

Joanna A. Ellis-Monaghan
Curriculum Vitae—July 2018

Work:

Department of Mathematics
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Research Areas: Algebraic combinatorics, graph theory, applied combinatorics.

Education:

- University of North Carolina, Chapel Hill, NC, Doctorate in Mathematics, Fall 1995. Advisor: James D. Stasheff. Dissertation: *A unique, universal graph polynomial and its Hopf algebraic properties, with applications to the Martin polynomial.*
- Dartmouth College, Hanover, NH, Fall 1988. Transferred to UNC in good standing.
- University of Vermont, Burlington, VT, Master of Science in Mathematics, Spring 1986.
- Bennington College, Bennington, VT, Bachelor of Arts, Mathematics/Studio Art, Spring 1984.
- **Employment History:**
- *Saint Michael's College*, Department of Mathematics and Statistics, Colchester, VT, July 2015-present, Department Chair.
- *Saint Michael's College*, Department of Mathematics and Statistics, Colchester, VT, July 2010-present, Full Professor; July 2006-June 2010, Associate Professor; July 2002-June 2006, Assistant Professor.
- *University of Vermont*, Department of Mathematics and Statistics, Burlington, VT, July 2015-present, Graduate Faculty.
- *University of Vermont*, Department of Mathematics and Statistics, Burlington, VT, August 2013-July 2014, Visiting Full Professor, August 2007-July 2008, Visiting Associate Professor; August 2000-July 2002, Visiting Assistant Professor.
- *Saint Michael's College*, Department of Mathematics and Statistics, Colchester, VT, August 1992-July 2002, Instructor, both full- and part-time.
- *University of Vermont*, Department of Mathematics and Statistics, Burlington, VT, August 1992-July 1997, part-time Lecturer.

Fellowships and Awards:

Visiting Scientist, Simons Institute, Berkeley University, Berkeley CA, Spring 2016.
Visiting Fellow, Isaac Newton Institute, Cambridge University, Cambridge, UK, Spring 2008.
Saint Michael's College Faculty Scholarship Award, 2011.

Editorial Work and Advisory Boards:

Editor-In-Chief, PRIMUS: Problems, Resources, and Issues in Undergraduate Mathematics, January 2011-present. Associate Editor, 2010. Editorial Board, 2006-2009.
Editor, Annales de l'Institut Henri Poincaré D: Combinatorics, Physics and their

Interactions. 2013-present.
Guest Editor, *Special Issue on the Tutte Polynomial, Advances in Applied Mathematics*,
Volume 94, Pages 1-156, March 2018.
Southeastern International Conference on Combinatorics, Graph Theory, & Computing
Advisory Committee, 2015-present.
Center for Undergraduate Research in Mathematics Advisory Board, 2012-present.
Discrete Math Days in the Northeast Steering Committee, 2012-present.
Maple Academic Advisory Board: a board that advises Maplesoft on ways to improve the
academic user experience, for both teaching and research, 2008-2012.

Publications:

* SMC undergraduate student, #graduate student.

Books--

1. J. Ellis-Monaghan, I. Moffatt, *Graphs on Surfaces: Twisted Duality, Polynomials, and Knots*. SpringerBriefs in Mathematics, 2013.

Book chapters--

2. J. Ellis-Monaghan, N. Jonoska, G. Pangborn, "Tile-based DNA Nanostructures: Mathematical Design and Problem Encoding", *Algebraic and Combinatorial Computational Biology*, R. Robeva & M. Macauley, eds. Elsevier, *in press*.
3. J. Ellis-Monaghan, "Reading, 'Riting, and Reals", *Beyond Lecture: Resources and Pedagogical Techniques for Enhancing the Teaching of Proof-Writing Across the Curriculum*. R. Schwell, A. Steurer, & J. Vasquez, eds. MAA Press, 2016.
4. J. Ellis-Monaghan, G. Pangborn, L. Beaudin*, D. Miller*, N. Bruno*, A. Hashimoto*, Minimal Tile and Bond-Edge Types for Self-Assembling DNA Graphs, in *Discrete and Topological Models in Molecular Biology*, N. Jonoska & M. Saito, eds. Natural Computing Series, Springer, 2013.
5. J. Ellis-Monaghan, C. Merino, "Graph polynomials and their applications I: the Tutte polynomial", invited chapter for *Structural Analysis of Complex Networks*, Matthias Dehmer, ed., Birkhauser, 2010.
6. J. Ellis-Monaghan, C. Merino, "Graph polynomials and their applications II: interrelations and interpretations", invited chapter for *Structural Analysis of Complex Networks*, Matthias Dehmer, ed., Birkhauser, 2010.

Journal articles--

7. M. N. Ellingham, J. Ellis-Monaghan, "Edge-outer graph embedding and the complexity of the DNA reporter strand problem", *submitted*.
8. J. Ellis-Monaghan, L. Kauffman, I. Moffatt, "Edge colourings and topological graph polynomials", *submitted*.
9. A. Morse#, W. Adkisson*, J. Greene*, D. Perry*, B. Smith*, G. Pangborn, J. Ellis-Monaghan, "DNA Origami and Unknotted A-trails in Torus Graphs", *submitted*.
10. M. Ferrari#, A. Cook*, A. Houlihan*, R. Rouleau*, N. Seeman, G. Pangborn, J. Ellis-Monaghan, "Design formalism for DNA self-assembly of polyhedral skeletons using rigid tiles", *The Journal of Mathematical Chemistry*, 56, no. 5 (2018) 1365-1392.

