# GRETCHEN L. MATTHEWS

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## RESEARCH INTERESTS

Applied algebra, specifically applications of algebraic geometry to coding theory

## EDUCATION

Ph.D., Louisiana State University, 1999, Mathematics
B.S., Oklahoma State University, 1995, Mathematics

## PROFESSIONAL EXPERIENCE

Clemson University, 2012-, Professor of Mathematical Sciences
Clemson University, 2007-2012, Associate Professor of Mathematical Sciences
Clemson University, 2001-2007, Assistant Professor of Mathematical Sciences
University of Tennessee, 1999-2001, Postdoctoral position in Algebra

## PROFESSIONAL ACTIVITIES AND LEADERSHIP ROLES

Coordinator of Instruction, Department of Mathematical Sciences, 2018-
Manager, NSF-funded Research Training Group in Coding Theory, Cryptography, and Number Theory, 2017-2018
Coordinator, Algebra, Discrete Math, & Number Theory Division (15 faculty), 2005-2010, 2015-2017
MAA (Mathematical Association of America) Committee on the Participation of Women, 2017-2020
AWM (Association for Women in Mathematics) Michler Prize Selection Committee, 2016-2019
IEEE (Institute of Electrical and Electronics Engineers) Information Theory Society, Senior Member, 2011-
AWM Long-range Planning Committee, 2001-2004

## HONORS AND AWARDS

2011 Award for Faculty Excellence, Clemson University Board of Trustees
2010 Mathematical Sciences Faculty Teaching Award
2002 Award for Faculty Excellence, Clemson University Board of Trustees

## PUBLICATIONS

1. S. Anderson, A. Fox, A. Johnson, G. Joshi, F. Kazemi, G. L. Matthews, C. Mayer, and E. Soljanin, Erasure coding techniques for faster distributed computing and content download, under review
2. S. Anderson, A. Johnson, G. Joshi, G. L. Matthews, C. Mayer, and E. Soljanin, Coding to reduce delay in storage, under review

3. K. Haymaker, B. Malmskog, and G. L. Matthews, Locally repairable codes from fiber products of maximal curves, *Advances in Mathematics of Communication*, to appear.
4. S. Anderson, M. Aktas, A. Johnson, G. Joshi, S. Kadhe, G. L. Matthews, C. Mayer, and E. Soljanin, On the Service Capacity Region of Accessing Erasure Coded Content, *2017 55th Annual Allerton Conference on Communication, Control, and Computing* (invited paper), to appear.
5. A. Barg, K. Haymaker, E. W. Howe, G. L. Matthews, and A. Várilly-Alvarado, Locally repairable codes from low genus algebraic geometry codes, *IPAM Proceedings*, to appear.
6. N. Bannister, G. L. Matthews, and A. Simpson, Cracking Her Codes: Understanding Shared Technology Resources as Positioning Artifacts for Power and Status in CSCL Environments, *International Journal of Computer-Supported Collaborative Learning* **12** (2017), 1556-1607.
7. S. Gao, F. Knoll, F. Manganellio, and G. L. Matthews, Codes for distributed storage from 3-regular graphs, *Discrete Applied Mathematics* **229** (2017) no 10, 82-89.
8. G. L. Matthews, Distance colorings of hypercubes from $Z_2Z_4$-linear codes, *Discrete Applied Mathematics* **217** (2017), no. 2, 356–361.
9. S. Anderson and G. L. Matthews, Stopping sets of Hermitian codes, *IEEE Transactions on Information Theory* **62** (2016), no. 11, 6304 - 6314.
10. W. Kositwattanarerk and G. L. Matthews, Pseudocodewords of Parity-Check Codes Over Fields of Prime Cardinality, *IEEE Transactions on Information Theory* **60** (2014), no. 9, 5215 – 5227.
11. S. Anderson and G. L. Matthews, Exponents of polar codes using algebraic geometric code kernels, *Designs, Codes and Cryptography* **73** (2014), no. 2, 699-717.
12. G. L. Matthews and J. D. Peachey, Small bias sets from extended norm-trace codes, *Contemporary Mathematics* **579** (2012), 143-152.
13. W. Kositwattanarerk and G. L. Matthews, Lifting the fundamental cone and enumerating the pseudocodewords of a parity-check code, *IEEE Transactions on Information Theory* (Special issue on Facets of Coding Theory: From Algorithms to Networks) **57** (2011), no. 2, 898-909.
14. N. Drake and G. L. Matthews, Minimum distance decoding of general algebraic geometry codes via lists, *IEEE Transactions on Information Theory* **56** (2010), no. 9, 4335-4340.
15. G. L. Matthews and J. D. Peachey, Minimal generating sets of Weierstrass semigroups of certain m-tuples on the norm-trace function field, *Contemporary Mathematics* **518** (2010), 315-326.
16. N. Drake and G. L. Matthews, Parameter choices and a better bound on the list size in the Guruswami-Sudan algorithm for algebraic geometry codes, *Designs, Codes, and Cryptography* **54** (2010), no. 2, 181-187.
17. G. L. Matthews, On Weierstrass semigroups of some triples on norm-trace curves, *Lecture Notes in Computer Science* **5557** (2009),146-156.
18. G. L. Matthews, Viewing multipoint codes as subcodes of one-point codes, Grobner Bases, Coding, and Cryptography, RISC Book Series (Springer, 2009), 399-402.
19. G. L. Matthews, Frobenius numbers of generalized Fibonacci semigroups, *Combinatorial Number Theory,* 117-124, *de Gruyter, Berlin,* 2009.

