

# Curriculum Vitae

## Joshua Brandon Holden

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### Education

- A.B., Harvard University, 1992
- A.M., Brown University, 1994
- Ph.D., Brown University, 1998 (requirements completed Sept. 1997)

### Employment

**Brown University** Research Assistant / Departmental Computer Coordinator, 1992–1994.  
Teaching Assistant / Research Assistant, 1994–1997.

**University of Massachusetts at Amherst** Visiting Assistant Professor (Postdoctoral position), 1997–1999.

**Duke University** Assistant Teaching Professor (Postdoctoral position), 1999–2001.

**Rose-Hulman Institute of Technology** Assistant Professor, 2001–2007.  
Associate Professor, 2007–present.

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## Honors and Awards

- Honorary Member of Upsilon Pi Epsilon (International Honor Society for the Computing and Information Disciplines), inducted Fall 2008.
- Best Paper Submitted to the ME Division, American Society for Engineering Education Annual Conference and Exposition, 2005. (With Richard Layton, Tina Hudson and Laurence D. Merkle.)

## Research Activities

### Research Specialty

Number Theory and Cryptography, in particular computational and algebraic number theory and applications

### Dissertation

“On the Fontaine-Mazur Conjecture for number fields and an analogue for function fields”, advised by Michael Rosen

### Research Publications

(Unpublished papers are available on the web at <http://www.rose-hulman.edu/~holden/Preprints> or at the <http://arXiv.org> preprint archive.)

- Irregularity of prime numbers over real quadratic fields. In: *Algorithmic number theory: third international symposium; proceedings*, no. 1423 in Springer Lecture Notes in Computer Science, Springer-Verlag, 1998.
- Comparison of Algorithms to Calculate “Quadratic Irregularity” of Prime Numbers. In: *Proceedings of the Conference on The Mathematics of Public-Key Cryptography*, June 12–17, 1999, Fields Institute, Toronto.
- On the Fontaine-Mazur Conjecture for number fields and an analogue for function fields. *Journal of Number Theory*, 81:16–47, 2000.
- Comparison of algorithms to calculate quadratic irregularity of prime numbers. *Mathematics of Computation*, 71:863–871, 2002.
- Fixed Points and Two-Cycles of the Discrete Logarithm. In: *Algorithmic number theory: fifth international symposium; proceedings*, 405–415, no. 2369 in Springer Lecture Notes in Computer Science, Springer-Verlag, 2002.
- Notes on an analogue of the Fontaine-Mazur conjecture. With Jeffrey D. Achter. *Journal de Théorie des Nombres de Bordeaux*, 15:627–637, 2003.
- Distribution of Values of Real Quadratic Zeta Functions. In: *Unusual Applications of Number Theory*, no. 64 in DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, AMS, 2004.

- Abelian varieties over finite fields with a specified characteristic polynomial modulo  $\ell$ . *Journal de Théorie des Nombres de Bordeaux*, 16:173–178, 2004.
- First-hit analysis of algorithms for computing quadratic irregularity. *Mathematics of Computation*, 73:939–948, 2004.
- New Conjectures and Results for Small Cycles of the Discrete Logarithm. With Pieter Moree. In: *High Primes and Misdemeanours: Lectures in honour of the 60th birthday of Hugh Cowie Williams*, 245–254, no. 41 in Fields Institute Communications, AMS, 2004.
- Distribution of the Error in Estimated Numbers of Fixed Points of the Discrete Logarithm. *Communications in Computer Algebra*, 38:111–118, 2004.
- Some Heuristics and Results for Small Cycles of the Discrete Logarithm. With Pieter Moree. *Mathematics of Computation*, 75:419–449, 2006.
- Mapping the Discrete Logarithm. With Daniel R. Cloutier. Submitted.

