Tung T. Nguyen

CONTACT INFORMATION

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RESEARCH INTERESTS

Algebraic and computational number theory, non-commutative algebras and their applications to spectral graph theory, non-linear dynamics, and Galois modules.

EMPLOYMENT

Postdoctoral Associate in Mathematics, Western University 2021-

EDUCATION

Doctor of Philosophy in Mathematics, The University of Chicago December 2020

- Advisor: Professor Kazuya Kato
- Thesis: Special values of L-functions over global fields

Bachelor of Science in Mathematics, Vietnam National University 2009-2014

- Senior thesis advisor: Professor Ralph Greenberg
- Senior thesis: On the norm of the fundamental units in real quadratic number fields.

PUBLICATIONS

1. L. Muller, J. Minac, **Tung T. Nguyen**, *Algebraic approach to the Kuramoto model*. Physical Review E vol. 104, 2021.
2. **Tung T. Nguyen**, *Heights and Tamagawa numbers of motives*. Journal of Pure and Applied Algebra, 226(5), 2021.
3. Roberto Budzinski, **Tung T. Nguyen**, Gabriel B. Benigno, Jacqueline Doan, Jan Minac, Terrence J. Sejnowski, Lyle Muller, *A simple geometry unites synchrony, chimeras, and waves in nonlinear oscillator networks*. Chaos: An Interdisciplinary Journal of Nonlinear Science, 32(3), 031104, 2022.
4. Jacqueline Doan, Jan Minac, Lyle Muller, **Tung T. Nguyen**, Federico W. Pasini, *Join of circulant matrices*, Linear Algebra and its Applications, 650, pp.190-209, 2022.
5. Jan Minac, Duy Tan Nguyen, **Tung T. Nguyen**, *Fekete polynomials, quadratic residues, and arithmetic,* Journal of Number Theory, 242, pp.532-575, 2022.
6. Jan Minac, Duy Tan Nguyen, **Tung T. Nguyen**, *Further insights into the mysteries of the values of zeta functions at integers*, Mathematica Slovaca, 2022.
7. Roberto Budzinski, Jacqueline Doan, Jan Minac, Lyle Muller, **Tung T. Nguyen**, Federico Pasini, *Equilibria in Kuramoto oscillator networks: An algebraic approach*, SIAM Journal on Applied Dynamical Systems, 2022.
8. Lauren Heller, Ján Mináč, **Tung T. Nguyen**, Andrew Schultz, Duy Tan Nguyen, *Galois module structure of some elementary p-abelian extensions*, Israel Journal of Mathematics, 2023.
9. Roberto C. Budzinski, **Tung T. Nguyen**, Gabriel B. Benigno, Jacqueline Doan, Jan Minac, Terrence J. Sejnowski, and Lyle E. Muller, *Analytical prediction of specific spatiotemporal patterns in nonlinear oscillator networks with distance-dependent time delays*, Physical Review Research, 5(1), p.013159, 2023.

10. **Tung T. Nguyen**, Roberto C. Budzinski, Federico W. Pasini, Robin Delabays, Ján Mináč, and Lyle E. Muller, Broadcasting solutions on multilayer networks of phase oscillators, Chaos, Solitons & Fractals 168, 2023.

11. Sunil Chebolu, Jon Merzel, Jan Minac, Lyle Muller, Federico Pasini, **Tung T. Nguyen**, Duy Tan Nguyen, *On the joins of group rings*, Journal of Pure and Applied Algebra 227, no. 9, 107377, 2023.

12. Frank Chemotti, Jan Minac, **Tung T. Nguyen**, Andrew Schultz, John Swallow, Nguyen Duy Tan, *Quaternion algebras and square power classes over biquadratic extensions*, Israel Journal of Mathematics, 2023.

PREPRINTS

- Jan Minac, Duy Tan Nguyen, **Tung T. Nguyen**, *On the arithmetic of generalized Fekete polynomials*. Submitted, 2022. Available at https://arxiv.org/abs/2206.11778.
- Jacqueline Doan, Jan Minac, Lyle Muller, **Tung T. Nguyen**, Federico W. Pasini, Join of normal matrices with constant row sums (submitted). Available at https://arxiv.org/abs/2207.04181
- Korey Brownstein, **Tung T. Nguyen**, Utilization of a natural language processing-based approach to determine the composition of artifact residues (submitted). Github repository for this project https://github.com/tungprime/NLP_and_composition_of_artifact_residues
- Lyle Muller, Jan Minac, **Tung T. Nguyen**, Duy Tan Nguyen, On the Paley graph of a quadratic character (submitted), 2022. Available at https://arxiv.org/abs/2212.02005

TEACHING EXPERIENCES

University of Chicago

- 2020-2021: MATH 15200 (Advanced Calculus II, via Zoom).
- 2019-2020: MATH 15100-15200 (Advanced Calculus I, II).
- Summer 2019: Introduction to Mathematics via the Proofs-based method (CAAP summer program at UChicago).
- 2018-2019: MATH 15200-15300 (Advanced Calculus II, III).
- 2017-2018: MATH 13100-13200-13300 (Elementary functions and calculus I, II, III).
- 2016-2017: MATH 13100-13200-13300 (Elementary functions and calculus I, II, III).
- 2015-2016: College Fellow for IBL Honors Calculus.

Vietnam National University

- 2023: Introduction to computational number theory and Sagemath (invited course, summer 2023.)
- 2014: Introduction to Probability and Statistics, MATH 2103.
- 2013: Teaching Assistant for the course "Introduction to Galois theory', MATH 3103.