20. R. C. Laskar, G. L. Matthews, B. Novick and J. Villalpando, On irreducible no-hole L(2,1) coloring of trees, *Networks* **53** (2009), no. 2, 206-211.
21. R. E. Jamison and G. L. Matthews, On the acyclic chromatic number of Hamming graphs, *Graphs and Combinatorics* **24** (2008), 349-360.
22. R. E. Jamison and G. L. Matthews, Acyclic colorings of products of cycles, *Bulletin of the Institute of Combinatorics and its Applications* 54 (2008), 59-76.
23. J. L. Kim and G. L. Matthews, Quantum error-correcting codes from algebraic curves, in *Advances in Algebraic Geometry Codes*, Series on Coding Theory and Cryptology (World Scientific, 2008), vol. 5; E. Martinez-Moro, C. Munuera, and D. Ruano, eds.; 419-444.
24. G. L. Matthews and R. S. Robinson, A variant of the Frobenius problem and generalized Suzuki semigroups, *Combinatorial Number Theory,* 363-369, *de Gruyter, Berlin,* 2007.
25. R. E. Jamison, G. L. Matthews, and J. Villalpando, Acyclic colorings of products of trees, *Information Processing Letters* **99** (2006), no. 1, 7-12.
26. H. Maharaj and G. L. Matthews, On the floor and the ceiling of a divisor, *Finite Fields and their Applications* **12** (2006), no. 1, 38-55.
27. M. A. Coleman, N. Drake, and G. L. Matthews, Codes from a quotient of the Hermitian curve attaining the designed distance, *Congressus Numerantium* **182** (2006), 161-170.
28. R. E. Jamison and G. L. Matthews, Distance k colorings of Hamming graphs, *Congressus Numerantium* **183** (2006), 193-202.
29. G. L. Matthews, Weierstrass semigroups and codes from a quotient of the Hermitian curve, *Designs, Codes and Cryptography* **37** (2005), no. 3, 473-492.
30. G. L. Matthews and T. W. Michel, One-point codes using places of higher degree, *IEEE Transactions on Information Theory* **51** (2005), no. 4, 1590-1593.
31. G. L. Matthews, On integers nonrepresentable by a generalized arithmetic progression, *Topics in Combinatorial Number Theory,* DIMITIA ITI 261, 2005, 143-148.
32. G. L. Matthews, Some computational tools for estimating the parameters of an algebraic geometry code, Contemporary Mathematics **381** (2005), 119-126.
33. H. Maharaj, G. L. Matthews, and G. Pirsic, Riemann-Roch spaces for the Hermitian curve with applications to algebraic geometry codes and low-discrepancy sequences, *Journal of Pure and Applied Algebra* **195** (2005), 261-280.
34. G. L. Matthews, Codes from the Suzuki function field, *IEEE Transactions on Information Theory* **50** (2004), no. 12, 3298-3302.
35. G. L. Matthews, On numerical semigroups generated by generalized arithmetic sequences, *Communications in Algebra* **32** (2004), no. 9, 3459-3469.
36. G. L. Matthews, The Weierstrass semigroup of an *m*-tuple of collinear points on a Hermitian curve, *Lecture Notes in Computer Science* **2948** (2004), 12-24.
37. D. E. Dobbs and G. L. Matthews, On a question of Wilf concerning numerical semigroups, *International Journal of Commutative Rings* **2** (2003), no. 4, 195-204.
38. G. L. Matthews, On triply-generated telescopic semigroups and chains of semigroups, *Congressus Numerantium* **154** (2002), 117-123.
39. D. E. Dobbs and G. L. Matthews, On comparing two chains of numerical semigroups and detecting Arf semigroups, *Semigroup Forum* **63** (2001), no. 2, 237-246.

40. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, *Designs, Codes and Cryptography* **22** (2001), no. 2, 107-121.

**PREPRINTS**

41. F. Manganiello, H. Lopez-Valdez, and G. L. Matthews, LCD Codes from curves and Cartesian products
42. G. L. Matthews and J. D. Peachey, Weierstrass semigroups from graphs
43. G. L. Matthews and J. D. Peachey, Compressed sensing matrices from function fields defined by linearized polynomials

**SPONSORED RESEARCH**

RTG: Coding Theory, Cryptography, and Number Theory, NSF, co-PI (PI: Jim Brown, co-PIs: Kevin James, Felice Manganiello), $2,126,971, 2016-2021

Topics in algebraic geometry codes, NSF, PI (co-PI: Shuhong Gao), $210,000, 2014-2017

Iterative decoding of $q$-ary parity-check codes and related problems, NSA, PI, $60,236, 2013-2015

Algebraic analysis of parity check codes and iterative decoding, NSF, PI, $120,000, 2009-2013.

Codes from algebraic geometry: constructions and algorithms for implementation, NSA, PI, $30,000, 2007-2009

Algebraic geometry codes and related structures, NSA, PI, $30,000, 2006-2008

Applications of semigroups to algebraic geometry codes, NSF, PI, $104,837, 2002-2006

Better codes using Suzuki curves, Clemson University Research Grant Committee, PI, $1,750, 2002-2003

Semigroups and error-correcting codes, Oak Ridge Associated Universities, PI, $5,000, 2002-2003

**RESEARCH PROPOSALS UNDER REVIEW**

CIF Medium: Expander graphs, decoding, and storage, NSF, PI (co-PIs: Shuhong Gao and Felice Manganiello), $802,208, 2018-2021

Codes from curves: structure, decoding, and modern applications, NSF, PI, $319,702, 2018-2021

**ADDITIONAL SPONSORED ACTIVITY**

Shannon Days at Clemson, IEEE, co-PI, $2650, 2016-17.