11. J. Ellis-Monaghan, G. Pangborn, N.C. Seeman, S. Blakeley*, C. Disher,* M. Falcigno*, B.Healy*, A. Morse#, B.Singh*, M. Westland*, “Design tools for Reporter Strands and DNA Origami Scaffold Strands”, *Theoretical Computer Science*, 671 no. 6 (2017) 69-78.
12. J. Ellis-Monaghan, I. Moffatt, “The Las Vergnas polynomial for embedded graphs”, *European Journal of Combinatorics*, 50 (2015) 97-114.
13. J. Ellis-Monaghan, A. McDowell#, I. Moffatt, G. Pangborn, “DNA origami and the complexity of Eulerian circuits with turning costs”, *Natural Computing*, 14 no. 3 (2015) 491-503.
14. J. Ellis-Monaghan, I. Moffatt, “A note on recognizing an old friend in a new place: List coloring and the zero-temperature Potts model,” *Annales de l’Institut Heri Poincaré D, Combinatorics, Physics, and their Interactions*, 1 (2015) 429-442.
15. J. Ellis-Monaghan, I. Moffatt, “Evaluations of topological Tutte polynomials”, *Combinatorics, Probability, and Computing*, 24 no. 3 (2015) 556-583.
16. J. Ellis-Monaghan, G. Pangborn, “An example of practical organization for undergraduate research experiences,” *PRIMUS*, 23, no. 9 (2013) 805-814.
17. J. Ellis-Monaghan, I. Moffatt, “A Penrose polynomial for embedded graphs,” *European Journal of Combinatorics*, 34 (2013) 424-445.
18. J. Ellis-Monaghan, I. Moffatt, “Twisted duality and polynomials of embedded graphs,” *Trans. Amer. Math. Soc.* 364 (2012), 1529-1569.
19. J. Ellis-Monaghan, I. Moffatt, “The Tutte-Potts connection in the presence of an external field,” *Advances in Applied Mathematics*, 47 (2011) 772-782.
20. J. Ellis-Monaghan, G. Pangborn, “Using DNA self-assembly design strategies to motivate graph theory concepts,” *Math. Model. Nat. Phenom.*, 6, no. 6 (2011) 96-107.
21. J. Ellis-Monaghan, I. Sarmiento, “Isotropic systems and the interlace polynomial,” submitted, arXiv:math/0606641v2.
22. J. Ellis-Monaghan, I. Sarmiento, “A recipe theorem for the topological Tutte polynomial of Bollobás and Riordan,” *European Journal of Combinatorics, Combinatorics* 32 no 6 (2011) 782–794.
23. J. Ellis-Monaghan, M. Boelkins, “PRIMUS: Sharing ideas in changing times”, *PRIMUS*, 21, no. 1 (2011) 1-3.
24. M. Boelkins, J. Ellis-Monaghan, “Twenty years of PRIMUS: A tribute to Brian J. Winkel”, *PRIMUS*, 21, no. 2 (2011), 99-100.
25. J. Ellis-Monaghan, “Considering the chalkless classroom,” *PRIMUS*, 20, no. 4 (2010) 332 – 343.
26. L. Beaudin*, J. Ellis-Monaghan, G. Pangborn, R. Shrock, “A little statistical mechanics for the graph theorist,” *Discrete Mathematics*, 310, no. 13-14 (2010) 2037-2053.
27. G. Ashline, J. Ellis-Monaghan, Z. Kadas, D. McCabe, “Math and Bio 2010: Shell morphology overview and poster,” *MAA Focus*, 30, no. 3 (2010) 15-17.
28. G. Ashline, K-D. Crisman, J. Ellis-Monaghan, Z. Kadas, G. Pangborn, L. Simons, “What we learned...by organizing and hosting an MAA sectional meeting,” *MAA Focus*, April/May 2009.
29. G. Ashline, J. Ellis-Monaghan, Z. Kadas, D. McCabe, “Modeling Seashell Morphology,” UMAP Module 801. In *UMAP/ILAP Modules 2009: Tools for Teaching*, edited by Paul J. Campbell, 101-139.
30. A. Dean, J. Ellis-Monaghan, S. Hamilton*, G. Pangborn, “Unit rectangle visibility

