Nathan McNew

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Employment

Towson University

Associate Professor	2021-Present
Assistant Professor	2015-2021
Fisher Endowed Chair in Mathematics	December 2016-June 2019

Education

Dartmouth College   Fall 2010 - Spring 2015

Ph.D. Mathematics, Advisor: Carl Pomerance   June 2015
Thesis: Multiplicative problems in combinatorial number theory

A.M. Mathematics   June 2012

University of Denver   Fall 2006 - Spring 2010

B.S. Mathematics and Physics, Summa Cum Laude, Phi Beta Kappa   June 2010

Publications

27. **Explicit bounds for large gaps between cubefree integers**

     With A. Kumchev, W. McCormick, A. Park, R. Scherr and S. Ziehr. *Combinatorial and Additive Number Theory VI* (Proceedings of CANT: May 2022 and 2023), Springer Proceedings in Mathematics & Statistics, **464** (2025) 259–282. https://doi.org/10.1007/978-3-031-65064-2_14

26. **Short interval results for powerfree polynomials over finite fields**

     With A. Kumchev, and A. Park. *International Journal of Number Theory.* **20** (2024) 867–892. https://doi.org/10.1142/S1793042124500453

25. **Links and the Diaconis Graham inequality**

     With C. Cornwell. *Combinatorica.* **44** (2024) 1149–1167.
     https://doi.org/10.1007/s00493-024-00107-1

24. **The distribution of intermediate prime factors**

     With P. Pollack, A. Singha Roy. *Illinois J. Math.* **68 (3)** (2024) 537 –576. http://dx.doi.org/10.1215/00192082-11417186

23. **Intermediate prime factors in specified subsets**

     With P. Pollack, A. Singha Roy. *Monatshefte für Mathematik.* **202** (2023), 837–855. https://doi.org/10.1007/s00605-023-01855-w

22. **Explicit bounds for large gaps between squarefree integers**

     With A. Kumchev, W. McCormick, A. Park, R. Scherr and S. Ziehr. *Journal of Number Theory.* **254** (2024), 336–357. https://doi.org/10.1016/j.jnt.2023.07.003

21. **Permutations and the divisor graph of** $[1, n]$

     Mathematika. **69 (1)** (2023), 51–67. https://doi.org/10.1112/mtk.12177

20. **Note on sets without geometric progressions**

     With X. Cao, J. Fang. *Integers.* **22** (2022), #A45. http://math.colgate.edu/~integers/w45/w45.pdf

19. **Unknotted Cycles**

     With C. Cornwell. *The Electronic Journal of Combinatorics.* **29 (3)** (2022), #P3.509 https://doi.org/10.37236/11016

18. **On the Erdős primitive set conjecture in function fields**
    With A. Gomez-Colunga, C. Kavaler and M. Zhu. *Journal of Number Theory.* **219** (2021), 412–444. https://doi.org/10.1016/j.jnt.2020.09.001

17. **On the size of primitive sets in function fields**
    With A. Gomez-Colunga, C. Kavaler and M. Zhu. *Finite Fields and their Applications.* **64** (2020), 101658. https://doi.org/10.1016/j.ffa.2020.101658

16. **Counting pattern-avoiding integer partitions**
    With J. Bloom. *The Ramanujan Journal.* **55** (2021) 555–591.
    https://doi.org/10.1007/s11139-020-00287-6

15. **Counting primitive sets and other statistics of the divisor graph of $\{1, 2, \ldots n\}$**
    The European Journal of Combinatorics. **92** (2021) 103237.
    https://doi.org/10.1016/j.ejc.2020.103237

14. **Primitive and geometric-progression-free sets without large gaps**
    Acta Arithmetica. **192** (2020), 95–104. https://doi.org/10.4064/aa180921-4-2

13. **Avoiding 3-Term Geometric Progressions in Hurwitz Quaternions**
    With M. Asada, B. Fang, E. Fourakis, S. Manski, S. J. Miller, G. Moreland, A. Yamin and S. Zhang, *Journal of Integer Sequences.* **27** (2024) 24.7.7.