We Do Math – A summer camp for 9$^{th}$ and 10$^{th}$ grade females, Tensor Women and Mathematics Grants (MAA), $6000, 2014

We Do Math - A summer mathematics experience for high school girls, AMS Epsilon Fund, $5000, 2014

Codes and cryptography, a Clemson University Creative Inquiry Grant to train team of undergraduates in applied algebra and number theory (together with Shuhong Gao and Hiren Maharaj), $2500, 2006-2009

PaNTS: Palmetto Number Theory Series, NSA, co-PI, $15,000, 2007-2008

PaNTS: Palmetto Number Theory Series, NSF, co-PI, $8,250, 2007-2008

Acquisition of parallel computing cluster for large-scale computational problems in the mathematical sciences, NSF, co-PI, $140,570, 2005-2006)

Grant to establish math clubs for girls in three middle schools in Knoxville, TN, MAA/Tensor Foundation, $5000, 2001-2002

## GRADUATE STUDENT RESEARCH ADVISING

Doctoral graduates

Anderson, S., Applications of algebraic geometric codes to polar coding, May 2015
Peachey, J., Explicit bases for Riemann-Roch spaces of function fields with many rational places and applications, December 2011
Kositwattanarerk, W., Pseudocodewords of parity-check codes, August 2011
Drake, N., Decoding of multipoint algebraic geometry codes via lists, December 2009)

Masters graduates

Pangia, A., An error-correction algorithm for a code from the quotient of a norm-trace function field, May 2017
Omairi, A., On stopping sets for linear codes, December 2014
Hyde-Volpe, J., Quantum codes from two-point Hermitian codes, August 2010
Peachey, J., On Weierstrass semigroups of some m-tuples on norm-trace curves, May 2009
Hicks, B., Investigating the regularity of decomposition graphs of prisms, May 2009
Thomas, R., Gene networks modeled by polynomials over finite fields, May 2008
Marshall, J., On the number of Weierstrass semigroups of triples on the Hermitian curve, May 2007
Coleman, M., Semigroups and exact minimum distances of codes from a quotient of the Hermitian curve, May 2005
Graham, S., Decoding arrays for two-point codes, May 2005
Drake, N., Exact minimum distances of some two-point Hermitian codes, May 2004
Michel, T., One-point codes using places of higher degree, May 2004
Durham, K., Some Weierstrass semigroups on certain maximal curves, May 2003
Bedford, T. A., $\mathbb{Z}_4$-linear codes, August 2001

Current doctoral students

Kshirsagar, R., in progress
Pangia, A., in progress

Current masters students

Murphy, A., in progress
Selken, S., in progress

## UNDERGRADUATE RESEARCH ADVISING

Bachelors honors graduates

Hyde-Volpe, J., Quantum codes from two-point Hermitian codes, May 2009
Baber, C., Distance 2 colorings of certain generalized Petersen graphs, May 2007
Robinson, R., On the dual and Lipman chains of a special family of numerical semigroups, May 2004
Bayless, J., On the group generated by an *n*-cycle and an involution, May 2003

pREU: preliminary Research Experience for Undergraduate students (2017)
Lia Bozzone (Vassar College)
Sam Ditkovsky (Haverford College)
Emma Lee Fancher (University of North Alabama)
Jennifer Johannes (SUNY Brockport)
Egwuchukwu Kalu (Florida State University)

**POSTDOC SUPERVISION**
Hiram Lopez, 2016-2018

**PRESENTATIONS**

1. H. Lopez-Valdez, F. Manganiello, and G. L. Matthews, TBD, Code-Based Cryptography Workshop, Davie, FL (April 2018).
2. G. L. Matthews, TBD, Texas A&M University at Galveston, Galveston, TX (April 2018).
3. G. L. Matthews, Reed-Solomon codes and the information lottery - be a winner every time, MAA Southeastern Section Meeting, Clemson, SC (March 2018).
4. G. L. Matthews, Codes for local recovery, Special Session on Algebraic Coding Theory and Applications, AMS Central Section Meeting, Columbus, OH (March 2018).
5. G. L. Matthews, Applications of algebraic geometry codes to distributed storage and other applications, Department of Mathematics Colloquium, Virginia Tech, Blacksburg, VA (February 2018).
6. G. L. Matthews, Quantum codes from algebraic geometry, Ohio State Quantum Information Seminar, Columbus, OH (February 2018).
7. G. L. Matthews, AG codes as products of Reed-Solomon codes and distributed storage, Minisymposium on Coding Theory, SIAM Conference on Applied Algebraic Geometry, Atlanta, GA (August 2017).
8. G. L. Matthews, Codes for distributed storage from 4-regular graphs, WiSDM: Women in Data Science and Mathematics Research Collaboration Workshop, ICERM, Providence, RI (July 2017).
9. G. L. Matthews, AG codes as products of Reed-Solomon codes and applications, Special Session on Theory and Applications of Finite Fields, Mathematical Congress of the Americas, Montreal, Canada (July 2017).
10. G. L. Matthews, Numerical semigroups from graphs, Texas A&M University at Galveston, Galveston, TX (April 2017).
11. G. L. Matthews, Semigroups from divisors of functions on graphs, Special Session on Chip-Firing and Divisors on Graphs and Complexes, AMS Central Sectional Meeting, Minneapolis, MN (October 2016).
12. G. L. Matthews, Codes with locality from quotients of Hermitian curves, Special Session on Advances in Algebraic Coding Theory, AMS Central Sectional Meeting, Minneapolis, MN (October 2016).
13. N. Bannister, G. L. Matthews, and A. Simpson, Cracking Her Codes: Investigating Technology Boundary Objects using Interaction Analysis, National Council of Teachers of Mathematics 2016 Research Conference, San Franscisco, CA (April 2016)
14. G. L. Matthews, Codes with locality constraints, co-leader with Alexander Barg, Algebraic Geometry for Coding Theory & Cryptography, Institute for Pure & Applied Mathematics, Los Angeles, CA (February 2016).