- graphs,” *The Electronic Journal of Combinatorics*, 15, no. 1 (2008) R79.
31. M. Cox[#], J. Ellis-Monaghan, T. Hughes, K. Mondanaro, “Hydrocarbon links in an octet truss,” *The Journal of Mathematical Chemistry*, 43, no. 2 (2008) 874-891.
 32. D. Archdeacon, P. Bonnington, J. Ellis-Monaghan, “How to exhibit toroidal maps in space,” *Discrete and Computational Geometry*, 38, (2007) 573-594.
 33. J. Ellis-Monaghan, I. Saramiento, “Distance Hereditary Graphs and the Interlace Polynomial”, *Combinatorics, Probability, and Computing*, 16 (2007) 947-973.
 34. J. Ellis-Monaghan, P. Gutwin, J. Lewis*, G. Pangborn, “Graph drawing for floorplanning with flexible blocks,” *Congressus Numerantium*, 178 (2006) 147-159.
 35. G. Ashline, J. Ellis-Monaghan, “How high? How fast? How long? Modeling water rocket flight with calculus,” *PRIMUS XVI*, no. 2 (2006), 121-137.
 36. J. Ellis-Monaghan, D. Pike, Y. Zou[#], “Decycling of Fibonacci cubes,” *The Australasian Journal of Combinatorics*, 35 (2006), 31-40.
 37. J. Ellis-Monaghan, L. Traldi, “Parametrized Tutte polynomials of graphs and matroids,” *Combinatorics, Probability, and Computing*, 15 (2006) 835-854.
 38. J. Ellis-Monaghan, P. Gutwin, J. Lewis*, G. Pangborn, “Principles and preliminary results for force directed floorplanning with malleable blocks,” *Congressus Numerantium*, 175 (2005), 81-96.
 39. G. Ashline, J. Ellis-Monaghan, “Credit cards and cars: The mathematics of the American dream, part I,” *The New Jersey Mathematics Teacher*, 63 no. 1 (2005), 16-23.
 40. G. Ashline, J. Ellis-Monaghan, “A house of your own: The mathematics of the American dream, part II,” *The New Jersey Mathematics Teacher*, 63 no. 2 (2005), 20-26.
 41. A. Daniels*, J. Ellis-Monaghan, “Surreal seashells,” *The Pi Mu Epsilon Journal*, 12 no. 1 (2004), 36.
 42. J. Ellis-Monaghan, “Transition polynomials, double covers, and biomolecular computing,” *Congressus Numerantium*, 166 (2004), 181-192.
 43. G. Ashline, J. Ellis-Monaghan, “The lottery: A dream come true or a tax on people who are bad at math?” *PRIMUS XIV*, no. 4 (2004), 303-314.
 44. D. Archdeacon, J. Ellis-Monaghan, D. Fisher, D. Froncek, P.C.B. Lam, S. Seager, B. Wei, R. Yuster, “Some remarks on domination,” *Journal of Graph Theory*, 46 no. 3 (2004), 207-210.
 45. J. Ellis-Monaghan, “Exploring the Tutte-Martin connection,” *Discrete Mathematics*, 281 no. 1-3 (2004), 173-187.
 46. J. Ellis-Monaghan, “Identities for the circuit partition polynomials, with applications to the diagonal Tutte polynomial,” *Advances in Applied Mathematics*, 32 no. 1-2, (2004), 188-197.
 47. J. Ellis-Monaghan, P. Gutwin, “Graph theoretical problems in next generation chip design,” *Congressus Numerantium*, 163 (2003), 143-159.
 48. G. Ashline A. Brizard, J. Ellis-Monaghan, “Water rockets in flight: Calculus in action,” *UMAP/ILAP Modules, 2002-2003: Tools for Teaching*, 151-189.
 49. J. Ellis-Monaghan, I. Sarmiento, “Generalized transition polynomials,” *Congressus Numerantium* 155 (2002), 57-69.
 50. J. Ellis-Monaghan, I. Sarmiento, “Medial graphs and the Penrose polynomial,” *Congressus Numerantium* 150 (2001), 211-222.

51. G. Ashline, J. Ellis-Monaghan, “Home sweet home: A financial incentive for the lower level mathematics course” (with George Ashline), *PRIMUS XI*, no. 1 (2001), 16–26.
52. G. Ashline, J. Ellis-Monaghan, “How many people are in your future? Elementary models of population growth,” in *Making Meaning: Integrating science through the case study approach to teaching and learning*, ed. S. Kuntz et al, McGraw-Hill Primis, 1999, pp. 42–80.
53. G. Ashline, J. Ellis-Monaghan, “How many people are in your future? Elementary models of population growth” (updated version), *Case studies in ecology*, ed. S. Kuntz et al., accompanying the 1st editions of *Manuel Molles’ text Ecology: Concepts and Applications*. WCB McGraw-Hill, New York, 1999.
54. G. Ashline, J. Ellis-Monaghan, “Interdisciplinary population projects in a first semester calculus course,” *PRIMUS IX* (March 1999), 39–55.
55. G. Ashline, J. Ellis-Monaghan, “Microcosm to macrocosm: Population models in biology and demography,” *Tools for Teaching*, UMAP unit 777 (1999), 39–80.
56. J. Ellis-Monaghan, “Martin polynomial miscellanea,” *Congressus Numerantium* 137 (1999), 19–31.
57. J. Ellis-Monaghan, “New results for the Martin polynomial,” *Journal of Combinatorial Theory*, series B 74 (1998), 326–52.

Selected External Grants and Awards:

(PI unless otherwise noted.)

- Leibniz Institute, Schloss Dagstuhl — Comparative Theory for Graph Polynomials. A week-long seminar for 40-45 international participants hosted by the Leibniz Institute at Schloss Dagstuhl in Germany to be held in September, 2019. Joint with A. Goodall, I. Moffatt, and K. Morgan.
- NSF—Advancing the Northeast Combinatorics Network, 2017-2018.
- NSF EFRI-ODESSEI Industry Supplement—Foldable self-replicating DNA nanostructures for organization of functional nanomaterials and 3D meta-material assembly (co-PI; W. Goddard, Caltech, PI). August 2017-July 2019.
- NASA EPSCoR 2016 Faculty Research Group Award, Graduate Student Support—Graph-Theoretical Design Strategies for Self-Assembly, summer 2015, spring 2016.
- NSF EFRI-ODESSEI—Foldable self-replicating DNA nanostructures for organization of functional nanomaterials and 3D meta-material assembly (co-PI; W. Goddard, Caltech, PI). August 2013-July 2017.
- Leibniz Institute, Schloss Dagstuhl — Seminar on Graph Polynomials: Towards a comparative theory. A week-long seminar for 45 international participants hosted by the Leibniz Institute at Schloss Dagstuhl in Germany, June 2016. Joint with A. Goodall, J. Makowsky, and I. Moffatt.
- EPSRC—Workshop on New Directions for the Tutte Polynomial: Extensions, Interrelations, and Applications. Four day workshop held at Royal Holloway University of London, July 2015. Joint with I. Moffatt.
- National Security Agency Mathematical Sciences Program—Conference Grant for Discrete Mathematics Days of the Northeast, September 2014-June 2015. (co-PI; Rosa Orellana, Dartmouth, PI) .
- National Security Agency Mathematical Sciences Program—Conference Grant for Discrete

Mathematics Days of the Northeast, July 2012 -June 2014 (co-PI; Rosa Orellana, Dartmouth, PI) .

