Caleb M. Shor

Curriculum vitæ

Department of Mathematics
Western New England University
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Employment

2008–present **Professor (2019–present), Associate Professor (2012–2019), Assistant Professor (2008–2012)**,
Western New England University, *Department of Mathematics*, Springfield, MA.
Taught in the undergraduate and MAMT (Master of Arts in Mathematics for Teachers) programs.

2012–2015, 2017–present (summers) **Director**, *PROMYS for Teachers*, *Boston University*, Boston, MA.
PROMYS for Teachers is part of the PROMYS (Program in Mathematics for Young Scientists) summer program at Boston University.

2005–2008 **Visiting Assistant Professor**, *Bates College*, *Department of Mathematics*, Lewiston, ME.
Taught in the undergraduate program.

Education

2005 **Ph.D. in Mathematics**, *Boston University*, Boston, MA.
Dissertation: On towers of function fields and the construction of the corresponding Goppa codes, advised by Dr. Emma Previato. Fields of study: algebraic geometry, coding theory.

2000 **B.S. in Mathematics**, *Bates College*, Lewiston, ME, summa cum laude.
Honors thesis: *Elliptic curves and their applications to cryptography*, advised by Dr. John Rhodes.
Secondary concentration in computer science.

1999 **Budapest Semesters in Mathematics**, *Technical University of Budapest (via St. Olaf College), spring semester*, Budapest, Hungary.

Research Interests

Numerical semigroups, algebraic geometry, number theory, coding theory

Teaching Interests

WeBWorK, developing courses using free course materials and open education resources

Publications

In press

16. (with J. H. Sim) "Equidistribution Conditions for Gaps of Geometric Numerical Semigroups," *Journal of Number Theory*.

Published

15. (with N. Dent) "On residues of rounded shifted fractions with a common numerator," *Journal of Integer Sequences*, vol. 27, 2024, Article 24.2.5.

14. "Reflective numerical semigroups," *Albanian Journal of Mathematics*, vol. 17, no. 1, 2023, pp. 41-68.

13. "Equidistribution of numerical semigroup gaps modulo m," *Discrete Mathematics*, vol. 345, no. 10, 2022.
12. "On free numerical semigroups and the construction of minimal telescopic sequences," *Journal of Integer Sequences*, vol. 22, 2019, Article 19.2.4.
11. (with T. A. Gassert) "Characterizations of numerical semigroup complements via Apéry sets," *Semigroup Forum*, vol. 98, no. 1, 2019, pp. 31–47.
10. "Higher-order Weierstrass weights of branch points on superelliptic curves." In *Higher genus curves in mathematical physics and arithmetic geometry*, vol. 703 of *Contemporary Mathematics*, 2018, pp. 143–156.
9. (with T. A. Gassert) "On Sylvester sums of compound sequence semigroup complements," *Journal of Number Theory*, vol. 180, 2017, pp. 45–72.
8. (with T. Shaska) "2-Weierstrass points of genus 3 hyperelliptic curves with extra involutions," *Communications in Algebra*, vol. 45, no. 5, 2017, pp. 1879–1892.
7. (with T. Shaska) "Theta functions and symmetric weight enumerators for codes over imaginary quadratic fields," *Designs, Codes and Cryptography*, vol. 76, issue 2, 2015, pp. 217–235.
6. (with T. Shaska) "Weierstrass points of superelliptic curves," *Advances on superelliptic curves and their applications*, NATO Sci. Peace Secur. Ser. D Inf. Commun. Secur., vol. 41, IOS, Amsterdam, 2015, pp. 15–46.
5. (with L. Beshaj, T. Shaska) "On Jacobians of curves with superelliptic components," In *Riemann surfaces and Klein surfaces, automorphisms, symmetries and moduli spaces*, vol. 629 of *Contemporary Mathematics*, 2014, pp. 1–14.
4. "Genus calculations for towers of function fields arising from equations of C_{ab} curves," *Albanian Journal of Mathematics*, vol. 5, no. 1, 2011, pp. 31–40.
3. (with T. Shaska, S. Wijesiri) "Codes over rings of size p^2 and lattices over imaginary quadratic fields," *Finite Fields and Their Applications*, no. 2, 2010, pp. 75–87.
2. "On the construction of codes from an asymptotically good tower over $\mathbb{F}_8$," *Serdica J. Computing*, no. 2, 2007, pp. 171–184.
1. (with T. Shaska) "Codes over $\mathbb{F}_{p^2}$ and $\mathbb{F}_p \times \mathbb{F}_p$, lattices, and theta functions," *Advances in Coding Theory and Cryptography*, vol. 3, 2007, pp. 70–80.

Submitted

- "Parity distributions among gaps of free numerical semigroups," submitted for publication, October 2025.