12. **When sets can and cannot have MSTD subsets**
    With H. Chu, S. J. Miller, V. Xu and S. Zhang, *Journal of Integer Sequences.* **21** (2018) 18.8.2.

11. **The convex hull of the prime number graph**
    In *Irregularities in the Distribution of Prime Numbers* Pintz J., Rassias M. (eds) Springer, Cham. 2018, pp. 125–141.

10. **Random multiplicative walks on the residues modulo n**
    Mathematika. **63** (2017), 602–621.

9. **Ramsey theory over the integers: avoiding generalized progressions**
   With A. Best, K. Huan, S. J. Miller, J. Powell, K. Tor and M. Weinstein. In *Combinatorial and Additive Number Theory II. CANT 2015, 2016.* Nathanson, M. (eds) Springer Proceedings in Mathematics & Statistics. **220**. Springer, New York, NY, 2017, pp. 39–52.

8. **Numbers divisible by a large shifted prime and large torsion subgroups of CM elliptic curves**
   With P. Pollack and C. Pomerance. *International Math Research Notices.* **18** (2017), 5525–5553.

7. **The most frequent values of the largest prime divisor function**
   Experimental Mathematics. **26** (2017), 210–224.

6. **Subsets of $\mathbb{F}_q[x]$ free of 3-term geometric progressions**
   With M. Asada, E. Fourakis, S. Manski, S. J. Miller and G. Moreland. *Finite Fields and Their Applications.* **44** (2017), 135–147.

5. **Geometric-progression-free sets over quadratic number fields**
   With A. Best, K. Huan, S. J. Miller, J. Powell, K. Tor and M. Weinstein. *Proceedings of the Royal Society of Edinburgh Section A.* **147** (2017), 245–262.

4. **Infinitude of k-Lehmer numbers that are not Carmichael**
   With T. Wright. *International Journal of Number Theory.* **12** (2016), 1863–1869.

3. **On sets of integers which contain no three terms in geometric progression**
   Mathematics of Computation. **84** (2015), 2893–2910.

2. **Efficient realization of nonzero spectra by polynomial matrices**
   With N. Ormes. *Involve, A Journal of Mathematics.* **8** (2015), 1–24.

1. **Radically weakening the Carmichael and Lehmer conditions**
   International Journal of Number Theory. **9** (2013), 1215–1224.

Awards and Honors and Grants

FCSM Mentoring Award	Fall 2024
REU Grant for Towson University Math REU CO-PI, $100,000 Award, NSA	2020
REU Grant for Towson University Math REU Key Personnel, $300,000 Award, NSF	2022-2024
S-STEM Grant to support math majors at TU Key Personnel, $1,000,000 Award, NSF	2021-2024
Grant to adapt OpenStax for Calculus I PI, Maryland Open Source Textbook Initiative	Fall 2018
Grant for MASON II-IV Co-PI, NSF	2018-2020
Jess and Mildred Fisher Endowed Chair in the Mathematical and Computing Sciences Towson University	2016-2019
Grant for MASON I Number Theory Foundation	October 2016
Dartmouth Graduate Poster Session Winner	Spring 2015
Outstanding Graduate Student Teaching Award Dartmouth Center for the Advancement of Learning	April 2014

Teaching

Associate Professor, Towson University

MATH 273: Calculus I	Fall 2021, Spring 2024, Spring 2025
MATH 314: Cryptography Fall 2021, Spring 2022 ($\times 2$), Fall 2023 ($\times 2$), Spring 2024, Fall '24	
MATH 378: Experimental Mathematics	Fall 2024
MATH 475: Complex Analysis	Spring 2025
MATH 491: Readings in Mathematics	Spring 2025
IDNM 400: Exploration of Careers in Mathematics	Fall 2021
IDNM 200: Exploration of Careers in Mathematics	Fall 2023
ORIE 101: Student support for Calculus I	Fall 2021
COSC 495: Independent Study (Quantum Computing)	Spring 2022