- NASA—Vermont Space Grant Consortium Grant, Summer Student Mentoring, Design Strategies for Self-Assembly, Summer 2012 (co-PI, G. Pangborn PI).
- NASA—Vermont Space Grant Consortium Grant, Summer Student Mentoring, Design Strategies for Self-Assembly, Summer 2011.
- NSF Algebra, Number Theory, and Combinatorics—New Graph Theory from and for Nanoconstruct Design Strategies, June 2010-May 2013.
- NASA—Vermont Space Grant Consortium Grant, Design Strategies for Self-Assembly, September 2010-August 2011.
- NSF—CSTEM award for computer science and mathematics scholarships (co-PI; G. Pangborn PI), June 2008-May 2013.
- Vermont Genetics Network/INBRE Baccalaureate Funding, Graph Polynomials and DNA Structures, September 2005-May 2010.
- Center for Undergraduate Research in Mathematics, Applied Graph Theory Undergraduate Research Group, AY 2009-2010.
- NASA—Vermont Space Grant Consortium Student Mentoring Grant, DNA Nanostructures, Summer 2009.
- Vermont EPSCoR—The Potts/Tutte Model for nearest neighbor complex systems, June 2009-May 2010.
- National Security Agency Standard Grant, Fiscal Years 2007 and 2008.
- NASA—Vermont Space Grant Consortium Student Mentoring Grant (co-PI, G. Pangborn PI), June 2006-May 2007.
- Vermont EPSCoR—Netlist Summer Support (co-PI, G. Pangborn PI), Summer 2006.
- Cadence Design Systems Undergraduate Research Support for Netlist Project, Spring 2006-Summer 2006.
- IBM/Cadence Design Systems—Collaborator Support for Student Mentoring in Netlist Project, Fall 2005.
- Vermont EPSCoR—Netlist Summer Support, Summer 2005.
- NASA—Vermont Space Grant Consortium Student Mentoring Grant, Spring 2005.
- AWM—Travel Grant to attend the Thirty-Sixth Southeastern International Conference on Combinatorics, Graph Theory, and Computing, FAU, Boca Raton, FL, March 2005.
- IBM—Collaborator Support for Student Mentoring in Netlist Project, Fall 2004.
- Vermont EPSCoR—summer research support, Summer 2004.
- Vermont Genetics Network/BRIN—Summer research support, Summer 2004.
- Vermont Genetics Network/BRIN—Continued research support, academic year 2003-2004.
- Waterloo Maple—Maplet Toolbox Grant from Waterloo Maple, Inc., Summer 2003.
- Vermont Genetics Network/BRIN—Summer research support, Summer 2003.
- Maplet Development Grant from Waterloo Maple, Inc., Spring 2003.
- AWM Travel Grant to attend the Thirty-Third Southeastern International Conference on Combinatorics, Graph Theory, and Computing, FAU, Boca Raton, FL, March 2002.

Student Papers:

- T. Dickerson, J. Girard, B. Goodhue, D. Koch, A. Parent, M. Spuches, “Self-Assembly Strategies in the Octet Truss”, manuscript.
- Tyler Hotte, Miranda LaRocque, “Design Techniques for the DNA Cubic Lattice”, *American Journal of Undergraduate Research*, 12, no 1, 2014.
- R. Hammond, “Improving conservation techniques through graph theoretic models”, *Rose-Hulman Undergraduate Mathematics Journal*, 15, no 1, 2014.
- James Coolidge, Kevin O’Brien, “Utilizing the Octet Truss in the Design of Lateral Transfer Retroreflectors”, NASA-Goddard technical report for the ATLAS project.
- Jake Girard, Andrew Gilbert, Dan Lewis, Mary Spuches, “Design optimization for DNA nanostructures”, *American Journal of Undergraduate Research*, 10, no 1, 2011.
- Eva Ellis-Monaghan, “Phase transitions in the Ising Model”, *Rose-Hulman Undergraduate Mathematics Journal*, 11, no 1, fall 2010
- J. Kaptcianos, “A graph theory approach to DNA fragment assembly,” *American Journal of Undergraduate Research*, 7 no.1, 2008.
- A. Austin, “The circuit partition polynomial, with applications and relation to the Tutte and interlace polynomials,” *The Rose-Hulman Undergraduate Math Journal*, 8 no. 2, 2007.
- L. Beaudin, “A review of the Potts model: its relation to the Tutte polynomial and its application to complex experiments,” *The Rose-Hulman Undergraduate Math Journal*, 8 no. 1, 2007. Co-advised with G. Pangborn.

Workshops Tutor:

- MAA Workshop, “Writing Pedagogical and Expository Papers”, co-organizer and panelist, JMM San Diego, 2018.
- ICERM REUF Continuation meeting, “New problems in graph theory from self-assembly”. Funded one week collaboration meeting at ICERM for follow on work to the June 2017 REUF with a small group of faculty researchers.
- ICERM Research Experiences for Undergraduate Faculty (REUF), “New problems in graph theory from self-assembly”. One of five principle tutors for a one week course, June 2017.
- Rocky Mountain Mathematics Consortium Summer School in Algebraic Graph Theory, “Graph polynomials and graph theory applications in DNA self-assembly”, one of three principal tutors for two week course, June 2013.
- NIMBioS Graph Theory and Biological Networks Workshop, “Graph theory in the Life Sciences”, and “Design strategies for DNA nanostructures”, one of four principal tutors for the program, August 2010.