15. G. L. Matthews, On locally decodable codes from algebraic geometry codes, Special Session on Coding Theory, AMS Central Sectional Meeting, Chicago, IL (October 2015).
16. G. L. Matthews, Errors beyond our control - and those we make intentionally - and the codes that correct them, East Tennessee State University, Johnson City, TN (September 2015).
17. G. L. Matthews, Analyzing codes defined by sparse matrices, Discrete Math Days in the Northeast, Worcester, MA (September 2015).
18. G. L. Matthews, Parity-check codes and their representations, International Conference on Combinatorics and Computer Algebra (CoCoA15), Fort Collins, CO (July 2015).
19. S. Anderson and G. L. Matthews, Stopping sets of Hermitian codes, Twelfth International Conference on Finite Fields and Their Applications, Saratoga Springs, NY (July 2015).
20. G. L. Matthews, Code parameters and graph coloring, Special Session on Studies in Interconnections among Parameters in Graph Theory, Combinatorics, and Discrete Geometry, San Antonio, TX (January 2015).
21. G. L. Matthews, Protecting information: activities from We Do Math! and Project WISE summer camps, Mathematical Outreach Programs Session, Joint Mathematics Meetings, San Antonio, TX (January 2015).
22. G. L. Matthews, Parity-check matrix choice and its impact on decoding, Algebraic Combinatorics Seminar, Colorado State University, Fort Collins, CO (December 2014).
23. G. L. Matthews, Applications of numerical semigroups beyond classical coding, International Meeting on Numerical Semigroups, Cortona, Italy (September 2014).
24. G. L. Matthews, Codes for error correction, AWM Chapter, Georgia College, Milledgeville, GA (May 2014).
25. G. L. Matthews, On Weierstrass semigroups and 3-point Hermitian codes, Special Session on Finite Fields, Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL (March 2014).
26. G. L. Matthews, Parity-check codes and pseudocodewords, Atlanta Lecture Series in Combinatorics and Graph Theory, Atlanta, GA (January 2014).
27. S. Anderson and G. L. Matthews, Crafting activities which analyze QR codes, Special Session on Communication of Mathematics via Interactive Activities, Joint Mathematics Meetings, Baltimore, MD (January 2014).
28. S. Anderson, G. L. Matthews, and A. Omairi, On stopping sets of algebraic geometry codes, Special Session on Algebraic Coding Theory, AMS Southeastern Section Meeting, Louisville, KY (October 2013).
29. G. L. Matthews, On q-ary polar coding, Minisymposium on Coding Theory and Geometry, SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO (August 2013).
30. S. Anderson and G. L. Matthews, Exponents of polar codes using algebraic geometric code kernels, International Workshop on Coding and Cryptography, Bergen, Norway (April 2013).
31. S. Anderson and G. L. Matthews, Rates of polarization of polar codes constructed using algebraic geometry code kernels, Joint Mathematics Meetings, San Diego, CA (January 2013
32. S. Anderson and G. L. Matthews, Constructing polar codes with large exponent via AG codes, IEEE International Symposium on Information Theory, Boston, MA (July 2012).

33. W. Kositwattanarerk and G. L. Matthews, On nonbinary parity-check codes, Special Session on Mathematical Coding Theory in Industrial Applications, AMS Western Section Meeting, Honolulu, HI (March 2012).
34. W. Kositwattanarerk and G. L. Matthews, On enumerating the pseudocodewords of parity-check codes, Special Session on Coding Theory, AMS Central Section Meeting, Lincoln, NE (October 2011).
35. G. L. Matthews, Small bias sets from extended norm-trace codes, Tenth International Conference on Finite Fields and Applications, Ghent, Belgium (July 2011).
36. G. L. Matthews and J. Peachey, On Weierstrass semigroups arising from finite graphs, Special Session on Discrete Dynamical Systems in Graph Theory, Combinatorics, and Geometry, AMS Western Section Meeting, Las Vegas, NV (April 2011).
37. W. Kositwattanarerk and G. L. Matthews, Iterative error correction for codes on graphs, Special Session on Discrete Dynamical Systems in Graph Theory, Combinatorics, and Geometry, AMS Western Section Meeting, Las Vegas, NV (April 2011).
38. G. L. Matthews and W. Kositwattanarerk, Cones and ternary codes, Combinatexas, Huntsville, TX (April 2011).
39. G. L. Matthews, Supercodes from evaluation, Texas A&M University at Galveston, Galveston, TX (April 2011).
40. G. L. Matthews and J. D. Peachey, On Weierstrass semigroups of m-tuples of places on function fields associated with linearized polynomials, Joint Mathematics Meetings, New Orleans, LA (January 2011).
41. G. L. Matthews and J. D. Peachey, Extended norm-trace codes, Soria Summer School on Computational Mathematics: Algebraic Geometric Modelling in Information Theory, Soria, Spain (July 2010).
42. W. Kositwattanarerk and G. L. Matthews, On irreducible pseudocodewords of binary parity check codes, IEEE International Syposium on Information Theory, Austin, TX (June 2010).
43. G. L. Matthews and J. D. Peachey, The extended norm-trace function field and applications, Minisymposium on Algebraic Coding Theory, SIAM Conference on Discrete Mathematics, Austin, TX (June 2010).
44. G. L. Matthews, Pseudocodewords via a lifted fundamental cone, plenary talk at Combinatexas, San Marcos, TX (April 2010).
45. G. L. Matthews, Pseudocodewords and Tanner graph representation, Special Session on Advances in Algebraic Coding Theory, AMS Southeastern Section Meeting, Lexington, KY (March 2010).
46. W. Kositwattanarerk and G. L. Matthews, Pseudocodewords and Tanner graph representation, Special Session on Advances in Algebraic Coding Theory, AMS Southeastern Section Meeting, Lexington, KY (March 2010).
47. G. L. Matthews and J. D. Peachey, Riemann-Roch spaces of the norm-trace function field, Special Session on Function Fields and their Applications, AMS Eastern Section Meeting, University Park, PA (October 2009).
48. G. L. Matthews and J. D. Peachey, Riemann-Roch spaces of the norm-trace function field, Ninth International Conference on Finite Fields and Applications, Dublin, Ireland (July 2009).
49. G. L. Matthews, On graphs and codes, Special Session on Graph Theory, AMS Southeastern Section Meeting, Huntsville, AL (October 2008).