## Research Talks

Slides for some of these talks may be found at <http://www.rose-hulman.edu/~holden/Preprints/#talks>

- “Arithmetic Duality Theorems and the Birch and Swinnerton-Dyer Conjecture”, Topic Examination, Brown University, March 15, 1995.
- “On the Fontaine-Mazur Conjecture”, Algebra Seminar, Brown University, October 21, 1996.
- “On the Fontaine-Mazur Conjecture”, Five College Number Theory Seminar, Amherst College, September 23, 1997.
- “On the Fontaine-Mazur Conjecture”, Algebra Seminar, Boston University, October 6, 1997.
- “Calculation of Bernoulli Numbers and Values of Zeta Functions”, Theory Seminar, Department of Computer Science, University of Massachusetts, April 28, 1998.
- “Irregularity of Prime Numbers over Real Quadratic Fields”, Algorithmic Number Theory Symposium III, Reed College, June 21, 1998.
- “Comparison of Algorithms to Calculate ‘Quadratic Irregularity’ of Prime Numbers”, Conference on the Mathematics of Public Key Cryptography, Fields Institute, June 13, 1999.
- “Online Analysis of Algorithms for Computing Quadratic Irregularity”, DIMACS Workshop on Unusual Applications of Number Theory, DIMACS Center, January 14, 2000.
- “First-hit Analysis of Algorithms for Computing Quadratic Irregularity”, AMS Special Session on Number Theory, Algorithms, and Cryptography, University of Notre Dame, April 8, 2000.
- “First-hit Analysis of Algorithms for Computing Quadratic Irregularity”, Algorithmic Number Theory Symposium IV (poster session), Universiteit Leiden, July 4, 2000.
- “Finiteness Conjectures for Unramified Extensions of Global Fields”, Algebraic Geometry Seminar, Duke University, October 10, 2000.

- “Cryptography and Society: Report on a new course”, MAA Session on Integrating Mathematics and Other Disciplines, Joint Mathematics Meetings, New Orleans, January 12, 2001.
- “Recent results on the computation of zeta values at negative integers”, AMS Special Session on Cryptography and Computational and Algorithmic Number Theory, AMS Central Section Meeting, The Ohio State University, September 22, 2001.
- “Counting Fontaine-Mazur-like function fields”, Algebraic Number Theory Seminar, University of Illinois at Urbana-Champaign, March 14, 2002.
- “Calculation of Bernoulli Numbers and Values of Zeta Functions”, RHIT Math Seminar, May 15, 2002.
- “Fixed points and Two-cycles of the Discrete Logarithm”, Algorithmic Number Theory Symposium V, University of Sydney, Australia, July 9, 2002.
- “Counting Fontaine-Mazur-like function fields”, AMS Special Session on Number Theory and Arithmetic Geometry, AMS Eastern Section Meeting, Northeastern University, October 5, 2002.
- “Parallel Computing in Number Theory”, RHIT Parallel Computing Seminar, October 23, 2002.
- “New Conjectures and Results for Small Cycles of the Discrete Logarithm”, Conference in Number Theory in Honour of Professor H.C. Williams, The Banff Centre, Banff, Alberta, Canada, May 26, 2003.
- “New Conjectures and Results for Small Cycles of the Discrete Logarithm”, RHIT Math Seminar, October 22 and 29, 2003.
- “Mapping the Discrete Logarithm”, Algorithmic Number Theory Symposium VII (poster session), Technische Universität Berlin, July 25, 2006. Joint work with Daniel R. Cloutier.
- “Mapping the Discrete Logarithm”, ISU Math & CS Research Seminar, Monday, February 19, 2007. Also given at Illinois Number Theory Fest, University of Illinois at Urbana-Champaign, May 20, 2007. Joint work with Daniel R. Cloutier.
- “A statistical look at maps of the discrete logarithm”, Algorithmic Number Theory Symposium VIII (poster session), Banff Centre, Banff, Alberta, May 18–22, 2008. Joint work with Nathaniel W. Lindle. Abstract published in *Communications in Computer Algebra*, 42:57–59, 2008.

# Educational and Expository Activities

## Educational and Expository Publications

- A Comparison of Cryptography Courses. *Cryptologia*, 28 (2), 2004.
- Underwater Model Rockets: An Innovative Design Problem and Competition for Undergraduate Students in Engineering, Math and Science. With Richard Layton, Tina Hudson and Laurence D. Merkle. In: *Proceedings of the 2005 American Society for Engineering Education Annual Conference and Exposition*, 2005. Chosen Best Paper Submitted to the ME Division.
- Underwater Hacker Missile Wars: A Cryptography and Engineering Contest. With Richard Layton, Laurence Merkle, and Tina Hudson. *Cryptologia*, 30:69–77, 2006.
- The graph theory of blackwork embroidery. In: *Making Mathematics with Needlework: Ten Papers and Ten Projects*, AK Peters, 2007.
- Review of *Complexity and Cryptography: An Introduction* by John Talbot and Dominic Welsh. *Cryptologia*, 32:92–97, 2008.
- Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs. With Shannon Sexton and Julia Williams. In: *The Impact of Tablet PCs and Pen-based Technology: New Horizons*, Purdue University Press, 2009