Assistant Professor, Towson University

Math 273: Calculus I	Fall 2015, Fall 2016, Fall 2018, Fall 2020
Math 275: Calculus III	Spring 2016 ($\times 2$)
Math 314: Cryptography Fall 2016, Spring 2017, Fall 2017, Spring 2018 ($\times 2$), Fall 2018 Spring 2019, Fall 2019 ($\times 2$), Spring 2020 ($\times 2$), Spring 2021 ($\times 2$)	
Math 315: Applied Combinatorics	Fall 2017
Math 374: Differential Equations	Spring 2020
Math 378: Experimental Mathematics	Fall 2020
Math 451: Graph Theory	Spring 2018
Math 467: Algebraic Structures	Fall 2015
Math 490: Senior Seminar	Spring 2017
Math 465/565: Theory of Numbers	Spring 2019, Fall 2019, Spring 2021

Instructor, Dartmouth College

Math 10: Introduction to Statistics	Spring 2013
Math 20: Discrete Probability	Fall 2013

Co-Instructor, Dartmouth College

Math 25: Elementary Number Theory	Fall 2014

Teaching Assistant, Dartmouth College

Math 8: Calculus of Functions of One and Several Variables	Fall 2010
Math 13: Calculus of Vector Valued Functions	Fall 2011
Math 23: Differential Equations	Winter 2011, Spring 2012

Professional Activities

Visiting Scholar, University of Georgia   Fall 2022

Park City Math Institute   Summer 2022
Participant in the Undergraduate Faculty Program, a 3-week long lecture and problem series. Topic: Fourier Analysis on Polytopes.

Towson REU   Summer 2022
Co-mentoreed, with Angel Kumchev, a group of 4 undergraduate students investigating gaps between squarefree integers and polynomials, with three papers in preparation.

TU REP CURE Course professional development 3rd cohort   Spring-Fall 2020
Faculty development program to discuss the design and implementation of Course-based Undergraduate Research Experience courses at TU with an emphasis on inclusive teaching practices.

SUMRY - Summer Undergraduate Math Research at Yale   Summer 2019
Led group of undergraduate researchers in combinatorial number theory, resulting in two publications.

MASON II Conference   April 2018
Co-organized (with Angel Kumchev) the second in the MASON series of number theory conferences.

Regional Undergraduate Math Conference
Co-organize (with Alexei Kolesnikov, Sergei Borodachov and others) an annual regional undergraduate math conference hosted at Towson for undergraduate students to present research, hear about opportunities for graduate school and network with students from nearby universities.

MASON Conference   October 2016
Co-organized (with Angel Kumchev) the first in a new series of regional number theory conferences (the Mid-Atlantic Seminar On Numbers) for the Mid-Atlantic region.

Project NExT   August 2016-August 2017
MAA program for new faculty to explore innovative new teaching techniques and transition from graduate school into a teaching position.

MSRI Summer School: Gaps Between Primes   July 2015
A two week program with lectures and problem sessions on recent progress on gaps between primes.

Arizona winter school: Arithmetic Statistics   March 2014
Workshop with lectures and problem sessions on topics in Arithmetic Statistics. I participated in the problem group for Melanie Matchett Wood's section on asymptotics for number fields and class groups.

Warwick University summer school: number theory for cryptography   June 2013
Course for PhD students in number theory and related fields on cryptology. Topics included high-speed cryptography, complex multiplication of elliptic curves, discrete logarithms and integer factorization.

Dartmouth Mathematics Teaching Seminar   Summer 2012
An intensive course taken by graduate students who have advanced to PhD candidacy. Involves discussion of educational philosophies, classroom techniques, and course design. Culminates in the design and instruction of two week long math camps for middle and high school students.

Banff International Research Center: Diophantine equations   June 2012
A workshop on contemporary techniques in Diophantine equations including the modular approach, the Brauer-Manin obstruction, Chabauty methods, and linear forms in logarithms.

