CURRICULUM VITAE

RONNIE S. WILLIAMS

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CONTACT INFORMATION

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DEGREES AND EDUCATION

ABD Ph.D. in Mathematics, The University of Arizona.
Dissertation: "Level compatibility in the passage from modular symbols to cup products".
Advisor: Romyar Sharifi

2010 M.S. in Mathematics, Texas Tech University.
Thesis: "Cubic Polynomials in the Number Field Sieve".
Advisor: Christopher Monico

2007 B.S. in Mathematics with Computer Science minor, Texas Tech University.

RESEARCH

My current research interests are in the field of algebraic number theory; specifically, Iwasawa theory, modular curves and modular symbols. The work of T. Fukaya, K. Kato and R. Sharifi establishes a deep connection between the geometry of the modular curve $X_1(N)$ and the arithmetic of the cyclotomic field $\mathbb{Q}(\zeta_N)$. The structure of these spaces depends on the choice of an integer, N, which we simply refer to as the level. My dissertation seeks to provide a degeneracy map between levels which is compatible with their connection. My master's thesis was written in the fields of algebra and cryptography; it detailed a new method of polynomial selection for the number field sieve algorithm for factoring large integers.

EMPLOYMENT

2014 - Graduate Associate II, The University of Arizona
2012 - 2014 Graduate Associate I, The University of Arizona
2010 - 2012 Graduate Assistant II, The University of Arizona
2008 - 2010 Graduate Part-Time Instructor, Texas Tech University
2006 - 2008 Tutoring & Study Center, Texas Tech University

TEACHING EXPERIENCE

The University of Arizona (2010 -)

- Math 112 - College Algebra (Fall '10, '11 & Spring '12)
- Math 122B - First Semester Calculus (Fall '12, '13, Spring '13 & Summer '13, '14)
- Math 122B Online - First Semester Calculus (Summer '15)
- Math 129 - Calculus II (Spring '14, '15)
- Math 313 - Introduction to Linear Algebra (Fall '15, Spring '16)
- Math 415A - Introduction to Abstract Algebra (Teaching Assistant) (Fall '13)

Texas Tech University (2008-2010)

- Math 0302 - Intermediate Algebra (Spring '08)
- Math 1300 - Contemporary Mathematics (Fall '08)
- Math 1320 - College Algebra (Summer '08)
- Math 1321 - Trigonometry (Summer '09)
- Math 1330 - Introductory Mathematical Analysis I (Spring '09)
- Math 1331 - Introductory Mathematical Analysis II (Fall '09 & Spring '10)

In the summer of 2009 I participated in a joint program between Texas Tech University's Department of Mathematics and Statistics and the Edward E. Whitacre Jr. College of Engineering, called the *ConocoPhillips Academic Success Bridge Program*. This was an intensive summer program designed to prepare and boost the retention of incoming engineering-major freshmen, in which I was the instructor of record for Math 1321 - Trigonometry.

Descriptions for all of the above courses can be provided upon request.

AWARDS

- Fall 2015 – Outstanding Graduate Teaching Assistant (Dept. of Mathematics)

TALKS

- A Degeneracy Map for the Correspondence between the Geometry of $X_1(N)$ and the Arithmetic of $\mathbb{Q}(\zeta_N)$, Graduate Colloquium, The University of Arizona, November 2015.
- Modular & Manin Symbols – A Brief Introduction, Introductory Algebra Seminar, The University of Arizona, October 2015.
- Weil's Three Columns & the Cohen-Lenstra Heuristics, Algebra and Number Theory Seminar, The University of Arizona, March 2014.
- Hida Theory, Comprehensive Exam Talk, The University of Arizona, February 2014.
- Singular Homology and Cohomology, Homological Algebra Seminar, The University of Arizona, Fall 2012.
- Elliptic Curve Triangle Parametrization (with A. Tao & L. Maloney), Research Tutorial Group Mini-Conference, The University of Arizona, Fall 2011.

WRITINGS

* Please note, the below have not been published, nor submitted for publication – they are merely papers that I have written and posted on my website.

- Modified Manin Symbols – Properties, Examples & Ideas, 2015.
- Dimension of $H_1(X_1(p), C_1^0, \mathbb{Z}_p)^+$ Via Manin Symbols, 2015.
- Hida Theory, Comprehensive Exam Paper, 2014.
- Elliptic Curve Triangle Parametrization, Research Tutorial Group Project, 2011.
- Cubic Polynomials in the Number Field Sieve, Masters Thesis, 2010.