## Educational and Expository Talks

Slides for some of these talks may be found at <http://www.rose-hulman.edu/~holden/Preprints/#talks>

- “A Tour of Public Key Cryptography (and of Number Theory)”, Colloquium, Miami University, October 11, 2001.
- “Modular Arithmetic and Trap Door Ciphers”, Mathematics and Computer Science Colloquium, Wabash College, March 27, 2003. Also given as Math Club Invited Speaker, Benedictine University, April 11, 2006.
- “Understanding the Magic: Teaching Cryptography with Just the Right Amount of Mathematics”, MAA Session on Applications of Mathematics in Computer Science, Joint Mathematics Meetings, Phoenix, January 9, 2004.
- “Cryptography and Computer Security for Undergraduates”, Panelist, SIGCSE Technical Symposium on Computer Science Education, Norfolk, Virginia, March 4, 2004.
- “The Graph Theory of Blackwork Embroidery”, Mathematics and Statistics Conference on “Mathematics and Symmetry”, Miami University, October 2, 2004. Also given at AMS Special Session on Mathematics and Mathematics Education in Fiber Arts, Joint Mathematics Meetings, Atlanta, January 7, 2005, and Indiana MAA Section Meeting, Indiana University-Purdue University Fort Wayne, April 1, 2005. Joint work with Lana Holden. Featured talk, AMS “Highlights of the 2005 Joint Mathematics Meetings” web page.
- “Picking up Stitches”, AMS Special Session on Mathematics and Mathematics Education in Fiber Arts, Joint Mathematics Meetings, Atlanta, January 7, 2005. Joint work with Lana Holden.

- “Blackwork Embroidery and Algorithms for Maze Traversals”, Indiana MAA Section Meeting, DePauw University, November 5, 2005. Also given at MAA Session on Mathematics and the Arts, Joint Mathematics Meetings, San Diego, January 9, 2008.
- “Number Theory, Polynomials, and the Advanced Encryption Standard”, MAA Session on Number-Theoretic Applications, Joint Mathematics Meetings, San Antonio, January 12, 2006. Also given at Mathematics and Statistics Conference on “Number Theory”, Miami University, September 29, 2007.
- “How to Paint Your Way out of a Maze”, RHIT Math Seminar, October 18, 2006.
- “Where Does it Hurt? A Teaching Clinic for New and Slightly Used Faculty”, Panelist, RHIT (sponsored by an RHIT Faculty Success Grant), September 13, 2006.
- “Writing Projects and Rubrics in Foundational Mathematics Courses”, MAA Session on Getting Students to Discuss and to Write about Mathematics, Joint Mathematics Meetings, New Orleans, January 6, 2007.
- “Writing Learning Objectives”, with Rich House, August Teaching Workshop, RHIT (sponsored by the RHIT Center for the Practice and Scholarship of Education and an RHIT Faculty Success Grant), August 16, 2007. Also given with Richard Layton, August Teaching Workshop, RHIT (sponsored by the RHIT Center for the Practice and Scholarship of Education), August 21, 2008, and given alone, August Teaching Workshop, RHIT (sponsored by the RHIT Center for the Practice and Scholarship of Education), August 20, 2009.
- “The Pohlig-Hellman Exponentiation Cipher as a Bridge between Classical and Modern Cryptography”, Indiana MAA Section Meeting, Manchester College, October 27, 2007. Also given at MAA Session on Cryptology for Undergraduates, Joint Mathematics Meetings, San Diego, January 8, 2008, MAA Session on Fascinating Examples from Combinatorics, Discrete Mathematics, and Graph Theory, MathFest, Madison, WI, August 2, 2008.
- “Braids, Cables, and Cells: An Interesting Intersection of Mathematics, Computer Science, and Art”, Illinois State MAA Section Meeting, Eastern Illinois University, April 4, 2008. Also given at RHIT Math Seminar, March 11, 2009, and Indiana MAA Section Meeting, IUPUI, March 21, 2009.
- Interview on cryptography with Namrita Nandakumar, Jason Bosco, David Appleyard, Rajesh D’monte, and Laura Velez, participants in ThinkQuest International website competition (second place in division). Interview available on the web at [http://library.thinkquest.org/07aug/01676/interact\\_interview\\_holden.html](http://library.thinkquest.org/07aug/01676/interact_interview_holden.html).
- “Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs”, Workshop on the Impact of Pen-Based Technology on Education (poster session), Purdue University, October 16, 2008.
- “Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs”, Indiana MAA Section Meeting, Rose-Hulman Institute of Technology, October 25, 2008.
- “Teaching the Group Theory of Permutation Ciphers”, MAA Session on Cryptology for Undergraduates, Joint Mathematics Meetings, Washington, DC, January 5, 2009.
- “Math in Your Hands: The Use of Tablet PCs and Computer Algebra Systems in a Calculus Classroom”, MAA Session on Demos and Strategies with Technology that Enhance Teaching and Learning Mathematics, Joint Mathematics Meetings, Washington, DC, January 6, 2009.