Selected Recent Invited Presentations:

- “New Dualities From Old: Generating Geometric, Petrie, and Wilson Dualities and Trialites of Ribbon Graphs”, Forty-Ninth Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Florida Atlantic University, March 2018.
- “New Dualities From Old: Generating Geometric, Petrie, and Wilson Dualities and Trialites of Ribbon Graphs”, Monash University, Australia, December 2017.

- “Graph embeddings and the complexity of the DNA reporter strand problem”, Southeastern Section AMS Meeting, September 2017.
- “An Introduction to the Quantum Ising Model”, Eastern Section AMS, September 2017.
- “Ins and Outs of DNA Self-Assembly”, CANADAM, Toronto, June 2017.
- “The Tutte polynomial: A mathematical catalyst”, Tutte Centenary Conference, Trinity College, Cambridge University, England, July 2017.
- “New Dualities From Old: Generating Geometric, Petrie, and Wilson Dualities and Trialites of Ribbon Graphs”, CANADAM, Toronto, June 2017.
- “New Problems in Graph Theory from Self-Assembly”, Joint Mathematics Meetings, January 2017.
- “Graph embeddings and the complexity of the DNA reporter strand problem”, Politecnico di Milano, January 2017.
- “Transition polynomials: definitions, properties, and interrelations”, The Leibniz Institute, Schloss Dagstuhl, Germany, June 2016.
- “Math and the World, with DNA assembly activities”, Hardwick Union High School, May 2016.
- “An introduction to the quantum Ising model”, Simons Institute, UC Berkeley, March 2016.
- “A Tutte polynomial for edge- and vertex- weighted graphs, list coloring, and the zero-temperature Potts model”, Workshop on New Directions for the Tutte Polynomial, Royal Holloway, England, July 2015.
- “Combinatorial strategies for self –assembly”, British Combinatorial Conference, Warwick, England, July 2015.
- “Undergraduate research experience as recruitment for non-majors”, plenary speaker, NES MAA section meeting, Keene, May 2015
- “New problems in graph theory from self-assembly”, HRUMC talk at Union College, April 2015
- “New graph theory from emergent self-assembly problems”, opening plenary speaker, Forty-Sixth Southeastern International Conference on Combinatorics, Graph Theory, and Computing Florida Atlantic University, March 2015
- “An old friend in a new place: List coloring and the zero-temperature Potts model”, opening plenary speaker, Forty-Sixth Southeastern International Conference on Combinatorics, Graph Theory, and Computing Florida Atlantic University, March 2015
- “An introduction to PRIMUS”, panel presentation on publication venues, Joint Mathematics Meeting, San Antonio, January 2015
- “An old friend in a new place: List coloring and the Potts model”, Summer Combo in NY, July 2014.
- “Math and the world”, Brattleboro Union HS, June 2014
- “Math and the world”, South Burlington High School, June 2014.
- “Graph theoretical expressions for statistical mechanics models”, Schrodinger Institute, Austria, June 2014.
- “Math and the world”, Canaan, VT, May 2014.
- “Math and the world”, Hinesburg High School, May 2014.

- “DNA origami and the complexity of Eulerian circuits with turning costs”, WPI, April 2014.
- “Ribbon graphs and twisted duality”, WPI, April 2014.
- “New problems in graph theory from micro and macroscale self-assembly”, 45th Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, FL, March 2014
- “The Tutte polynomial and beyond”, 45th Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, FL, March 2014
- “Polynomials of graphs in surfaces”, AMS-MAA Joint Meetings, Baltimore, January 2014.
- “Undergraduate research as recruitment for non-majors”, REU Panel, AMS-MAA Joint Meetings, Baltimore, January 2014.
- “DNA origami and the complexity of Eulerian circuits with turning costs”, UW Madison, WI, November 2013.
- “An undergraduate research project as recruitment for non-majors”, MAA Section Meeting, Potsdam, NY, October 2013.
- “Graph Theory for DNA self-assembly”, University of Delaware, October 2013
- “Graph theory in DNA self-assembly: an early entry point for interdisciplinary student research, MathFest, Hartford, August 2013.
- “Graph Theory for DNA Self-assembly”, 16th Annual Rocky Mountain Discrete mathematics Days, June 2013.
- “Math and the world”, Champlain Valley Union High School, May 2013.
- “Math and the world”, Brattleboro Union High School, two classes, June 2013.
- “Graph theory and DNA self-assembly”, Lafayette College, March, 2013.
- “Ribbon graphs and twisted-duality”, Lafayette College, March 2013.
- “The shapes of sea shells: Mathematical beauty in the natural world”, Academy of Arts and Science Annual Meeting, Boston, February 2013.
- “The Tutte-Potts connection with an external field”, Leibniz Institute, Schloss Dagstuhl, Germany, January, 2013.
- “The Tutte-Potts connection with an external field”, CMS Seminar, Caltech, October, 2012.
- “Graph theory tools for DNA self assembly”, various self assembly labs, Caltech, October, 2012.
- “Math and the world”, SMC convocation, September 2012.
- “Graph theoretical design strategies for origami folded DNA”, Summer Combo in Vermont Conference, July, 2012.
- “Graph theoretical design strategies for self-assembling nanostructures”, SIAM, Halifax, June, 2012.
- “The topological Penrose polynomial”, SIAM, Halifax, June, 2012.
- “Graph theoretical design strategies for self-assembling nanostructures”, Potsdam REU, June, 2012.
- “Graph colouring and the topological Penrose polynomial”, 43rd Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, FL, March 2012

