where $\dim \mathcal{M}_7^{\text{nd}} = 16$; thus, a generic curve of genus g is nondegenerate if and only if $g \leq 4$.
- (9) *Enumeration of totally real number fields of bounded root discriminant*, Algorithmic number theory, eds. Alfred van der Poorten and Andreas Stein, Lecture Notes in Comp. Sci., vol. 5011, Springer, Berlin, 2008, 268–281.
 We enumerate all totally real number fields F with root discriminant $\delta_F \leq 14$. There are 1229 such fields, each with degree $[F : \mathbb{Q}] \leq 9$.
- (8) *Shimura curve computations*, Arithmetic Geometry, Clay Math. Proc., vol. 8, Amer. Math. Soc., Providence, 2009, 103–113.
 We introduce Shimura curves first as Riemann surfaces and then as moduli spaces for certain abelian varieties. We give concrete examples of these curves and do some explicit computations with them.
- (7) *Heegner points and Sylvester’s conjecture* (with Samit Dasgupta), Arithmetic Geometry, Clay Math. Proc., vol. 8, Amer. Math. Soc., Providence, 2009, 91–102.
 We consider the classical Diophantine problem of writing positive integers n as the sum of two rational cubes, i.e. $n = x^3 + y^3$ for $x, y \in \mathbb{Q}$. A conjecture attributed to Sylvester asserts that a rational prime $p > 3$ can be so expressed if $p \equiv 4, 7, 8 \pmod{9}$. The theory of mock Heegner points gives a method for exhibiting such a pair (x, y) in certain cases. In this article, we give an expository treatment of this theory, focusing on two main examples: a theorem of Satgé, which asserts that $x^3 + y^3 = 2p$ has a solution if $p \equiv 2 \pmod{9}$, and a proof sketch that Sylvester’s conjecture is true if $p \equiv 4, 7 \pmod{9}$ and 3 is not a cube modulo p .
- (6) *Quadratic forms that represent almost the same primes*, Math. Comp. **76** (2007), 1589–1617.
 Jagy and Kaplansky exhibited a table of 68 pairs of positive definite binary quadratic forms that represent the same odd primes and conjectured that their list is complete outside of “trivial” pairs. In this article, we confirm their conjecture, and in fact find all pairs of such forms that represent the same primes outside of a finite set.
- (5) *Computing CM points on Shimura curves arising from cocompact arithmetic triangle groups*, Algorithmic number theory (ANTS VII, Berlin, 2006), eds. Florian Hess, Sebastian Pauli, Michael Pohst, Lecture Notes in Comp. Sci., vol. 4076, Springer, Berlin, 2006, 406–420.
 Let $\Gamma \subset PSL_2(\mathbb{R})$ be a cocompact arithmetic triangle group, i.e. a Fuchsian triangle group that arises from the unit group of a quaternion algebra over a totally real number field. The group

Γ acts on the upper half-plane \mathfrak{H} ; the quotient $X_{\mathbb{C}} = \Gamma \backslash \mathfrak{H}$ is a Shimura curve, and there is a map $j : X_{\mathbb{C}} \rightarrow \mathbb{P}_{\mathbb{C}}^1$. We algorithmically apply the Shimura reciprocity law to compute CM points $j(z_D) \in \mathbb{P}_{\mathbb{C}}^1$ and their Galois conjugates so as to recognize them as purported algebraic numbers. We conclude by giving some examples of how this method works in practice.