- “Braids, Cables, and Cells: An intersection of Mathematics, Computer Science, and Fiber Arts”, AMS Special Session on Mathematics and Mathematics Education in Fiber Arts, Joint Mathematics Meetings, Washington, DC, January 7, 2009.
- (with Shannon Sexton and Julia Williams) “Math in Your Hands: The Use of Tablet PCs and Computer Algebra Systems in a Calculus Classroom”, DyKnow Virtual User Conference, online presentation, July 30, 2009.
- ‘ “How Do You Say ‘Cryptography’ in Romanian?” Learning About Integers from Ciphers in Different Languages’, MAA Session on Fascinating Examples from Combinatorics, Number Theory, and Discrete Mathematics, MathFest, Portland, OR, August 6, 2009.
- (with Shannon Sexton and Julia Williams) “Math in Your Hands: The Use of Tablet PCs and Computer Algebra Systems in a Calculus Classroom”, ICI IT Summit, Taylor University, August 14, 2009.
- (with Shannon Sexton and Julia Williams) “Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs”, Workshop on the Impact of Pen-Based Technology on Education, Virginia Tech, October 12, 2009.

## Curriculum Development

**Summer 1996; Spring 1997** Obtained grants for, developed curriculum for, and team-taught new course in “Calculus and Its History” at Brown University in cooperation with Prof. Kim Plofker of the Brown History of Mathematics Department. Used “historically informed” pedagogy to teach calculus.

**Summer and Fall 2000** Obtained grants for, developed curriculum for, and taught new course in “Cryptography and Society” at Duke University. Seminar-style introduction to the techniques of modern cryptography and the impact on society of their widespread use.

**Summer 2000–present** Designed web-based learning modules for the Connected Curriculum Project including:

- Mathematica Tutor (with Lang Moore, David Smith, and Jim Tomberg). Available on the web at <http://www.math.duke.edu/education/ccp/materials/linalg/mmatutor/index.html>.
- Maple Tutor (Maple 10 and higher) (with Lang Moore, David Smith, and Jim Tomberg). Available on the web at <http://www.math.duke.edu/education/ccp/materials/mvcalc/javamaptutor/index.html>.
- Linear Filters. Available on the web at <http://www.math.duke.edu/education/ccp/materials/linalg/linfilters/index.html>.
- Introduction to the Mathematics of Ciphers. In review.
- Damping and Resonance Investigations Using Laplace Transforms. In review.
- Using Riemann Sums to Estimate Areas, Volumes, and Lengths of Arc. In preparation.

**Spring 2002, Spring 2003, Spring 2004** Developed curriculum for and taught course in “Cryptography” at RHIT. (Team-taught in 2002 and 2003 in cooperation with Prof. David Mutchler of the RHIT Computer Science Department.)

**Spring 2004** Developed curriculum for and taught course in “Abstract Algebra” at RHIT.

**Spring 2005** Developed curriculum for and taught course in “Topics in Discrete Mathematics:  $p$ -adic numbers” at RHIT.