- “Graph theoretical design strategies for self-assembly”, Bard College, March 2012.
- “Shell morphology: mathematical beauty in the natural world” Discrete and topological models in molecular biology conference, Tampa, FL, March 2012.
- “Optimally constructed 3D DNA polytopes”, (poster) Discrete and topological models in molecular biology conference, Tampa, FL, March 2012.
- “The topological Penrose polynomial”, Topology seminar, University of South Alabama, November, 2011.
- “Graphs in your neighborhood”, Enosburg VT, High School October, 2011
- “Origami Silhouettes and Wrapping”, SMC-UVM joint applied Combinatorics seminar, October, 2011
- “Graph Theoretical Design Strategies for Self-Assembly”, Middlebury College, September, 2011
- “Ribbon Graphs and Twisted Duality”, AWM 40th anniversary conference, Brown University, September, 2011
- “Design Strategies for Space Assembly” at NASA Goddard Space Flight Center, March 2011.
- “Graph theoretical design strategies for DNA nanostructures”, Applied mathematics seminar, George Washington University, March 2011.
- “Graph theoretical design strategies for DNA nanostructures”, Applied mathematics seminar, Institute for Defense Analysis, Princeton, NJ, February, 2011.
- “Ribbon graphs and twisted duality”, AMS-MAA Joint Meetings, New Orleans, January 2011.
- “Ribbon Graphs and Twisted Duality,” SIAM Conference on Discrete Mathematics, Austin, TX, June, 2010.
- “Ribbon graphs and twisted duality,” AMS Eastern Sectional Meeting, Newark, NJ, May, 2010.
- “Graphs in your neighborhood,” Missisquoi Valley Union Middle School, Swanton, VT, April, 2010.
- “Graph theoretical design strategies for self assembling nanostructures,” Dartmouth Combinatorics Seminar, Hanover, NH, March, 2010
- “Graph theory in the modern world,” Center for Undergraduate Research in Mathematics (CURM) Conference, Provo, UT, March, 2010
- “Twisted duality and the ribbon group of an embedded graph: a leisurely exploration in three parts. Part I. Representations of ribbon graphs and twisted duality,” Combo talk, University of Vermont, Burlington, VT, February, 2010.
- “Twisted duality and the ribbon group of an embedded graph: a leisurely exploration in three parts. Part II. The ribbon graph group, with orbits and classifications,” Combo talk, University of Vermont, Burlington, VT, February, 2010.
- “Twisted duality and the ribbon group of an embedded graph: a leisurely exploration in three parts. Part III. Those pesky polynomials,” Combo talk, University of Vermont, Burlington, VT, February, 2010.
- “Graph invariants from self-assembling nanostructures,” Special session on applied graph theory, Joint AMS-MAA Meeting, San Francisco, CA, January, 2010.
- REU discussion panelist, Mid-Hudson Mathematics Conference for Undergraduates,

October 2009.

- “From Potts to Tutte and back again...a graph theoretical approach to statistical mechanics,” Combinatorics Seminar, Lafayette College, Easton, PA, April 2009.
- “From Potts to Tutte and back again...a graph theoretical approach to statistical mechanics,” Colloquium, USA, Mobile, AL, February 2009.
- “Graph theory in the modern world: from beer foam and computer chips to DNA molecules and beyond!” Math Circle, USA, Mobile, AL, February 2009.
- “Graph theory and its applications,” The Rockpoint School, VT, December 2008.
- “Multivariable Tutte and Transition Polynomials,” Seminar, SUNY Binghamton, November, 2008.
- “The Tutte polynomial and Potts model in statistical mechanics,” Colloquium, SUNY Binghamton, November, 2008.
- “The increasingly popular Potts model, or, a graph theorist does physics,” plenary speaker, WIMIN conference, Smith College, Northampton, MA, September 2008.
- “Digraph polynomials,” Summer Combo in Vermont Miniconference, Colchester, VT, July 2008.
- “Graph theory designs for DNA nanostructures,” REU, SUNY Pottsdam, July 2008.
- “Multivariable Tutte and Transition Polynomials,” Combinatorics and Statistical Mechanics Programme, Isaac Newton Institute, Cambridge University, UK, April, 2008.
- “Graph theory and DNA nanostructures,” Smith College, MA, October, 2007.
- “Graph theory designs for DNA nanostructures,” Villanova University, Philadelphia, PA, October 2007.
- “Finding minimal tile and bond-edge types for self-assembling DNA graphs ...with students!” special session on graph theory topics for undergraduate research, MathFest, San Jose, August 2007.
- “From Potts to Tutte and back again—a graph theoretical view of statistical mechanics, with applications” USF, Tampa, FL, January 2007.
- “From Potts to Tutte and back again—a graph theoretical view of statistical mechanics,” UPenn, Philadelphia, PA, November 2006.
- “Network Applications for Math Enrichment,” Essex High School In-service workshop, March 2006.
- “A Duality Relation for the Topological Tutte Polynomial,” American Mathematical Society Meeting Special Session on Invariants of Graphs and Matroids, Bard College, NY, October 2005.
- “Weak Tutte Functions,” workshop on Tutte Polynomials and Related Topics, Centre de Recerca Matematica, Bellaterra, Spain, October 2005.
- “Graph models for DNA structures,” Vermont Genetics Network Workshop, August 2005.
- “Properties of the interlace polynomial,” American Mathematical Society Meeting Special Session on Graph Polynomials, Pittsburgh, November 2004.
- “Graph models from the Kevin Bacon game to biomolecular computing and beyond,” Skidmore College, October 2004.
- “Relations for generalized transition polynomials,” USF, Tampa, FL, March 2004.
- “Generalized transition polynomials and DNA sequencing,” CINEVESTAV, Mexico, January 2004

UVM Ph.D. Students (Ph.D. Advisor):

- Ada Morse, Ph. D Candidate, Mathematics, University of Vermont, Spring 2018.