- (4) *Arithmetic Fuchsian groups and Shimura curves, Quaternion algebras* (with David Kohel), *Associative orders* (with Nicole Sutherland), Handbook of Magma functions, eds. John Cannon and Wieb Bosma, <http://magma.maths.usyd.edu.au/magma/htmlhelp/MAGMA.htm>, Sydney, July 2007.
- (3) *Curves over finite fields with many points: an introduction*, Computational aspects of algebraic curves, ed. Tanush Shaska, Lecture Notes Series on Computing, vol. 13, World Scientific, Hackensack, NJ, 2005, 124–144.
The number of points on a curve defined over a finite field is bounded as a function of its genus g . In this introductory article, we survey what is known about the maximum number of points on a curve of genus g defined over \mathbb{F}_q , including an exposition of upper bounds, lower bounds, known values of this maximum, and briefly indicate some methods of constructing curves with many points, providing many references to the literature.
- (2) *Quadratic forms and quaternion algebras: Algorithms and arithmetic*, Ph.D. thesis, University of California, Berkeley, 2005.
- (1) *On the nonexistence of odd perfect numbers*, MASS Selecta: Teaching and learning advanced undergraduate mathematics, Svetlana Katok, Alexei Sossinsky, and Serge Tabachnikov, eds., Amer. Math. Soc., Providence, RI, 2003, 293–300.
In this article, we show how to prove that an odd perfect number with eight distinct prime factors is divisible by 5.

Teaching

- ▶ **Visiting Scholar**, McGill University
Arithmetic of Quaternion Algebras, Winter 2010
- ▶ **Assistant Professor**, University of Vermont
HONS 195: Enigma: A Social and Mathematical History of Cryptography, Fall 2009
MATH 241: Analysis in Several Real Variables I, Fall 2009
MATH 255: Elementary Number Theory, Spring 2009
MATH 295/395: Cryptography, Fall 2008
MATH 20: Calculus II, Fall 2008
MATH 252: Abstract Algebra II, Spring 2008
MATH 251: Abstract Algebra I, Fall 2007
- ▶ **Graduate Student Instructor (GSI)**, University of California, Berkeley
MATH 110: Linear Algebra, Spring 2005
MATH 115: Elementary Number Theory, Summer 2004
MATH 1A: Calculus, Spring 2004
MATH 250B: Multilinear Algebra, Spring 2003
MATH 195: Cryptography, Spring 2002
MATH 1B: Calculus, Fall 2001
- ▶ **Research in Mathematics Education**
Panelist, Teaching Critical Reading Across the Disciplines, March 14, 2005
Special Session Leader, Spring GSI Teaching & Orientation Workshop, January 14, 2005
Workshop Leader, Fall GSI Teaching & Orientation Workshop, August 27, 2004
Plenary panelist, Spring GSI Teaching & Orientation Workshop, January 17, 2002
Panelist, Fall meeting of the Faculty Advisers for GSI Affairs, October 15, 2001

Advising

- ▶ **Master's dissertation advisor**
Aurel Page, École Normale Supérieure, expected 2010
- ▶ **Undergraduate research, independent study**
Suma Desu, *Computer algebra in systems biology*, University of Vermont, Fall 2009
- ▶ **Ph.D. studies committee member**
Jason Price, *Popescu's conjecture in multiquadratic extensions*, student of Jonathan Sands, University of Vermont, June 2009
Matt Welz, student of Richard Foote, University of Vermont
- ▶ **Undergraduate honors thesis advisor**
Barbara Abbott, *Investigating binary cubic forms*, University of Vermont, May 2009
- ▶ **Ph.D. referee**
David Gruenewald, *Explicit algorithms for Humbert surfaces*, student of David Kohel, University of Sydney, 2009

Invited Lectures

- *Tables of Hilbert modular forms*
AMS 2009 Fall Southeastern Meeting, Boca Raton, Florida, October 31, 2009
Maine/Québec Conference on Number Theory and Related Topics, University of Maine, Orono, October 4, 2009
- *Rings of low rank with a standard involution and quaternion rings*, Dartmouth Colloquium, Hanover, New Hampshire, October 1, 2009
- *Nonsolvable number fields ramified only at small primes*, Dartmouth Number Theory Seminar, Hanover, New Hampshire, October 1, 2009
- *Algorithmic theory of quaternion algebras*, 2009 Summer School Automorphic Forms and L-Functions: Computational Aspects, Centre de Recherches Mathématiques (CRM), Montréal, June 25–26, July 2–3, 2009
- *Constructing modular Galois representations ramified only at small primes*
Computational Algebra Seminar, University of Sydney, Australia, May 21, 2009
Arithmetic Geometry Seminar, McMaster University, Hamilton, Ontario, April 2, 2009
- *Quaternions*, Mathematics Seminar, Middlebury College, Middlebury, March 31, 2009
- *Characterizing quaternion rings*, Quadratic Forms, Sums of Squares, Theta Functions, and Integral Lattices, University of Florida, Gainesville, March 11, 2009
- *Algorithms for enumerating ideal classes in quaternion orders*, Sage Days 13, University of Georgia, Athens, February 28, 2009
- *Computing automorphic forms on Shimura curves*
Five College Number Theory Seminar, Amherst College, Massachusetts, February 10, 2009
Québec-Vermont Number Theory Seminar, Concordia University, Montreal, December 11, 2008
- *A database of totally real quintic fields*, Sage Days 11, University of Texas, Austin, Texas, November 9, 2008
- *The Gauss higher relative class number problem*, Maine/Québec Conference on Number Theory and Related Topics, Université Laval, Québec City, October 4, 2008
- *Computing fundamental domains for Fuchsian groups*, Computations with Modular Forms, University of Bristol, Bristol, UK, August 21, 2008