**Winter 2005–2006** Developed curriculum for and taught course in “Topics in Mathematics: Galois Theory” at RHIT.

**Fall 2008** Developed new technology for integrating the use of Maple with the use of wireless Tablet PCs and DyKnow Vision software and implemented it in Calculus III, revising course as appropriate.

**Spring 2009** Developed curriculum for and taught course in “Topics in Discrete Mathematics: Quantum Computing” at RHIT.

## Grants

- Wayland Collegium Course Development Grant for “Calculus and Its History”, Brown University (joint application with Kim Plofker), Summer 1996.
- Curricular Development Grant for “Calculus and Its History”, Brown University (joint application with Kim Plofker), Spring 1997.
- Recognition Award for the Integration of Research and Education (RAIRE) Grant for curriculum development for “Cryptography and Society”, Duke University, Summer 2000.
- Undergraduate Mathematics Conference Grant for the RHIT Undergraduate Mathematics Conference, administered by the Mathematical Association of America, supported by grant DMS-0241090 from the National Science Foundation, 2005–2006.
- Senior Investigator, Research Experiences for Undergraduates (REU) Site Grant from National Science Foundation in the research area of “Discrete Logarithms” (joint application with Kurt Bryan and David Finn, Co-PI’s), National Science Foundation grant DMS-0352940, 2007–2009 funding cycle.
- Principal Investigator, National Science Foundation group travel grant for the Eighth Algorithmic Number Theory Symposium ANTS-VIII, (joint application with Jonathan Sorenson, Co-PI), DMS-0801165, 2008–2009.
- Investigator, Project to Implement Tablet PCs and DyKnow Vision Software into a Course, RHIT, Summer 2008.
- Rose-Hulman Summer Professional Development Grant, Summer 2009.

## Workshops Attended

- Project NExT-IN (New Experiences in Teaching — Indiana) Workshop, MAA Indiana Section Meeting, Butler University, March 28, 2003.

## Teaching Experience

Syllabi and materials used in many of these courses may be found on my web site.

**Pre-calculus and Introductory Calculus** Brown University, Rose-Hulman Institute of Technology  
Used Eric Mazur’s “Peer Instruction” and other collaborative learning techniques.

**Calculus I–III** Brown University, University of Massachusetts, Duke University, Rose-Hulman Institute of Technology

Teaching techniques used include “Peer Instruction”, collaborative techniques, computer algebra system labs, graphing calculator labs, written projects, and computer algebra system demonstrations.

**Differential Equations I–II** Rose-Hulman Institute of Technology

Teaching techniques used include “Peer Instruction”, collaborative techniques, computer algebra system labs, and computer algebra system demonstrations.

**Discrete and Combinatorial Algebra I–II** Rose-Hulman Institute of Technology

**Engineering Statistics I** Rose-Hulman Institute of Technology

**Linear Algebra** Duke University, Rose-Hulman Institute of Technology

Used Maple labs and demonstrations, and writing, programming, and student research projects.

**Undergraduate Number Theory** University of Massachusetts, Rose-Hulman Institute of Technology

Integrated writing, computer programming, and student research projects (written and/or oral) into the syllabus, as well as discussions of current research.

**Undergraduate Number Theory Seminar** Duke University

Roughly half the course lecture-based, half based on student presentations on various topics. Student written projects included answers to questions from other students.

**Undergraduate Abstract Algebra I** University of Massachusetts

Integrated writing, computer programming, and student research projects into the syllabus, as well as discussions of current research.

**Undergraduate Abstract Algebra** Rose-Hulman Institute of Technology

Developed curriculum for and taught new course.

Integrated student research projects (written and oral) into the syllabus, as well as discussions of current research.

**Cryptography** Rose-Hulman Institute of Technology

Developed curriculum for and team-taught course in cooperation with Prof. David Mutchler of the RHIT Computer Science Department.

Integrated writing, computer programming, and student research projects and presentations into the syllabus, as well as discussions of current research.

**Theory of Computation** Rose-Hulman Institute of Technology

**Topics in Discrete Mathematics** Rose-Hulman Institute in Technology

Topic for Spring 2005 was  $p$ -adic numbers. Developed curriculum for and taught course.