UVM Masters Students (co-advisor/thesis committee):

- Jessica Scheld, Masters co-advisor and Masters Thesis Committee, University of Vermont, Spring 2007.
- Dan Nardi, Masters co-advisor and Masters Thesis Committee, University of Vermont, Fall 2003.
- Patricia Fogarty (SMC alumna), Masters Thesis Committee, University of Vermont, Spring 2003.

Defense Committees:

- Margherita Ferrari, Ph.D., Mathematical Models and Methods in Engineering, Politecnico di Milano, 2016.
- Tyson Williams, Ph. D., Computer Science, University of Wisconsin Madison, 2015.

Conference, Session, and Panel Organization:

- Co-organized Summer Combo in Vermont Conferences, SMC, most summers, 2007-present.
- Co-organized MAA Panel: Effectively Chairing a Mathematical Sciences Department, JMM San Diego, 2018.
- Co-organized a Special Session “Topological and Geometric Algorithms”, CanaDAM, June 2017.
- Co-organized Discrete Mathematics Days in the Northeast, Vermont Meeting, Jointly sponsored by UVM and SMC, June 2009, July 2011, and October 2016.
- Co-organized Graph Polynomials: Towards a Comparative Theory, Dagstuhl Seminar, 12th-17th June 2016
- Co-organized Workshop on New Directions for the Tutte Polynomial: Extensions, Interrelations, and Applications, EPSRC supported, Royal Holloway University of London, July 2015
- Co-organized a Special Session “Sharing the Joy: engaging Undergraduate Students in Mathematics,” AWM Research Symposium, April 2015.
- Co-organized a Special Session on Graph Polynomials and Their Applications for the 46th Southeastern International Conference on Combinatorics, Graph Theory, and Computing, March 2015.
- Planning Committee, 46th Southeastern International Conference on Combinatorics, Graph Theory, and Computing.
- Co-organized SIAM Discrete Mathematics 2014 Mini Symposium, Graph Polynomials: Towards a General Theory, June 2014.
- Co-organized the Joint Saint Michael's College/University of Vermont Applied Combinatorics Seminar, promoting collaboration of academic researchers in mathematics, computer science, and the sciences, as well as industry members, 2000-present.

- Co-Chair MAA Northeast Section Meeting, May 2008.

Selected Invited/Funded Conferences and Workshops:

- Tutte Centenary Retreat, MATRIX, Australia, November 2017.
- Combinatorics, Geometry, and Physics workshop at the Schrodinger Institute, Vienna, Austria, June-July 2014.
- Computational Counting Seminar at the Leibniz Institute, Schloss Dagstuhl, Germany, January, 2013.
- Departmental Self-Assessment workshop, Joint AMS-MAA meetings, San Francisco, January 2010.
- Tutte Polynomials and Related Topics Workshop , Centre de Recerca Matematica, Bellaterra, Spain, October 2005 and 2000.

Industry Collaborations:

Netlist Partitions: seeking tools from graph theory and geometric combinatorics to find a wiring layout on a chip within the space and timing parameters of the design, with J. Cohn (IBM), A. Dean (Skidmore), P. Gutwin (Cadence Design Systems), J. Lewis (SMC), and G. Pangborn (SMC) Spring 2002–Fall 2006.

Geometric Pattern Recognition: using a graph-theoretical approach to find and implement an algorithm for identifying specific small structures on a large chip layout, with J. Cohn (IBM), Dan Nardi (UVM), and R. Snapp (UVM), Fall 2001–Summer 2005.

Method for Defining a Set of Circuit Library Elements: developed heuristics using graph-theory techniques to find representative elements given a large set of elements with various parameters, with D. Hathaway (IBM) and A. Venkataraman (IBM), 2001.

Patent Provisional Applications and Disclosures:

Tiled Nanostructure Assemblies for Encaging Viral Capsids, J. Ellis-Monaghan, M. Gethers, W. Goddard, S. Han, J. Rossi, L. Scherer, N. Seeman, J. Voss Andreae CIT File No.: CIT-6860-P, 3/19/2014.

Mechanically Interlocked Complexes of Synthetic Polymer Nanostructure and Antibodies, J. Ellis-Monaghan, M. Gethers, W. Goddard, S. Han, J. Rossi, L. Scherer, N. Seeman, J. Voss Andreae CIT File No.: CIT-6861-P, 3/19/2014.

Pattern Recognition Algorithm for locating substructures in rectilinear designs (with J. Cohn (IBM), D. Nardi (UVM), and R. Snapp (UVM)), Patent Disclosure Draft (UVM internal), May 2003.

Method for defining a set of circuit library elements (with D. Hathaway and A. Venkataraman (IBM)), Patent Disclosure Draft (IBM internal), September 2001.

Software Development:

* *SMC undergraduate student.*

T. Dickerson*, G. McColm, J. Ellis-Monaghan, G. Pangborn, Developed software to generate crystal lattice structures, 2012.

T. Dickerson*, J. Ellis-Monaghan, G. Pangborn, Developed software to generate all possible tile geometries in the octet truss, 2012. <http://code.google.com/p/octettrusstilefinder/>

J. Ellis-Monaghan, P. Gutwin, C. Jennings*, J. Lewis*, G. Pangborn, Developed a C++ program for computer chip-layout problems adapted to standard industry interface through

OpenAccess, 2006-2008.

- J. Ellis-Monaghan, P. Gutwin, J. Lewis*, G. Pangborn, Developed a Java program for addressing various micro-electronics industry computer chip-layout problems such as floorplanning and automating small problematic configurations, 2004-2006.
- P. Bodkin*, J. Ellis-Monaghan, W. Sherman*, “Graph Analysis and Polynomial Maplet,” published on-line at MapleApps, Summer 2004.
- J. Ellis-Monaghan, L. McLane*, Maplet toolbox of development code for Maplet authors and tutoring guides for novice users. Developed for Waterloo Maple, Inc, Summer 2003.
- J. Ellis-Monaghan, C. Kriwox*, L. McLane*, 18 Maplets running on a Java platform for interactive graphical exploration of vector calculus concepts. Developed for Waterloo Maple, Inc, and published on MapleApps, Spring 2003.

