

Jeffrey Hatley

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Education

University of Massachusetts, Amherst, MA

Ph.D. in Mathematics, 2015
Thesis Advisor: Tom Weston

University of Massachusetts, Amherst, MA

M.S. in Mathematics, 2011

The College of New Jersey, Ewing, NJ

B.A. in Mathematics with honors, 2009
Minor: Art History; Phi Beta Kappa

Employment

Union College, Schenectady, NY

Assistant Professor, September 2018 – Present
Visiting Assistant Professor, September 2015 – August 2018

Teaching Experience

Union College Fall 2015 - Present

- Calculus I, Calculus II, and Multivariable Calculus with Linear Algebra
- Introduction to Logic & Set Theory
- Number Theory
- Real Variable Theory
- Complex Analysis
- Mathematical Cryptology
- Ordinary Differential Equations
- Independent study: Algebraic Number Theory
- Senior Theses (available on my website)
 - Frank Rocco, *Elliptic Curves Cryptology* (2017)

- Casey Bruck, *A Concrete Example of Prime Behavior in Quadratic Fields* (2017)
- Allegra Dawes, *Geometric Group Theory and Hyperbolic Groups* (2019)
- Nicholas Kender, *Symmetric Polynomials: The Fundamental Theorem and Uniqueness* (2019)
- Edward Winters, *Analysis of the Doomsday Algorithm* (2020)
- Zachary Porat, *Classification of Torsion Subgroups for Mordell Curves* (2020)
- Thomas Farina, *The Relationship Between Zeros of the Riemann Zeta Function and Primes* (2021)
- Undergraduate Research
 - Casey Bruck, *Composite Sequences and Covering Systems* (Summer 2017)
 - Jason Stack and Tzu-Ruei Huang, *Noncongruence witnesses for elliptic curves* (Summer 2020)
 - Jason Stack, *Infinite families of elliptic curves of large rank* (Fall 2021)

University of Massachusetts Amherst, Fall 2009- Spring 2015

- Calculus I, Calculus II, Calculus II for Life Sciences and Business
- Linear Algebra

Research Publications

- [14] *The vanishing of anticyclotomic μ -invariants for non-ordinary modular forms* (with Antonio Lei), submitted. arXiv:2108.05958
- [13] *Statistics for anticyclotomic Iwasawa invariants of elliptic curves* (with Debanjana Kundu and Anwesh Ray), submitted. arXiv:2106.01517
- [12] *Two infinite families of elliptic curves with rank greater than one* (with Jason Stack), submitted. arXiv:2103.00307
- [11] *Comparing anticyclotomic Selmer groups of positive coranks for congruent modular forms – Part II* (with Antonio Lei), **Journal of Number Theory**, Vol. 229 (2021), 342–363. arXiv:2009.03772
- [10] *Λ -submodules of finite index of anticyclotomic plus and minus Selmer groups of elliptic curves* (with Antonio Lei and Stefano Vigni), to appear in **manuscripta mathematica**. arXiv:2003.10301
- [9] *Groups of generalized G -type and applications to torsion subgroups of rational elliptic curves over infinite extensions of \mathbf{Q}* (with Harris B. Daniels and Maarten Derickx), **Transactions of the London Mathematical Society**, Vol. 6, No. 1 (2019), 22–52.
- [8] *Comparing anticyclotomic Selmer groups of positive coranks for congruent modular forms* (with Antonio Lei), **Mathematical Research Letters**, Vol. 26, No. 4 (2019), 1115–1144.
- [7] *Arithmetic properties of signed Selmer groups at nonordinary primes* (with Antonio Lei), **Annales de l'Institut Fourier**, Vol. 69, No. 3 (2019), 1259–1294.
- [6] *Rank parity for congruent supersingular elliptic curves*, **Proceedings of the AMS**, Vol. 145 (2017), 3775–3786.
- [5] *Modular forms of arbitrary even weight with no exceptional primes*, **Journal of Number Theory**, Vol. 166 (2016), 158–165.
- [4] *Elliptic curves with maximally disjoint division fields* (with H. B. Daniels and J. Ricci), **Acta Arithmetica**, Vol. 175, No. 3 (2016), 211–223.
- [3] *Obstruction criteria for modular deformation problems*, **International Journal of Number Theory**, Vol. 12, No. 1 (2016), 273–285.

- [2] *The Probability of Relatively Prime Polynomials in $\mathbb{Z}_{p^k}[x]$* (with T. Hagedorn), **Involvement, a Journal of Mathematics**, Vol. 3, No. 2 (2010), 223–232.
- [1] *Numerical Evidence on the Uniform Distribution of Power Residues for Elliptic Curves* (with A. Hittson), **Involvement, a Journal of Mathematics**, Vol. 2, No. 3 (2009), 306–321.