Topic for Spring 2009 was quantum computing. Developed curriculum for and taught course.

Integrated discussions of current research into the syllabus.

**Topics in Number Theory** Rose-Hulman Institute in Technology

Topic for Winter 2005–2006 was Galois Theory. Developed curriculum for and taught course.

Integrated frequent student presentations of material into the syllabus, as well as discussions of current research.

**Contemporary Mathematical Problems** Rose-Hulman Institute in Technology**“Calculus and Its History”** Brown University

Developed curriculum for and team-taught new course in cooperation with Prof. Kim Plofker of the Brown History of Mathematics Department.

Used “historically informed” pedagogy to teach calculus. Included student term papers as well as problem sets.

**History of Mathematics** University of Massachusetts

Supervised independent study.

**“Cryptography and Society”** Duke University

Developed curriculum for and taught new course.

Seminar-style introduction to the techniques of modern cryptography and the impact on society of their widespread use. Included student short essays and term papers as well as problem sets and computer experience. Guest lecturers also used.

**Mathematics Seminar** Rose-Hulman Institute of Technology

Responsible for coordinating student attendance and talks at department seminar. Worked with students to develop 50 minute-long mathematical talks and supervised their presentation.

**Problem Solving Seminar** Rose-Hulman Institute of Technology

Student-driven presentation of solutions to contest-type problems. Incorporated written and oral presentations and team contests.

**Senior Thesis** Rose-Hulman Institute of Technology

Supervised senior theses in number theory for Mathematics and Computer Science and Software Engineering Departments.

**Topics in Combinatorics** Rose-Hulman Institute of Technology

Supervised independent study.

**Number Fields I and II** Rose-Hulman Institute of Technology

Supervised independent study.

## Advising and Student Projects

- Committee member, Master’s Thesis on high-speed digital multiplierless FIR filters, Himanshu Narayana, Electrical and Computer Engineering department, 2003–2004.
- Advisor, Senior Thesis on “Mapping the Discrete Logarithm”, Daniel Cloutier, Computer Science and Software Engineering department, 2004–2005.

- “Mapping the Discrete Logarithm”, presented by Daniel Cloutier at AMS Special Session on Number Theory, AMS Central Section Meeting, Notre Dame University, April 9, 2006.
- Mathematics major advisor, graduating class of 2008.
- Group director, Rose-Hulman Research Experience for Undergraduates (REU) in Mathematics, Summer 2007. Supervised the following projects, which were presented at the Indiana Summer Undergraduate Mathematics Conference, Wabash College, July 26, 2007, and are also available as RHIT Technical Reports:
  - “The Discrete Logarithm Problem and Ternary Functional Graphs”, Max F. Brugger and Christina A. Frederick. Also presented at MAA Undergraduate Poster Session, Joint Mathematics Meetings, San Diego, January 8, 2008, and published in the *Rose-Hulman Undergraduate Mathematics Journal*, Vol. 8, No. 2, 2007.
  - “Isomorphisms of Elliptic Curves over Extensions of Finite Fields”, Matthew Niemerg. Also presented at the Illinois State MAA Section Meeting, Eastern Illinois University, April 5, 2008, and at the Rose-Hulman Undergraduate Mathematics Conference, April 11, 2008.
  - “Structural Properties of the Mapping  $g^x \rightarrow g^{x^2}$ ”, Philip Brunetti.
- Advisor, Senior Thesis on “A Statistical Look at Maps of the Discrete Logarithm”, Nathaniel W. Lindle, Computer Science and Software Engineering department, 2007–2008.
- “A Statistical Look at Maps of the Discrete Logarithm”, presented by Nathaniel W. Lindle at the Rose-Hulman Undergraduate Mathematics Conference, April 12, 2008.
- Committee member, Senior Thesis, Max Brugger, Mathematics Department, Oregon State University, 2007–2008.
- Committee member, Senior Thesis, Robert Lemke-Oliver, Mathematics Department, RHIT, 2007–2008.
- Committee member, Senior Thesis, Ian Rogers, Mathematics Department, RHIT, 2007–2008.
- Advisor, Senior Thesis on “The Collatz Conjecture”, Amanda Vessey, Mathematics Department, RHIT, 2008–2009.
- Committee member, Senior Thesis, Jordan Phegley, Mathematics Department, RHIT, 2008–2009.
- Committee member, Senior Thesis, Jeremy Schendel, Mathematics Department, RHIT, 2008–2009.
- Group director, Rose-Hulman Research Experience for Undergraduates (REU) in Mathematics, Summer 2009. Supervised the following projects, which were presented at the Indiana Undergraduate Research Conference, Indiana University, July 23, 2009 and are also available as RHIT Technical Reports:
  - “The Digraph of the Square Mapping on Elliptic Curves”, Katrina Glaeser.
  - “Statistical Investigation of Structure in the Discrete Logarithm”, Andrew Hoffman. Also published in the *Rose-Hulman Undergraduate Mathematics Journal*, Vol. 10, No. 2, 2009.
  - “Symmetries and Automorphisms in Power Digraphs Modulo  $n$ ”, Joseph Kramer-Miller.
  - “Mapping the Discrete Logarithm Problem over Composite Moduli”, Marc Mace.