Service

Western New England University

2022-24	Co-PI, Grant from the Davis Educational Foundation: *Overcoming Math & Quantitative Reasoning Barriers*
2021–2023	Member, Nominations & Rules Committee, College of Arts & Sciences
2018–present	WeBWorK administrator for Math Department
2012–2018	Faculty advisor, Ultimate Frisbee Club
various	Member, Peer Review Committee, College of Arts & Sciences, 2015/16, 2017/18, 2018/19
2015/16	Secretary, Arts & Sciences Executive Board
2015, 2019	Member, Committee on Scholarship / Faculty Grants Committee

2010–2016 Faculty advisor, Undergraduate Problem Solving / Putnam Group

2016 Member, Arts & Sciences Research and Service Award Committee

various Member, Math Department Search Committees. 2010/11, 2013/14 (2), 2019, 2023

2010–14 Member, WNE Admissions and Retention Committee

2009/10 Member, Diversity Taskforce

Bates College

2005–2008 Faculty advisor, Bates College Math Council

2005–2008 Faculty advisor, Bates College Putnam Exam Team

2007/08 Member, Bates College Athletics Committee

2005–2008 Faculty liaison for the Bates rowing team, a role designed for faculty members to bridge the gap between academics and athletics

Capstone mathematics project advising

WNE Taryn Padilla '23, titled "The Bernoulli numbers and sums of powers"

WNE Michelle Normand '21, titled "Detecting when the gaps of an arithmetic numerical semigroup are evenly distributed modulo m"

WNE Michael Urbanski '19, titled "Algebraic geometry and applications to coding theory"

WNE William Nevins '17, titled "Using number theory to produce nice problems"

WNE Luis Robles '17, titled "Lattice geometry and sums of squares with other applications"

WNE Kelsey Hawkins '15, titled "From coding to coloring"

WNE Stephen Farnham '14, titled "An investigation of a bound on the rank of elliptic curves"

WNE Michael Fielding '13, titled "Geometric constructions, origami, and Galois theory"

WNE Christopher Frei '12, titled "Elliptic curves and their applications"

Bates Abigail Dalton '07, titled "An Exploration of Elliptic Curve Cryptography" (with honors)

Referee/Review work

Referee: Mathematics Magazine, Semigroup Forum; Albanian Journal of Mathematics

Reviewer: Mathematical Reviews Database; zbMATH

Organizing

2022-present Organizer and facilitator, PROMYS for Teachers academic year workshops

2014 Principal organizer (with co-organizers L. Beshaj, A. Malmendier), Special Session on Arithmetic of Algebraic Curves, AMS Southeastern Spring Sectional Meeting, University of Tennessee, Knoxville, TN, March 2014

2012 Program creator, Hudson River Undergraduate Mathematics Conference (HRUMC), Western New England University, April 2012

2010–2013, 2023 Principal organizer, Math Department Faculty Seminar, Western New England University

2007/08 Co-organizer (with P. Wong), Colby-Bates-Bowdoin Colloquium Series in Algebra and Topology

2007 Session Co-organizer (with W. D. Joyner, T. Shaska), Special Session in Coding Theory, Applications of Computer Algebra 2007, Oakland University, Michigan

Research Presentations

- "Investigating symmetries among the gaps of numerical semigroups," Hudson River Undergraduate Mathematics Conference (HRUMC), Union College, April 2025.
- "Rounding sequences and counting by congruence classes," PROMYS India 2024, Indian Institute of Science (IISc), Bangalore, India, May 2024.
- "Residues of rounded fractions and lattice points in conic sections,"
  - Northeast Section of the MAA, Fall Section Meeting, Boston College, November 2023.
  - Hudson River Undergraduate Mathematics Conference (HRUMC), Mt. Holyoke College, April 2023.
  - Joint Mathematics Meetings, Boston, MA, January 2023.
- "Connections between residues of rounded fractions and lattice points in conic sections," Five College Number Theory Seminar, Amherst College, September, 2022.
- "On free numerical semigroups and their corresponding algebraic curves," Special Session on Arithmetic Geometry, Hawaii Number Theory 2019 (HINT 2019), University of Hawai'i at Mãnoa, March 2019.
- "Numerical semigroups with evenly distributed gaps," Special Session on Algebraic Curves and Their Applications, AMS Central Section Spring Meeting, Ohio State University, Columbus, OH, March 2018.
- "Characterizing gaps of numerical semigroups," University of New Haven Mathematics and Physics Seminar Series, November 2017.
- "A characterization of the complement of a free numerical semigroup," Maine/Québec Number Theory Conference, University of Maine, Orono, October 2017.
- "Characterization of free numerical semigroups," Math Department Colloquium, University of Hawai'i at Mãnoa, April 2017.
- "Higher-order Weierstrass points on certain hyperelliptic curves, superelliptic curves, and associated towers," AMS session on Minimal Integral Models of Algebraic Curves, Joint Mathematics Meetings, Atlanta, GA, January 2017.
- "Compound sequences, numerical semigroups, and power sums," Number Theory Session, Union College Mathematics Conference, December 2016.
- "Ordinary and higher-order Weierstrass points on superelliptic curves," Special Session on Arithmetic of Hyperelliptic Curves, AMS Central Section Spring Meeting, Michigan State University, East Lansing, MI, March 2015.
- "Ordinary and higher-order Weierstrass points on cyclic covers of the projective line," University of Colorado Boulder Number Theory Seminar, November 2014.
- "On the q-Weierstrass weights of branch points of superelliptic curves," Special Session on Arithmetic Geometry, Applications of Computer Algebra 2014, Fordham University, July 2014.
- "On q-Weierstrass points of hyperelliptic curves with extra automorphisms," Special Session on Arithmetic of Algebraic Curves, AMS Southeastern Spring Sectional Meeting, University of Tennessee, Knoxville, TN, March 2014.
- "On 2-Weierstrass points of genus 3 hyperelliptic curves with extra automorphisms," AMS Session on Algebraic Geometry, Joint Mathematics Meetings, Baltimore, MD, January 2014.
- "Codes over rings of square cardinality, lattices, theta functions, and specific examples," Special Session on Computational Algebraic Geometry and Applications, AMS Southeastern Spring Section Meeting, University of South Florida, March 2012.