Recent Invited Talks

- “Recent progress in positive rank Iwasawa theory,” Special session on algebraic number theory, Canadian Mathematical Society Summer Meeting, June 8, 2021.
- “Comparing positive rank Iwasawa modules,” AMS Special Session on A Showcase of Number Theory at Undergraduate Institutions, Joint Math Meetings, January 6, 2021.
- “Iwasawa theory in the positive rank setting,” Arizona State University Number Theory Seminar, November 20, 2020.
- “Iwasawa Theory and Goldfeld’s Conjecture,” unQVNTS (University of Vermont), October 31, 2019.
- “The Birch and Swinnerton-Dyer Conjecture,” The College of New Jersey Mathematics Colloquium, September 25, 2019.
- “Variation of arithmetic invariants in families,” Front Range Number Theory Day (CU Boulder), April 27, 2019.
- “Torsion subgroups of rational elliptic curves over infinite extensions,” AMS Sectional Meeting Special Session on Algebraic Number Theory (Hartford CT), April 14, 2019.
- “Anticyclotomic Iwasawa Theory in the Positive Rank Setting,” Cornell University Number Theory Seminar, November 16, 2018.
- “Heads or tails? Coin-flipping with elementary number theory,” MAA Session on Innovative Teaching Practices in Number Theory, Joint Math Meetings 2018.
- “Anticyclotomic Iwasawa theory in the positive corank case,” Five College Number Theory Seminar, December 5, 2017
- “Rank parity in families of nonordinary modular forms,” University of Connecticut Algebra Seminar, November 1, 2017
- “Unobstructed Modular Deformation Theory,” Université Laval séminaire d’algèbre et de géométrie gradué, March 7, 2016
- “Pairs of Elliptic Curves with Large Galois Image,” Five College Number Theory Seminar, February 9, 2016.

Recent Contributed Talks

- “Torsion subgroups of rational elliptic curves over infinite extensions,” CNTA XV at Université Laval, July 11, 2018.
- “Comparing Selmer groups of positive corank,” CTNT 2018 at the University of Connecticut Storrs, June 1, 2018.

- “Comparing Selmer groups of positive corank,” Upstate New York Number Theory Conference, April 29, 2018.
- “Comparing anticyclotomic Selmer groups of positive coranks for congruent modular forms,” AMS Session on Number Theory I, Joint Math Meetings 2018.
- “Rank parity for congruent modular forms,” Upstate New York Number Theory Conference, May 6, 2017
- “Arithmetic properties of signed Selmer groups at nonordinary primes,” Joint Math Meetings 2017
- “Rank parity for congruent supersingular elliptic curves,” Conférence de Théorie des Nombres Québec-Maine, October 8, 2016
- “Pairs of Elliptic Curves with Large Galois Image,” Five College Number Theory Seminar, February 9, 2016.

Grants awarded

- 2019-2022 NSF Collaborative grant. DMS-1901866 *Upstate New York Number Theory Conference* (collaborative with Ravi Ramakrishna and Doug Haessig)

Professional Service

- Referee for Transactions of the AMS, Proceedings of the LMS, Annales mathématiques du Québec, the International Journal of Number Theory, and American Mathematical Monthly
- Author of Mathematical Reviews for MathSciNet
- Master’s thesis committee for Cédric Dion, *Fonction L p -adique d’une forme modulaire*, 2020. Université Laval
- Undergraduate poster judge at JMM 2021

Departmental Service

- Admissions co-liason (Fall 2018 - Spring 2020)
- Graduate school liason, Union College (Fall 2015 - Spring 2018)
- REU liason, Union College (Fall 2015 - Present)
- Departmental website co-editor (Winter 2019- Present)
- Co-organizer of the 2016 and 2019 Union College Math Conferences
- Co-organizer for Student Seminar, Union College (Winter-Spring 2017)

Union College Service

- Faculty Review Board, Center 2 non-tenured representative (Fall 2021 - present)
- Undergraduate Research Committee Division III Representative (Winter 2019 - Present)
- Writing Board Division III Representative (Winter 2019)

Honors and Awards

- Departmental Distinguished PhD Thesis Award, UMass Amherst, 2015
- Phi Beta Kappa Membership, Delta of New Jersey, 2009

References

Research

- Tom Weston, weston@math.umass.edu
- Rob Pollack, rpollack@math.bu.edu
- Ravi Ramakrishna, ravi@math.cornell.edu
- Antonio Lei, antonio.lei@mat.ulaval.ca

Teaching

- Bill Zwicker, zwickerw@union.edu
- Kathryn Lesh, leshk@union.edu