RESEARCH STUDENTS

- Co-supervised Lewis Glabush toward his senior thesis (with Prof. Jan Minac and Prof. Lyle Muller).
  - Topic: Special Families of Generalized Paley Graphs and the Riemann Hypothesis for Graphs.
- Co-supervised four students in the Fields Undergraduate Summer Research Program 2021 (with Prof. Jan Minac and Prof. Lyle Muller).
  - Students: Anna Krokhine, Chun Hei Lam, Ton Meesena, William I Jones.

- Project: Spectrum of almost complete digraphs.

- Mentored 3 projects for the Directed Reading Program at The University of Chicago.
  - Michael Cronin: Modular arithmetic (Spring 2016).
  - Benjamin Andrew: Elementary number theory (Fall 2017).
  - Xingyu Wang: p-adic numbers and applications (Spring 2018).

- Mentored 3 REU projects at UChicago (Summer 2016).
  - Hung Ho: Gaussian integers.
  - Christopher Wilson: A brief introduction to ZFC.
  - Mantas Mazeika: The singular value decomposition and low-rank approximation.

- Co-supervised the Ph.D. student Priya B. Chain toward her thesis (with Prof. Jan Minac and Prof. Lyle Muller).
  - Project: Broadcasting solutions on multiplex systems of oscillator networks.

PEDAGOGY DEVELOPMENT AND COURSEWORK

Course Design and College Teaching (CCTE 50000). The main goals of this course are.

- Design an inclusive and well-conceived course based on meaningful learning objectives and constructed with teaching methods and assessments aligned with those objectives.
- Articulate a meaningful student-centered approach to teaching.

PROFESSIONAL SERVICES

- Organized a virtual math conference to celebrate the 85th birthday of Professor Moshe Rosenfeld, March 2023.
- Co-organized and served as a lecturer for the Western-Fields School in Networks and Neuroscience, September 2022.
- Co-organized the PolyMath REU program with Dr. Thang Pham, Dr. Tuan Tran, and Dr. Tu Nguyen, Since August 2022.
- Co-organized the Algebra Seminar at Western University with Prof. Jan Minac, 2021.
- Proctored for the Canadian Open Mathematics Challenge, 2021.
- Co-organized the following learning groups at UChicago: etale cohomology, scheme theory, and p-adic Hodge theory (2014-2020).

REFEREE SERVICES

- Revista Matematica Iberoamericana.
- Tatra Mountains Mathematical Publications.
- AMS Mathematical Reviews.

RESEARCH PRESENTATIONS

1. Virtual Brazilian Number Theory Seminar, June 2023 (upcoming).
2. International Workshop on Matrix Analysis and Its Applications, Quynhon, July 2023 (upcoming).
3. Pan Asian Number Theory conference, Harbin China, August 2023 (upcoming).
4. Research Seminar, University of Arkansas at Little Rock, March 2023.
5. Special Session Rethinking Number Theory, AMS Joint Meeting, Boston, January 2023.
6. Korea-Taiwan-Vietnam joint seminar in Combinatorics and Analysis, November 2022.
7. 2nd International workshop on matrix analysis and applications, October 2022.
8. Fields Number Theory Seminar, Fields Institute, October 2022.
9. 34th Midwestern Conference on Combinatorics and Combinatorial Computing, Illinois State University, October 2022.
10. Algebra Seminar, Illinois State University, September 2022.
11. Connecticut Number Theory 2022 Conference, June 2022.
12. Zassenhaus Groups and Friends Conference, Binghamton University, May 2022.
13. 2022 Southern Regional Number Theory Conference, Louisiana State University, March 2022.
14. New Developments in Number Theory, February 2022.
15. UIC Number Theory Seminar, February 2022.
16. Northwestern Number Theory Seminar, December 2021.
17. The Algebra and Number Theory Seminar, Texas Tech University, November 2021.
18. Algebra Seminar, Binghamton University, November 2021.
19. AMS Fall Western Sectional Meeting, October 2021.
20. Undergraduate colloquium, Illinois State University, October 2021.
21. First SIBAU-NU Workshop on Matrix Analysis and Linear Algebra, October 2021.
22. Mathematics and Statistics Colloquium, Loyola University, October 2021.
23. Invited talk at Williams SMALL REU 2021. I also had an open discussion about my experiences in mathematics and shared some personal advice for undergraduate students.
24. Young Researchers in Algebraic Number Theory, University of Bristol, August 2021.
25. Hanoi, Chicago, Boston and Western: A panoramic view of absolute Galois groups (joint talk with Jan Minac), joint seminar between
    - Mini-workshop on Algebra and homogeneous spaces
    - Online seminar on quadratic forms, linear algebraic groups, and beyond
26. Fekete polynomials, quadratic residues, and arithmetic, GTA Philadelphia 2021, Temple University, May 2021.
27. Heights and Tamagawa numbers of motives, Algebra Seminar, Western University, February 2021.
28. Hurwitz zeta functions, What is ... a seminar? February 2021.

29. Special values of the Riemann zeta function at negative integers, The Trojan Math Seminar, Troy University, December 2020.
30. Heights and Tamagawa numbers of motives, HUJI-BGU Number Theory Seminar, December 2020.
31. Heights and Tamagawa numbers of mixed motives, Interactions between Representation Theory and Algebraic Geometry, Chicago 2017 (poster session).

AWARDS AND SCHOLARSHIPS

- PI4-IMA fellowship, 2020, UIUC.
- AMS Graduate Travel Grant to Joint Mathematics Meetings 2020.
- National Program for the Development of Mathematics scholarship, 2014.
- Honda Young Engineers and Scientists award for top 10 Vietnamese students in STEM fields, 2013.

COMPUTER SKILLS

• Python • Machine learning • Probabilistic programming with PyMC3 • Matlab • Sagemath