- "On towers of function fields and constructions of corresponding error-correcting codes," Five College Number Theory Seminar, Amherst College, October 2009.
- "Codes over certain rings with square cardinality, lattices, and theta functions," Maine/Québec Number Theory Conference, University of Maine, Orono, October 2009.
- "Codes over $\mathbb{F}_{p2}$ and $\mathbb{F}_p \times \mathbb{F}_p$, lattices, and theta functions," Special Session on Number Theory, AMS Spring 2009 Eastern Section Meeting, Worcester Polytechnic Institute, April 2009.
- "Quantum algebraic geometry codes from algebraic curves with automorphisms," New Challenges in Digital Communications, NATO Advanced Study Institute, Vlora, Albania, May 2008.
- "Error-correcting codes, lattices, and theta functions," Colby-Bates-Bowdoin (CBB) Math Seminar, Bowdoin College, November 2007.
- "Codes over $\mathbb{F}_{p2}$ and $\mathbb{F}_p \times \mathbb{F}_p$, lattices, and theta functions," Applications of Computer Algebra 2007, Oakland University, July 2007.
- "Genus calculations for towers of function fields arising from equations of C_{ab} curves," Session on Computational Algebraic and Analytic Geometry for Low-Dimensional Varieties, Joint Mathematics Meetings, New Orleans, LA, January 2007.
- "On the geometric construction of codes from an asymptotically good tower over GF(8)," 12th International Conference on Applications of Computer Algebra, Varna, Bulgaria, June 2006.
- "Genus calculations for towers of function fields arising from equations of C_{ab} curves," Conference on Computational Aspects of Algebraic Curves, University of Idaho, May 2005.

General audience talks

- "Number theory, Pythagorean and Eisenstein triples, and calculus problem design", Math Department Faculty Seminar, Western New England University, November 2019.
- "Mind the gaps! (An introduction to numerical semigroups)", Math Department Faculty Seminar, Western New England University, April 2018.
- "Sums of squares of non-McNugget numbers," Northeast Section of the MAA, Fall Section Meeting, Trinity College, November 2016.
- "An introduction to coding theory," Math Department Faculty Seminar, Western New England University, January 2016.
- "Function fields, Riemann-Roch spaces, and Weierstrass points," Northeast Section of the MAA, Fall Section Meeting, Wheaton College, November 2013.
- "An introduction to elliptic curves," / "What are elliptic curves?!"
  - Math Department Faculty Seminar, Western New England University, April 2013.
  - Math Department Faculty Seminar, Western New England University, April 2011.
  - Math Department Seminar, Bates College, May 2007.
- "How CD players deal with scratched discs,"
  - Math Department Faculty Seminar, Western New England University, October 2010.
  - Math Club, University of Connecticut, October 2008.
  - Math Lunch, Bowdoin College, April 2008.
- "Using algebraic geometry with error-correcting codes", Northeastern Section MAA Fall Meeting, Framingham State College, November 2007.
- "Error-correcting codes - theory and applications," MAA Masterclass, Boston University, April 2007.

- "Genus calculations - counting gaps with postage stamps," Math Department Seminar, Bates College, November, 2006.

Fellowships

2008 NSF Fellowship to attend the NATO Advanced Study Institute: "New Challenges in Digital Communications" in Vlora, Albania, April/May 2008

2000–2005 Presidential University Graduate Fellow, Boston University

Professional Memberships

American Mathematical Society

Mathematical Association of America

Website profiles (clickable)

arXiv

Google Scholar

ORCID

ResearchGate

MathSciNet

Mathematics Genealogy Project

Faculty profile at WNE

cshor.org (personal webpage)

Mailing address

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References

Available upon request.

CV Information

The electronic version of this CV contains clickable hyperlinks (in blue).

CV current as of November, 2025.