Service

MASON MidAtlantic Seminar On Numbers
Local Co-Organizer (Towson University)	Fall 2016
Local Co-Organizer (Towson University)	Spring 2018
Co-Organizer (James Madison University)	Spring 2019
Co-Organizer (Gettysburg College)	Spring 2020
Co-Organizer (Online)	Spring 2021
Local Co-Organizer (Towson University)	Spring 2025
Local Co-Organizer (UMD)	Spring 2023

Regional Undergraduate Mathematics Conference, Co-organizer   2017, 2018, Spring 2019,
Fall 2019, Spring 2021, 2022, 2023, 2024, Fall 2024

Baltimore Combinatorics and Number Theory Seminar Co-organizer   Fall 2015-Present

Departmental Honors Coordinator Towson U.   2019-Present

Pure and Applied Mathematics Working Group Towson U.
Chair	Fall 2023-Present

Graduate Committee-Applied and Industrial Math Program Towson U.   2016-2022

Curriculum Committee Towson University Math Department
Assistant Chair	Fall 2019-Spring 2020

Pure Math Committee Towson University Math Department   2015-Present
Chair	Spring 2018

Honors Program Coordinator Towson University Math Department   2019-Present

Department Representative to MAA Towson University Math Department   2016-2023

Colloquium Committee Towson University Math Department   2015-2018, 2021-2022
Chair	2017-2018

Math Club Faculty Sponsor Towson University Math Department   2015-2019, Spring 2025

Problem Solving Team Coach Towson University Math Department   2015-Present

Dartmouth Number Theory Seminar Organizer   Fall 2011-Spring 2013

Dartmouth Graduate Student Council Math Department Representative   Fall 2013-Summer 2014

Referee: 2014-Present

Journal of Integer Sequences, Journal of Number Theory, Information Security Journal, Mathematics Magazine, Mathematics of Computation, Experimental Mathematics, Integers, Mathematics, Symmetry, IEEE Access, Electronic Journal of Combinatorics, Involve, Israel Journal of Mathematics, Mathematika, MAA Monthly, Research in Number Theory

Reviewer: Mathematical Reviews   2015-Present

Educational Outreach

SUMRY (Summer Undergraduate Research at Yale) Project Mentor   Summer 2019
Mentored three students through a research project regarding primitive sets of polynomials for a 10 week summer program.

Regional Undergraduate Math Research Conference   April 2017, April 2018, April 2019
November 2019, May 2021, April 2022, April 2023, April 2024, November 2024
Co-organized conference for undergraduates in mathematics to present their research and learn about opportunities in graduate school or industry after graduation.

Williams College REU Graduate Mentor   Summer 2014, 2015
Worked with undergraduates at the Williams College REU on research in combinatorial number theory.

Putnam Supervisor at Dartmouth College and Towson University   2013-Present
Helped students to prepare for the Putnam competition, and proctored the exam.

Extreme Academics, University of Denver   Nov '11, Mar '13, Feb '14, Apr '15, Mar '16, Apr '17
Invited to participate in a panel discussion about applying to and doing research in grad school.

Young Mathematicians Conference, Ohio State University   August 2014
Mentor to students and served on a panel discussion about applying to graduate school.

Dartmouth College Science Day   April 2014
Showed visiting elementary school students about the mathematics of hexaflexagons.

Johns Hopkins Center for Talented Youth   May 2011
Designed and led three workshops for middle and high school students. Topic: Cryptography

Vermont Southeast Regional MATHCOUNTS Volunteer   February 2011
Gave a talk to middle school students about math research, helped proctor and grade competition.

MATHCOUNTS Coach: Jefferson Academy Middle School, Broomfield CO   2006-2010
Led weekly problem sessions with the team, discussed problem solving strategies and concepts.