# Service Activities

## Institutional Service

### Institute Committees

- Member, Visual and Performing Arts Committee, Rose-Hulman Institute of Technology, 2001–2002.
- Member, Quality of Education Committee, Rose-Hulman Institute of Technology, 2002–2003.
- Member, Academic Computing/Technology Committee, Rose-Hulman Institute of Technology, 2003–2007.
- Secretary, Academic Computing Committee, Rose-Hulman Institute of Technology, 2003–2004.
- Chair, Academic Technology Committee, Rose-Hulman Institute of Technology, 2004–2006.
- Member, Faculty Affairs Committee, Rose-Hulman Institute of Technology, 2007–2009.
- Member, Committee on Potential Academic Technologies, Rose-Hulman Institute of Technology, 2008–2009.
- Member, Course Management Software Faculty Team, Rose-Hulman Institute of Technology, 2003–2004.
- Member, Commission on the Assessment of Student Outcomes, Rose-Hulman Institute of Technology, 2005–2006.
- Member, Parallel Computing Steering Committee, Rose-Hulman Institute of Technology, 2005–2008.
- Member, Imaging Systems Faculty Cluster, 2005–2010.
- Member, Parallel Computing Faculty Cluster, 2005–2010.
- Member, Academic Computing Review Commission, 2006–2007.
- Member, Tablet and Lightweight PC Study Team, 2007–2008.

### Departmental Committees

- Member, ad hoc subcommittee of the Undergraduate Affairs Committee to choose textbook for Calculus with Computers, University of Massachusetts Department of Mathematics, 1998.
- Member, Calculus Committee, Duke University Mathematics Department, 1999–2001.
- Member, Library Committee, Rose-Hulman Institute of Technology Mathematics Department, 2001–2004.
- Member, RHIT High School Contest Committee, Rose-Hulman Institute of Technology Mathematics Department, 2002–2005.
- Co-chair, RHIT High School Contest Committee, Rose-Hulman Institute of Technology Mathematics Department, 2004–2005.

- Chair, Brochure Committee, Rose-Hulman Institute of Technology Mathematics Department, 2002–2004.
- Member, Computing Environment Committee, Rose-Hulman Institute of Technology Mathematics Department, 2003–2007, 2008–2009.
- Member, Curriculum Committee, Rose-Hulman Institute of Technology Mathematics Department, 2003–2005.
- Member, Mathematics Concentration Curriculum Development Group, Rose-Hulman Institute of Technology Mathematics Department, 2002–2010.
- Chair, Mathematics Concentration Curriculum Development Group, Rose-Hulman Institute of Technology Mathematics Department, 2004–2005.
- Member, Discrete Applied Mathematics Concentration Curriculum Development Group, Rose-Hulman Institute of Technology Mathematics Department, 2002–2010.
- Member, Assessment and Testing Curriculum Development Group, Rose-Hulman Institute of Technology Mathematics Department, 2007–2009.
- Member, Four-day Calculus Committee, Rose-Hulman Institute of Technology Mathematics Department, 2004–2005.
- Member, Hiring Committee, Rose-Hulman Institute of Technology Mathematics Department, 2006–2007.
- Member, Alfred R. Schmidt Freshman Mathematics Competition Prize Committee, Rose-Hulman Institute of Technology Mathematics Department, 2006–2009.
- Member, Student Recruiting Committee, Rose-Hulman Institute of Technology Mathematics Department, 2008–2010.