- *Moduli of nondegenerate curves*, Algebraic Geometry Seminar, Duke University, Durham, May 1, 2008
- *Escher and the Droste effect*:
Mathematics Seminar, Middlebury College, Middlebury, April 15, 2008
Math Day (Vermont High School Mathematics Contest), University of Vermont, Burlington, May 15, 2007
Undergraduate Math Club Lecture, University of Minnesota, Minneapolis, March 29, 2007
- *Shimura curves of genus at most two*, Number Theory Seminar, University of Washington, Seattle, February 20, 2008
- *Shimura curves of low genus and totally real fields of small root discriminant*, Québec-Vermont Number Theory Seminar, McGill University, Montreal, December 6, 2007
- *Heegner points and Sylvester's conjecture*, Five College Number Theory Seminar, Amherst College, Massachusetts, November 27, 2007
- *Enumeration of totally real number fields*:
Colloquium, University of Washington, Seattle, February 20, 2008
MIT Number Theory Seminar, Cambridge, Massachusetts, October 25, 2007
- *Fundamental domains for finitely generated Fuchsian groups*, Maine/Québec Conference on Number Theory and Related Topics, University of Maine, Orono, September 29–30, 2007
- *Computing zeta functions using p -adic cohomology*:
Number Theory Seminar, University of Georgia, Athens, December 6, 2006
Computational Algebra Seminar, University of Sydney, June 7, 2007
- *Shimura curve computations*
Some Diophantine applications of Heegner points
Clay Summer School in Arithmetic Geometry, George-August Universität, Göttingen, Germany, August 1–2, 2006
- *Computational aspects of Shimura curves*, Magma 2006 conference, Technische Universität, Berlin, Germany, July 30, 2006
- *Special lecture series: Shimura curves*, University of Sydney, Australia, April 4, 7, 11, 2006
- *Curves over finite fields with many points: an introduction*, Computational aspects of algebraic curves, University of Idaho, Moscow, Idaho, May 27, 2005
- *Computing zeta functions of Δ -regular hypersurfaces*, Number Theory Seminar, University of California, Irvine, April 22, 2005
- *Quadratic forms that represent almost the same primes*:
Number Theory Seminar, University of Georgia, Athens, April 10, 2008
Colloquium, Wake Forest University, Winston-Salem, North Carolina, May 2, 2005
Explicit algebraic number theory, Institut Henri Poincaré, Paris, October 12, 2004
Colloquium, Santa Clara University, September 28, 2004
Modular Seminar, Harvard University, April 20, 2004
- *Introduction to stacks*, Basic Notions Seminar, Harvard University, April 19, 2004

Contributed Talks

- *Algorithms for automorphic forms on Shimura curves*, Explicit methods in number theory, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, July 14, 2009
- *On moduli of nondegenerate curves*, GeoCrypt 2009, Point-à-Pitre, Guadeloupe, May 1, 2009
- *Probability distributions on abelian groups*, Vermont Number Theory Seminar, University of Vermont, Burlington, February 26, 2009