Selected Presentations

A tale of two densities: covering numbers and abundant numbers
INTEGERS Conference, University of Georgia (Plenary)   May 2025
Combinatorial and Additive Number Theory, CUNY   May 2025

From circle time to prime time
JMM - TPSE Session Models for Inclusive Student Experiences, Seattle WA   January 2025

Knots and the Diaconis Graham Inequality for Permutations
AMS Sectional Meeting, Howard University, Washington DC   April 2024

Short Interval Results For Powerfree Polynomials Over Finite Fields
JMM, San Francisco CA   January 2024
Canadian Number Theory Association Meeting, U. of Toronto   June 2024

The distribution of intermediate prime factors
INTEGERS, Athens GA   May 2023
Combinatorial and Additive Number Theory, CUNY   May 2023

Permutations and the divisor graph of $[1, n]$
Number Theory Seminar, University of Georgia   October 2022
JMM Special Session- Number Theory at non-PhD institutions, Boston MA   January 2023
Colloquium, Loyola University Baltimore   March 2023

Number Theory Seminar, Dartmouth College   May 2023

Primitive sets in function fields
Combinatorial and Additive Number Theory (CUNY/Online)   June 2020

Counting pattern-avoiding integer partitions
PAlmetto Number Theory Series, Clemson University   December 2019
Mid Atlantic Seminar On Numbers, Gettysburg College   March 2020

Two combinatorial problems regarding primitive sets of integers
Combinatorics Seminar, George Washington University   April 2019

Counting primitive sets and other statistics of the divisor graph of $\{1, 2, \ldots n\}$
Combinatorial and Additive Number Theory, CUNY   May 2018
INTEGERS, Augusta GA   October 2018

Unknotted Cycles
Permutation Patterns, Dartmouth College   July 2018

Primitive and geometric-progression-free sets without large gaps
Colloquium, University of Denver   April 2017
Combinatorial and Additive Number Theory, CUNY   May 2017
Canadian Number Theory Association Meeting XV, Laval University   July 2018
MASON, James Madison University   February 2019
Colloquium, Yale University   July 2019

Random multiplicative walks on the integers modulo n
Canadian Number Theory Association Meeting XIV, U. of Calgary   June 2016
INTEGERS, U. of West Georgia   October 2016
JMM Special Session on Analytic Number Theory, Atlanta GA   January 2017

Numbers divisible by a large shifted prime
SouthEast Regional Meeting On Numbers, James Madison University   April 2016
Combinatorial and Additive Number Theory, CUNY   May 2016

The convex hull of the prime number graph
Combinatorial and Additive Number Theory, CUNY   May 2015
Elementary, analytic, and algorithmic number theory, U. of Georgia   June 2015
Illinois Number Theory Conference, UIUC   August 2015

Popular values of the largest prime divisor function
Combinatorial and Additive Number Theory, CUNY   May 2014
Canadian Number Theory Association Meeting XIII, Carleton College   June 2014
Quebec/Maine Number Theory Conference, Université Laval   September 2014
Department Colloquium, University of Maine   October 2014
Joint Mathematics Meetings, Austin TX   January 2015
Southeastern AMS Sectional Meeting, Huntsville, AL   April 2015
Penn State Number Theory Seminar, Penn State University   April 2016

Unconventional Results in Multiplicative Combinatorial Number Theory
Invited Graduate Speaker, SERMON, Wofford College   April 2014

Using congruences to cover the integers
Graduate Student Seminar, Dartmouth College   February 2014

Things you can prove with a degree from DU, two results in number theory
Department Colloquium, University of Denver   February 2014

On sets of integers which contain no three terms in geometric progression

Maine/Quebec Number Theory Conference, University of Maine   October 2013
INTEGERS, University of West Georgia   October 2013
West Coast Number Theory, Pacific Grove, CA   December 2013
Joint Math Meetings, Baltimore, MD   January 2014
Exciting New Faces in Analytic Number Theory,
    Hausdorff Center for Mathematics, Bonn Germany   June 2014
Department Colloquium, Williams College   July 2014

When does each prime dividing $\varphi(n)$ also divide $n - 1$?
Quebec/Maine Number Theory Conference, Université Laval   October 2012
Canadian Mathematics Society Winter Meeting, Montreal   December 2012

Probabilistic Galois Theory
Graduate Student Seminar, Dartmouth College   October 2011

Efficient realization of nonzero spectra by polynomial matrices
Graduate Student Seminar, Dartmouth College   October 2010
Departmental Colloquium, University of Denver   May 2010