50. N. Drake and G. L. Matthews, On list decoding of algebraic geometry codes over rings, Special Session on Linear Codes over Rings and Modules, AMS Central Section Meeting, Kalamazoo, MI (October 2008).
51. G. L. Matthews, Decoding one-point codes defined using places of higher degree, Mathematical Theory of Networks and Systems, Blacksburg, VA (August 2008).
52. G. L. Matthews, On quantum codes from multipoint AG codes, Special Session on Algebraic Aspects of Coding Theory at AMS Central Section Meeting, Bloomington, IN (April 2008).
53. G. L. Matthews, Decoding general AG codes using lists, Department of Mathematics Colloquium, University of Nebraska, Lincoln, NE (February 2008).
54. G. L. Matthews, Fibonacci semigroups and their duals, Special Session on the Linear Diophantine Problem of Frobenius at Joint Mathematics Meetings, San Diego, CA (January 2008).
55. G. L. Matthews, Acyclic colorings of Hamming graphs, Special Session on Graph Theory at AMS Southeastern Section Meeting, Murfreesboro, TN (November 2007).
56. G. L. Matthews, Frobenius numbers of generalized Fibonacci semigroups, Integers Conference 2007, Carrollton, GA (October 2007).
57. G. L. Matthews, Partial permutation decoding of Hermitian codes, Special Session on Algebraic Coding Theory honoring the retirement of Harold N. Ward at AMS Central Section Meeting, Chicago, IL (October 2007).
58. R. C. Laskar, G. L. Matthews, B. Novick, and J. Villalpando, On irreducible no-hole L(2,1) colorings of trees, 20th Cumberland Conference on Discrete Mathematics, Atlanta, GA (May 2007).
59. G. L. Matthews, Some mathematics behind bar codes, credit card numbers, and compact discs, Emory and Henry College, Bristol, VA (April 2007).
60. G. L. Matthews, Automorphisms, isomorphisms, and algebraic geometry codes, Special Session on Applicable Algebra at AMS Southeastern Section Meeting, Davidson, NC (March 2007).
61. G. L. Matthews, An approach to decoding Hermitian codes, Special Session on Algebraic Coding Theory honoring the retirement of Vera Pless at AMS Central Section Meeting, Cincinnati, OH (October 2006).
62. G. L. Matthews, Multipoint codes as subcodes and implications for decoding, Number Theory Seminar, University of South Carolina, Columbia, SC (September 2006).
63. G. L. Matthews, Multipoint codes are super codes, Department of Mathematics Colloquium, College of Charleston, Charleston, SC (September 2006).
64. G. L. Matthews, Unique decoding of m-point codes using lists, Groebner Bases in Cryptography, Coding Theory, and Algebraic Combinatorics, Linz, Austria (May 2006).
65. R. E. Jamison and G. L. Matthews, Distance two colorings and their relatives on products of trees and cycles, 37$^{th}$ Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL (March 2006).
66. M. A. Coleman, N. Drake, and G. L. Matthews, Parameters of codes from quotients of Hermitian curves, 37$^{th}$ Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL (March 2006).

67. G. L. Matthews, The Weierstrass semigroup of an *m*-tuple of collinear points on a Hermitian curve, Seventh International Conference on Finite Fields and Applications, Toulouse, France (May 2003).
68. G. L. Matthews, On algebraic geometry codes from Suzuki curves, Special Session in Coding Theory, Second Irish Conference on the Mathematical Foundations of Computer Science and Information Technology, Galway, Ireland (July 2002)
69. G. L. Matthews, Codes from field extensions, AMS Special Session on Field Extensions at Joint Mathematics Meetings, San Antonio, TX (January 2006).
70. G. L. Matthews, Codes from curves, Department of Mathematics Colloquium, Virginia Tech, Blacksburg, VA (November 2005).
71. G. L. Matthews and R. S. Robinson, A variant of the Frobenius problem and generalized Suzuki semigroups, Integers Conference 2005, Carrollton, GA (October 2005).
72. G. L. Matthews, Floors and ceilings of divisors with applications to codes, Mathematics Department Colloquium, U. S. Naval Academy, Annapolis, MD (April 2004).
73. G. L. Matthews, Floors and ceilings and good error-correcting codes, Mathematics Department Colloquium, Trinity University, San Antonio, TX (March 2004).
74. G. L. Matthews and T. W. Michel, One-point codes using points of higher degree, Special Session in Algebraic Coding Theory at AMS Central Section Meeting, Athens, OH (March 2004).
75. G. L. Matthews, On numerical semigroups generated by generalized arithmetic sequences, Integers Conference 2003, Carrollton, GA (October 2003).
76. G. L. Matthews, Weierstrass semigroups and codes from a class of maximal non-classical curves, Special Session in Applications of Number Theory and Algebraic Geometry to Coding at AMS Joint Central and Western Section Meeting, Boulder, CO (October 2003).
77. G. L. Matthews, Suzuki function fields and a few good codes, Algebra-Cryptology Seminar, Florida Atlantic University, Boca Raton, FL (September 2003).
78. G. L. Matthews, Some simple tools for analyzing algebraic geometry codes, Plenary talk at Conference on Coding Theory and Quantum Computing, Charlottesville, VA (May 2003).
79. G. L. Matthews, Some mathematics behind bar codes, credit card numbers, and compact discs, East Tennessee State University Mathematics Honors and Awards Banquet, Johnson City, TN (April 2003).
80. G. L. Matthews, Numerical semigroups and arithmetic sequences, South Central Regional Weekend Algebra Conference, New Orleans, LA (April 2002).
81. G. L. Matthews, Chains of numerical semigroups, SERMON: Southeast Regional Meeting On Numbers, Clemson, SC (March 2002).
82. G. L. Matthews, Chains of numerical semigroups, 33rd Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL (March 2002).
83. G. L. Matthews, Minimum distances of some Hermitian codes, AMS Special Session in Algebraic Coding Theory at Joint Mathematics Meetings, San Diego, CA (January 2002).