- *Quadratic symbols over commutative rings*, Workshop Norm Residue Symbols, Universiteit Leiden, February 3–4, 2009
- *The analogy between number fields and function fields*, Vermont Number Theory Seminar, University of Vermont, Burlington, January 22, 2009
- *Computing the tame kernel of a number field*, Vermont Number Theory Seminar, University of Vermont, Burlington, October 9, 2008
- *On lattice polygons*, Joint University of Vermont/St. Michael's College Combinatorics Seminar, University of Vermont, Burlington, September 18, 2008
- *Enumeration of totally real fields of bounded root discriminant*, Algorithmic Number Theory Symposium (ANTS) VIII, Banff International Research Station (BIRS), Banff, Alberta, May 17, 2008
- *The Gauss higher relative class number problem*, Vermont Number Theory Seminar, University of Vermont, Burlington, April 11, 2008
- *How many times should you shuffle a deck of cards?*, UVM Math Club, University of Vermont, Burlington, March 18, 2008
- *Introduction to quaternion orders*, Vermont Number Theory Seminar, University of Vermont, Burlington, February 28, 2008
- *Enumeration of totally real number fields*, Vermont Number Theory Seminar, University of Vermont, Burlington, October 11, 2007
- *Zeta functions of varieties over finite fields*, Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, November 14, December 12, 2006
- *Algorithms for quaternion algebras*, SAGE Days 2, University of Washington, Seattle, October 8, 2006
- *Computing CM points on Shimura curves arising from cocompact arithmetic triangle groups*, Algorithmic Number Theory Symposium (ANTS) VII, Technische Universität, Berlin, Germany, July 27, 2006
- *Computing maximal orders for quaternion algebras*, Explicit methods in number theory, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, July 18, 2005
- *Quadratic forms that represent almost the same primes*
Number Theory Seminar, Universiteit Leiden, Netherlands, December 11, 2003
Number Theory Seminar, University of California, Berkeley, April 30, 2003
- *Computing the reciprocity law for CM points on Shimura curves*
Number theory and algebraic geometry in Magma, Institut Henri Poincaré, October 5, 2004
Number Theory Seminar, University of California, Berkeley, September 1, 2004
- *Computing zeta functions of Δ -regular hypersurfaces*, Zeta Functions Seminar, University of California, Berkeley, February 27 and March 5, 2004
- *Modular curves as coarse moduli spaces*, Semester Course, University of California, Berkeley, Spring 2003
- *Representation of primes by quadratic forms*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, November 16, 2002
- *Error-correcting codes using algebraic geometry*, Undergraduate Applied Mathematics Seminar, University of California, Berkeley, March 1, 2002
- *Explicit resolution of plane curve singularities*, Graduate Student Number Theory Seminar, University of California, Berkeley, February 13, 2002
- *Height functions defined by line bundles*, Arithmetic Geometry Seminar, University of California, Berkeley, February 5 and 12, 2002

- *Curves over finite fields with many points*, Function Fields Seminar, University of California, Berkeley, October 6, 2000
- *On the nonexistence of odd perfect numbers*, Graduate Student Number Theory Conference, University of Illinois, Urbana-Champaign, Illinois, March 25, 2000
West Coast Number Theory Conference, Asilomar Center, Monterey, California, December 16, 1999
- *On perfect numbers*, MASS Colloquium, Penn State University, State College, Pennsylvania, November 3, 1998