## Other

- Webmaster for Five College Number Theory Seminar, 1997–1999.
- Led session for student laptop orientation, Rose-Hulman Institute of Technology, each Fall, 2002–2009.
- Co-organizer, RHIT Undergraduate Mathematics Conference, 2005–2006.
- Advisor, Rose-Hulman Macintosh Interest Group, 2003–2006.
- Advisor, Unity, 2007–2009.
- Captain, RHIT Faculty/Staff Intramural Soccer Team (“The Dinosaurs”), 2005–2006.
- Speaker, RHIT Student Leaders’ Luncheon on the theme “Diversity Matters”, January 17, 2007.
- Photo Archivist, Rose-Hulman Institute of Technology Mathematics Department, 2007–2009.

## Professional Service

### Professional Organizations

- Member, Nominating Committee, Indiana MAA Section, 2009–2012.

## Conferences

- Co-organizer, AMS Special Session on Cryptography and Computational and Algorithmic Number Theory, AMS Central Section Meeting, Indiana University, April 4–6, 2003.
- Judge, Undergraduate Student Poster Session, Joint Mathematics Meetings, Phoenix, January 9, 2004.
- Member, Design Contest Planning Committee, Midwestern Undergraduate Private Engineering Colleges Student Conference, Rose-Hulman Institute of Technology, March 27, 2004.
- Co-organizer, Graduate Student Workshop, Indiana MAA Section Meeting, Indiana State University, April 3, 2004.
- Judge, Undergraduate Student Poster Session, Joint Mathematics Meetings, New Orleans, January 7, 2007.
- Conductor, Early Music Sing, Joint Mathematics Meetings, New Orleans, January 7, 2007.
- Member, Organizing Committee, Algorithmic Number Theory Symposium VIII, 2006–2008.
- Judge, MAA Student Paper Sessions, MathFest, Madison, WI, July 31, 2008.
- Judge, MAA Student Paper Sessions, MathFest, Portland, OR, August 6, 2009.

## Publications

- Referee for *Journal of Number Theory*, *Journal of Online Mathematics and its Applications*, *RHIT Undergraduate Mathematics Journal*, *Cryptologia*, *PRIMUS*, *Boletín de la Sociedad Matemática Mexicana*, *Integers*.
- Editor, *Cryptologia* Editorial Board, 2005–present.
- Editor, *Ball State Undergraduate Mathematics Exchange* Editorial Board, 2008–present.
- Reviewer for *The Internet Encyclopedia*, Hossein Bidgoli, Editor-in-Chief, John Wiley and Sons, 2003.
- Pre-publication reviewer for *Calculus*, Taalman, Brazfield, and Kohn, Houghton Mifflin Company.
- Pre-publication reviewer for Princeton University Press.
- Pre-publication reviewer for Thomson Higher Education.
- Pre-publication reviewer for 12th edition of *Thomas' Calculus*, Pearson Addison-Wesley.
- Pre-publication reviewer for third edition of *Introduction to Computer Theory*, Cohen, John Wiley & Sons, Inc.
- Pre-publication reviewer for *Discrete Math*, by David Barrington, McGraw-Hill.
- Pre-publication reviewer for *Calculus*, Soo Tan, Cengage Learning.
- Pre-publication reviewer for 12th edition of *Thomas' Calculus: Early Transcendentals*, Pearson Addison-Wesley.

## Other

- Assistant Coach, American Regions Mathematics League Team from Indiana, Spring, 2002.

# Consulting Activities

## Consulting Employment

- Cryptography consultant, Vadium Technology, Summer 2003.
- Reader, AP Calculus Exam, Summer 2005, Summer 2006, Summer 2008.
- Contributed homework problems to *Cryptography and Network Security*, Fourth Edition, William Stallings, Prentice-Hall, 2006.
- Rater, RosEPortfolio, Rose-Hulman Institute of Technology, Summer 2007, Summer 2008.

## Consulting Publications

- “XOR Convert Phase of the AlphaCipher Key Distribution Protocol”, proprietary document prepared for Vadium Technology, July 24, 2003.