84. G. L. Matthews, Gap sets and error-correcting codes, Department of Pure and Applied Mathematics Colloquium, Washington State University, Pullman, WA (March 2001).
85. G. L. Matthews, Error-correcting codes and compact discs, Tennessee Technological University Graduate Student Seminar, Cookeville, TN (March 2001).
86. G. L. Matthews, Gap sets and error-correcting codes, Department of Mathematical Sciences Colloquium, Clemson University, Clemson, SC (February 2001).
87. G. L. Matthews, Gap sets and error-correcting codes, Department of Mathematical Sciences Colloquium, Florida Atlantic University, Boca Raton, FL (February 2001).
88. G. L. Matthews, Gap sets and error-correcting codes, Department of Mathematics and Statistics Colloquium, University of Missouri-Rolla, Rolla, MO (February 2001).
89. G. L. Matthews, Gap sets and error-correcting codes, AWM Workshop at Joint Mathematics Meetings, New Orleans, LA (January 2001).
90. G. L. Matthews, The Weierstrass gap set of an m-tuple and minimum distance of associated Goppa codes, Special Session in Algebraic Coding Theory at AMS Central Section Meeting, South Bend, IN (April 2000).
91. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Department of Mathematics and Computer Science Colloquium, San Diego State University, San Diego, CA (January 1999).
92. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Department of Mathematical Sciences Colloquium, Florida Atlantic University, Boca Raton, FL (February 1999).
93. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Department of Mathematical Sciences Colloquium, Michigan Technological University, Houghton, MI (January 1999).
94. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Joint Mathematics Meetings, San Antonio, TX (January 1999).
95. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Coding Theory Seminar, San Diego State University, San Diego, CA (January 1999).
96. G. L. Matthews, Weierstrass pairs and minimum distance of Goppa codes, Louisiana State University Algebra Seminar, Baton Rouge, LA (October 1998).
97. G. L. Matthews, Polynomials and knots, Lee High School, Baton Rouge, LA (October 1997, October 1996).
98. G. L. Matthews, Uses of polynomials in knot theory, Lee High School, Baton Rouge, LA (October 1996).

<u>Local presentations</u>

1. G. L Matthews (along with Sarah Anderson, Amy Grady, Rachel Groether, and Fiona Knoll), Math Auction, Math Club, Clemson University, Clemson, SC (February 2015).
2. G. L. Matthews, Modular bowling and assorted math-y bowling activities, Math Club, Clemson, SC (January 2015).
3. G. L. Matthews, Clemson Tri-Mathlon, Math Club, Clemson University, Clemson, SC (November 2014).
4. G. L. Matthews, Mathematical scavenger hunt, Math Club, Clemson University, Clemson, SC (November 2013).

5. G. L. Matthews, Automorphisms of codes and Riemann-Roch spaces, Informal Algebra and Number Theory Seminar, Clemson University, Clemson, SC (October 2003).
6. G. L. Matthews, A coding theory mystery solved, Informal Algebra and Number Theory Seminar, Clemson University, Clemson, SC (January 2003).
7. G. L. Matthews, Semigroups of triples of points on Hermitian curves, Clemson University Algebra and Discrete Mathematics Seminar, Clemson, SC (September 2002).
8. G. L. Matthews, Codes and curves I-IV, Clemson University Informal Algebra and Number Theory Seminar, Clemson, SC (November-December 2002).
9. G. L. Matthews, Error-correcting codes and compact discs, University of Tennessee NSF Research Experience for Undergraduates Faculty Seminar, Knoxville, TN (July 2001).
10. G. L. Matthews, Algebraic geometry codes and gap sets, University of Virginia Coding Theory Seminar, Charlottesville, VA (October 2000).
11. G. L. Matthews, Error-correcting codes and applications, University of Tennessee NSF Research Experience for Undergraduates Faculty Seminar, Knoxville, TN (July 2000).
12. G. L. Matthews, The Weierstrass gap set of an m-tuple and minimum distance of algebraic geometry codes, Clemson University Algebra/Discrete Math Seminar, Clemson, SC (April 2000).
13. G. L. Matthews, Codes and curves I-XI: An introduction to algebraic geometry codes, Algebra Seminar, University of Tennessee, Knoxville, TN (Fall 1999).