Mathematical Activities and Professional Experience ---

- Course Assistant, Arizona Winter School 2009: Quadratic Forms, University of Arizona, Tucson, March 14–18, 2009
- Visiting Faculty, MathPath, Summer 2008
Taught breakout course and gave three plenary lectures at an “advanced summer camp for students age 11–14 who show high promise and love mathematics”
- Referee for Math. Comp., Lect. Notes in Comp. Sci., J. of Comb. Theory (Ser. A), Comm. Contemporary Math., J. Algebra, J. Théor. Nombres Bordeaux, Int. J. Number Theory
- Mentor, Association for Women Mathematicians (AWM), Fall 2007–present
- Reviewer, Math. Reviews, Spring 2006–present
- Berichterstatter, Explicit methods in number theory, Mathematisches Forschungsinstitut Oberwolfach, July 17–23, 2005, published in *Oberwolfach reports*, European Mathematical Society, vol. 2, no. 3, 2005, 1799–1866.
- Visitor, Institut Henri Poincaré, Fall 2004
- Web Liaison, Future directions in algorithmic number theory, American Institute of Mathematics, Palo Alto, California, <http://www.aimath.org/WWN/primesinp/>, March 24–28, 2003
- Web Coordinator, Lenstra Treurfeest, University of California, Berkeley, March 21–23, 2003
- Visitor, Universiteit Leiden, Fall 2002
- Analyst, Education Program for Gifted Youth (EPGY), Summer 2000
Analyzed the question-and-answer session of computerized mathematics courses (through calculus) for gifted students; categorized problem types by content and input and made recommendations to improve pedagogy and implementation
- Volunteer, Math Nerds (<http://www.mathnerds.com>), Summer 2000–Summer 2002
- Representative, Mathematical Graduate Student Association (MGSA), 2000–2002
- Participating Student Researcher, Summer 1997–Summer 1998
Center for the Design of Analog-Digital Integrated Circuits (CDADIC); supervised by Massimo Capobianchi, Gonzaga University
- Member, American Mathematical Society (AMS), 1999–2004, 2007–present
- Member, Mathematical Association of America (MAA), 1994–1995, 2001–2002
- Participant, Mathematics Advanced Study Semester (MASS), Penn State University, State College, Pennsylvania, Fall 1998
- Computer analyst, Docent Inc., Summer 1996

Expository Work ---

- *The genus of a quadratic form*, Arizona Winter School: Quadratic Forms, University of Arizona, Tucson, course notes from John Conway, March 14–17, 2009

- *Integral and rational points on higher dimensional varieties*, American Institute of Mathematics, Palo Alto, California, December 11–20, 2002
- Notes from *Explicit algebraic number theory*, Oberwolfach Seminar, November 10–16, 2002
- *Introduction to stacks*, notes from lecture at Harvard, April 2004
- *Complex multiplication and group schemes*, course notes from Don Zagier and Rene Schoof, Spring 2001
- *Toric surfaces and continued fractions*, manuscript, May 2000

Service: University of Vermont

- **Departmental committee member**
 Committee to review and update Faculty Evaluation Guidelines, Fall 2009–Spring 2010
 Curriculum committee: the first two years, Fall 2009–Spring 2010
 Putnam committee, Fall 2007–Spring 2010
 High school contest committee, Fall 2007–Spring 2010
 Colloquium committee, Fall 2007–Spring 2008
- Graduate faculty appointment, Fall 2007–present
- Academic Integrity Council member, Center for Student Ethics and Standards, Fall 2007–Fall 2008
- Volunteer coach, Lawrence Debate Union, Fall 2007–present
- Member, President’s Commission on Lesbian, Gay, Bisexual, and Transgender (LGBT) Equity, Fall 2008–present
- **Master’s oral examination committee member**
 Nicholas Teff, March 25, 2008
 Betsy George, March 25, 2008

Other Conferences Attended

- Borcherds Products and their Applications to Arithmetic Geometry, Bellairs Workshop in Number Theory, Bellairs Research Institute, Holetown, Barbados, May 3–10, 2009
- Modular Forms and Arithmetic, Mathematical Sciences Research Institute (MSRI), Berkeley, California, June 28–July 2, 2008
- Elliptic Curves, Annual Workshop on Computational Complexity, Bellairs Research Institute, Holetown, Barbados, March 2–9, 2008
- Conference in honour of John Labute, McGill University and Centre de Recherche Mathématiques (CRM), Montréal, November 15–16, 2007
- *L*-functions and Modular Forms, American Institute of Mathematics, Palo Alto, California, July 30–August 3, 2007
- Journées Arithmétiques, University of Edinburgh, Scotland, July 2–6, 2007
- Arizona Winter School: *p*-adic Geometry, University of Arizona, Tucson, Arizona, March 10–14, 2007
- Explicit Methods for Rational Points on Curves, BIRS, Banff, Alberta, February 4–9, 2007
- Recent Developments in the Arithmetic of Shimura Varieties and Arakelov Geometry, Centre de Recerca Matemàtica (CRM), Universitat Autònoma de Barcelona, Bellaterra, Spain, July 10–15, 2006
- Intersection of Arithmetic Cycles and Automorphic Forms, Centre de Recherches Mathématiques (CRM), Montréal, December 12–16, 2005
- Summer Institute in Algebraic Geometry, AMS, Seattle, Washington, August 1–12, 2005

- Explicit Methods in Number Theory, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, July 17–23, 2005
- Explicit Arithmetic Geometry, Institut Henri Poincaré, Paris, France, December 6–10, 2004
- Explicit Algebraic Number Theory, Institut Henri Poincaré, Paris, France, October 11–15, 2004
- Number theory and Algebraic Geometry in Magma, Institut Henri Poincaré, Paris, France, October 4–8, 2004
- Algorithmic Number Theory Symposium (ANTS) VI, University of Vermont, Burlington, Vermont, June 13–16, 2004
- Special Points on Shimura Varieties, Lorentz Center, Leiden, the Netherlands, December 15–19, 2003
- Progress on the Birch and Swinnerton-Dyer Conjecture, Princeton University, New Jersey, November 5–7, 2003
- Arithmetic Degeneration of Moduli, University of California, Irvine, California, May 7–10, 2003
- Future Directions in Algorithmic Number Theory, American Institute of Mathematics, Palo Alto, California, March 24–28, 2003
- Lenstra Treurfeest, University of California, Berkeley, March 21–23, 2003
- Arizona Winter School: Logic and Number Theory, University of Arizona, Tucson, Arizona, March 15–19, 2003
- AMS-MAA Joint Mathematics Meeting, Baltimore, Maryland, January 15–18, 2003
- Rational and Integral Points on Higher Dimensional Varieties, American Institute of Mathematics, Palo Alto, California, December 11–20, 2002
- Explicit Algebraic Number Theory, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, November 10–16, 2002
- Perspectives in Classification and Moduli Spaces, Il Palazzone, Cortona, Italy, October 14–19, 2002
- Explicit Algebraic Number Theory (Stieltjes Onderwijsweek, NWO-OTKA Workshop), Lorentz Center, Leiden, the Netherlands, September 23–October 2, 2002
- Elliptic Curves and Higher Dimensional Analogues (ECHIDNA), University of Sydney, Sydney, Australia, July 15–19, 2002
- Algorithmic Number Theory Symposium (ANTS) V, University of Sydney, Sydney, Australia, July 7–12, 2002
- Learning Stacks and Computational Methods through Problem-Solving, University of Illinois, Urbana-Champaign, Illinois, June 12–15, 2002
- Arizona Winter School: Periods, University of Arizona, Tucson, Arizona, March 9–13, 2002
- Special Values of Rankin L -series, MSRI, Berkeley, December 10–14, 2001
- Arizona Winter School: Modular Forms, University of Arizona, Tucson, Arizona, March 10–14, 2001
- Joint Mathematics Meetings, New Orleans, Louisiana, January 10–13, 2001
- Western Number Theory Conference, University of San Diego, December 16–20, 2000
- Arithmetic Geometry: Algorithmic Number Theory Program, MSRI, Berkeley, December 11–15, 2000
- Midwest Arithmetic Geometry in Cryptography (MAGC) Workshop, University of Illinois, Urbana-Champaign, Illinois, November 17–19, 2000

- Clay Mathematics Institute Introductory Workshop in Algorithmic Number Theory, MSRI, Berkeley, August 14–23, 2000
- Mathematical Challenges of the 21st Century, University of California, Los Angeles, August 8–10, 2000
- Millennial Number Theory Conference, University of Illinois, Urbana-Champaign, Illinois, May 21–27, 2000
- Advances in Algebraic Geometry and Commutative Algebra (AAGCA), Texas A&M University, College Station, Texas, May 18–20, 2000
- Graduate Student Number Theory Conference, University of Illinois, Urbana-Champaign, Illinois, March 25–26, 2000
- Arizona Winter School: Arithmetic of Function Fields, University of Arizona, Tucson, Arizona, March 10–15, 2000
- West Coast Number Theory Conference, Monterey, California, December 16, 1999