**TEACHING**

Clemson University

MTHSC 311, Linear Algebra, Fall 2001
MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2002
MTHSC 851, Abstract Algebra I, Spring 2002
MTHSC 482H, Honors Research, Fall 2002
MTHSC 852, Abstract Algebra II, Fall 2002
MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2003
MTHSC 892, Master's Project Course, Spring 2003
MTHSC 985, Algebraic Function Fields and Codes, Spring 2003
MTHSC 970, Directed Studies in Coding Theory, Summer 2003
MTHSC 991, Doctoral Research, Summer 2003
MTHSC 102, Introduction to Mathematical Analysis, Fall 2003 (2 sections)
MTHSC 482H, Honors Research, Fall 2003
MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2004 (2 sections)
MTHSC 482H, Honors Research, Spring 2004
MTHSC 851, Abstract Algebra I, Spring 2004
MTHSC 892, Master's Project Course, Spring 2004
MTHSC 970, Topics in Algebraic Function Fields, Summer 2004
MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2005
MTHSC 853, Matrix Analysis, Spring 2005
MTHSC 892, Master's Project Course, Spring 2005
MTHSC 970, Topics in Coding Theory, Summer 2005
MTHSC 129, Problem Solving in Discrete Mathematics, Fall 2005
MTHSC 853, Matrix Analysis, Fall 2005

MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2006 (2 sections)
MTHSC 985, Theory of Error-correcting Codes, Spring 2006
MTHSC 129, Problem Solving in Discrete Mathematics, Fall 2006
MTHSC 482H, Honors Research, Fall 2006
MTHSC 853, Matrix Analysis, Fall 2006
MTHSC 481, Codes and Cryptography, Spring 2007
MTHSC 892, Master's Project Course, Spring 2007
MTHSC 129, Problem Solving in Discrete Mathematics, Fall 2007
MTHSC 491, Independent Study on the Frobenius Problem, Fall 2007
MTHSC 491, Creative Inquiry in Codes and Cryptography, Fall 2007
MTHSC 853, Matrix Analysis, Fall 2007
MTHSC 851, Abstract Algebra I, Spring 2008
MTHSC 129, Problem Solving in Discrete Mathematics, Spring 2008
MTHSC 892, Master's Project Course, Spring 2008
MTHSC 852, Abstract Algebra II, Fall 2008
MTHSC 129, Problem Solving in Discrete Mathematics, Fall 2008
MTHSC 482H, Honors Research, Fall 2008
MTHSC 108, Calculus of One Variable II, Spring 2009 (2 sections)
MTHSC 482H, Honors Research,, Spring 2009
MTHSC 892, Master's Project Course, Spring 2009
MTHSC 108, Calculus of One Variable II, Fall 2009
MTHSC 129, Problem Solving in Discrete Mathematics, Fall 2010 (2 sections)
MTHSC 119, Introduction to Discrete Methods, Spring 2011 (2 sections)
MTHSC 206, Calculus of Several Variables, Fall 2011 (2 sections)
MTHSC 119, Introduction to Discrete Methods, Fall 2012
MTHSC 851, Abstract Algebra I, Fall 2012
MTHSC 852, Abstract Algebra II, Spring 2013
MTHSC 206, Calculus of Several Variables, Fall 2013 (2 sections)
MTHSC 985, Topics in Modern Coding Theory, Fall 2013
MATH 2060, Calculus of Several Variables, Fall 2014 (3 sections)
MATH 4120, Algebra I, Summer 2015
MATH 2060, Calculus of Several Variables, Fall 2015 (3 sections)
MATH 4820, Undergraduate Research, Fall 2015
MATH 4820, Undergraduate Research, Spring 2016
MTHSC 8530, Matrix Analysis, Summer 2016
MATH 2060, Calculus of Several Variables, Fall 2016 (2 sections)
MATH 8920, Master's Project Course, Spring 2017
MTHSC 8530, Matrix Analysis, Summer 2017
MATH 2060, Calculus of Several Variables, Fall 2017 (2 sections)
MATH 9850, Coding for Distributed Storage, Fall 2017
MATH 9850, Code-based Cryptography, Spring 2018

University of Tennessee
MATH 141, Calculus I, Fall 1999 (2 sections), Fall 2000
MATH 251, Linear Algebra, Spring 2000
MATH 551, Abstract Algebra I, Fall 2000
MATH 552, Abstract Algebra II, Spring 2001

Louisiana State University
MATH 1020, Developmental College Algebra, Fall 1998
MATH 1550, Calculus I, Spring 1999

**OUTREACH EXPERIENCE**

Co-creator and instructor, Data Science Summer Camp – a summer camp for middle school students revolving around statistics and information theory, 2017-

Director, pREU, a summer program designed to prepare students for REUs by providing a preliminary research experience outside of the typical classroom setting, especially students from HBCUs, regional universities, small colleges, or from groups underrepresented in the math sciences, 2017-

Instructor, Project WISE (Women in Science and Engineering) summer camp for junior high girls: Math, Science,and Engineering - It's a Girl Thing! Development of hands-on coding/cryptography activities for middle school students and distribution of curriculum via publications for teachers (in collaboration with S. Anderson), 2004-

Co-creator and instructor, We Do Math - a STEM summer camp for high school girls. Significant curriculum development and research study (in collaboration with N. Bannister and A. Simpson) of interplay between status and technology in a single-gender camp setting, 2013-2015

Instructor, STEM Day, a recruiting activity for groups underrepresented in science and Engineering, April 2012, April 2013

Coordinator, Math Superstars, Clemson Elementary School, 2010-

Instructor, PAW - PEER and WISE - Day, a recruiting activity for groups underrepresented in science and engineering, April 2009

Instructor, PEER (Program for Education, Enrichment, and Retention) Mathematics Excellence Workshop for minority students entering engineering and science. Role includes providing curriculum and support for first-generation college students who are taking their first college math class, 2006-2008

Organizer, SHaring ADventures in Engineering and Science (SHADES): An interactive colloquium in engineering and science for middle school girls, mathematics session, March 2001

Outreach volunteer, Westhaven Elementary School, Knoxville, TN, 2000-2001

**SERVICE**

Conference organization and panel service

Organizer, Early Career Workshop on Coding Theory, Cryptography, and Number Theory, Summer 2018

Co-organizer, Special Session on Engaging Activities in Coding Theory, Cryptography, and Number Theory at MAA Southeastern Section Spring Meeting, March 2018

Co-organizer, Minisymposium in Coding Theory, SIAM AG 2017: Conference on Applied Algebraic Geometry, July 2017
Co-organizer, AMS Special Session on Coding Theory, Cryptography, and Number Theory, AMS Spring Southeastern Section Meeting, March 2017
Co-organizer, AMS Special Session on Coding Theory for Modern Applications at Joint Math Meetings, January 2017
Co-organizer, Shannon Centennial at Clemson, March-December 2016
Panelist, MAA, 2016-17
Panelist, NSF, twice 2015-16, 2016-17, 2018
Co-organizer, Special Session on Activities for Math Clubs at MAA Southeastern Section Spring Meeting, March 2016
Co-leader, working group at Algebraic Geometry for Coding Theory and Cryptography Workshop, Institute for Pure & Applied Mathematics/UCLA, 2016
Co-organizer, AMS Special Session on Advances in Coding Theory at Joint Mathematics Meetings, January 2015
External reviewer, Department of Mathematics and Statistics, University of North Carolina-Charlotte, 2014
Panelist, WISE Research Opportunities for Undergraduates, November 2013
Panelist, Southeastern Conference for Undergraduate Women in Mathematics, October 2013
Co-organizer, AMS Special Session on Advances in Coding Theory at Joint Mathematics Meetings, January 2012
Co-organizer, AMS Special Session on Recent Advances in Coding Theory at Joint Mathematics Meetings, January 2009
Co-founder and co-organizer, PaNTS: Palmetto Number Theory Series, 2006-2008
Co-organizer, AMS Special Session on Algebraic Geometry Codes at Joint Mathematics Meetings, January 2005
Organizer, Research Experiences for Undergraduates Poster Session at Joint MAA Southeastern Section/SIAM Southeast Atlantic Section Meeting, March 2003
Invited researcher, American Institute of Mathematics Workshop Rational and integral points on higher dimensional varieties, December 2002
AWM representative, MSRI CRAFTY Workshop The Preparation of Math Majors in the First Two Years, February 2001
Research advisor, NSF Research Experiences for Undergraduates in Pure and Applied Mathematics, University of Tennessee, Summer 2000, 2001
Co-organizer, Project NExT Session on Creative Research Techniques at Joint Mathematics Meetings, January 2000
Co-organizer, Louisiana State University Graduate Student Seminar, 1996-1997

<u>University and departmental service</u>
Organizer, RTG Seminar on Coding Theory, Cryptography, & Number Theory, 2017-
Co-creator and administrator, Pow!–Math Sciences Problem of the Week, 2015-
Graduate affairs committee, 2015-2017
Research mentor for junior faculty, 2013-
Faculty co-advisor and affiliated faculty, AWM Student Chapter, 2013-
Tenure, Promotion, & Reappointment committee, 2012-
Tenure, Promotion, & Reappointment subcommittee to draft departmental TPR guidelines, 2015-

Chair, Department chair search and screening committee, 2012-2013
Chair, Tenure, Promotion, & Review Committee, 2012-2013
Mathematical Sciences Faculty Teaching Award selection committee, 2011-2013
Chair, Sabbatical Review committee, 2011-2015
Calculus textbook committee, 2009
Department chair review committee, 2008-2009, 2015
Mathematical Sciences Council (departmental governing body), 2008-2009, 2010-2014
Teaching mentor for junior faculty, 2008-
Organizer, Algebra and Discrete Mathematics Seminar, 2002-2004, 2015-2016
Academic advisor for graduate and undergraduate students in math sciences, 2002-

**ADDITIONAL ACTIVITIES**

Mentor, MAA Early Career Mathematician Networking Group, 2016-
Hiring committee, Professor in algebraic coding theory and its application in data security, Department of Mathematical Sciences, Aalborg University, 2016-2017
Mentor, IEEE Information Society Mentoring Network, 2014-
Hiring committee, Assistant Professor in algebraic coding theory, Department of Mathematical Sciences, Aalborg University, 2012-2013
Referee for *Journal of Algebra; IEEE Transactions on Information Theory; Designs, Codes and Cryptography*; *Finite Fields and their Applications; Advances in Mathematics of Communications; Applicable Algebra in Engineering, Communication and Computing*; *Linear Algebra and its Applications*; *The American Mathematical Monthly; Journal of Combinatorial Theory, Series A; Communications in Algebra*; *SIAM Journal on Discrete Mathematics; Discrete Applied Mathematics; Pacific Journal of Mathematics*; *European Journal of Combinatorics*; *Proceedings of the 2003 Arithmetic and Birational Geometry Conference*; *Discussiones Mathematicae Graph Theory; Integers*; and *Houston Journal of Mathematics*.
Reviewer, Calculus text, 2009
Reviewer, Discrete mathematics text, 2008
Consultant, MAA Project NExT, 2007-2008, 2011-2013
Mentor, AWM Mentor Network, 2002-
Project NExT, MAA, 1999-2001

*December 21, 2017*