Recent Grant-Supported Student Mentoring and Research:

- Marissa Berry, Anna Cook, Brenna Smith, Roxanne Withers, Anthony Zoellner, Margherita Ferrari (Politico di Milano grad student), Ada Morse (UVM grad student), ODESSEI Nanoconstruct Design Strategies Undergraduate Research Group, Summer 2017.
- Anna Cook, Jessica Greene, Alana Houlihan, David Perry, Rebecca Rouleau, and Brenna Smith, Ada Morse (UVM grad student),. ODESSEI Nanoconstruct Design Strategies Undergraduate Research Group, Summer 2016
- Ada Morse (UVM grad student), Bharti Singh, Melissa Westland, Design Strategies for Self-Assembly, Vermont Space Grant Consortium Research Grant, Summer 2015
- Conor Disher, Samantha Tremblay, Brianna Healy, and Alexandra Brown ODESSEI Nanoconstruct Design Strategies Undergraduate Research Group, Summer 2015
- Mary Falcigno, Eric Sherman, David Robins, Nate Hodge, Sam Blakely, Michael Farrell, NSF New Graph Theory from and for Nanoconstruct Design Strategies Undergraduate Research Group, Summer 2013.
- Tom Dickerson, Rob Hammond, Brianne Conlon, Sam Blakely, Eric Sherman, Saja Willard, NSF New Graph Theory from and for Nanoconstruct Design Strategies Undergraduate Research Group, AY, 2012-2013.
- Katelyn Heath, Design Strategies for Self-Assembly, Vermont Space Grant Consortium Research Grant, Summer 2012.
- Mary Falcigno, Eric Sherman, Tyler Hotte, Miranda LaRocque, Tom Dickerson, Saja Willard, NSF New Graph Theory from and for Nanoconstruct Design Strategies Undergraduate Research Group, Summer 2012.
- Mary Spuches, Mary Hall, Saja Willard, Tom Dickerson, NSF New Graph Theory from and for Nanoconstruct Design Strategies Undergraduate Research Group, AY 2011-2012.
- James Coolidge, Design Strategies for Self-Assembly, Vermont Space Grant Consortium Student Mentoring Grant, Summer 2011.
- Kevin O’Brien, Design Strategies for Self-Assembly, Vermont Space Grant Consortium Research Grant, Summer 2011.
- Mary Spuches, Chris Lessard, Jessica Adams, Kelsey King, Tom Dickerson, NSF New Graph Theory from and for Nanoconstruct Design Strategies Undergraduate Research Group, AY 2010-2011.
- Brandon Doster, Jessica Adams, Mary Hall, Tom Dickerson, NSF New Graph Theory

from and for Nanoconstruct Design Strategies Undergraduate Research Group, Summer, 2010-2011.

- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches, Andrew Gilbert, and Keith Randall, Undergraduate research experience in applied graph theory, Center for Undergraduate Research in Mathematics, AY 2009-2010.
- Andrew Gilbert and Jacob Girard, Design strategies for rigid DNA nanoconstructs, Vermont Genetics Network, Summer 2009.
- Dan Lewis, DNA nanostructures, Vermont Space Grant Student Mentoring Program, Summer 2009
- Brian Hopper and Paul Jarvis, Structure theorems for building complexes from DNA, Vermont Genetics Network, AY 2008-2009.
- Eva Ellis-Monaghan, The Potts and Ising models of statistical mechanics, National Security Agency, Summer 2008.
- Nick Bruno and Paul Jarvis, Mathematical models for building graphical complexes from DNA, National Security Agency, Summer 2008.
- Andrea Austin, Eulerian Cycles and Graph Polynomials, National Security Agency, Summer 2007.
- Jonathan Kaptcianos, The Eulerian Superpath Problem and DNA Fragment Assembly, National Security Agency, Summer 2007.
- Andrea Austin, Eulerian Cycles and Graph Polynomials, Vermont Genetics Network, Spring 2007.
- Jonathan Kaptcianos, The Eulerian Superpath Problem and DNA Fragment Assembly, Vermont Genetics Network, Spring 2007.
- Laura Beaudin, Applications of the Potts Model, Vermont Genetics Network, Summer 2006, AY 2006-2007.
- Sarah Hamilton, Developing Graph Theory Tools for Netlist Layout, (co-advised with G. Pangborn), Vermont Space Grant Student Mentoring Program, Summer 2006, AY 2006-2007.
- David Miller, Minimum pot sets for DNA self-assembly. Vermont Genetics Network, Spring/Summer 2006, AY 2006-2007.
- Chris Jennings, Graph theoretical approaches to netlist layout, Vermont EPSCoR, (co-advised with G. Pangborn), Summer 2006.
- Jamey Lewis, Graph theoretical techniques in netlist layout. Cadence Design Systems Grant, Spring/Summer 2006.
- Jess Scheld, DNA sequencing and Euler Circuits. Vermont Genetics Network, Spring/Summer 2006.
- Mary Cox, Carbon knots and the Tutte polynomial, Vermont Genetics Network, AY 2005-2006.
- Sarah Walker, DNA nanostructures, Vermont Genetics Network, AY 2005-2006.
- Jamey Lewis, Graph theoretical techniques in netlist layout. Industry Collaborator and FDC Support, Fall 2005.
- Mary Cox, Marisa Debowsky, Jessica Scheld, Graph polynomials and DNA structures, Vermont Genetics Network, Summer 2005.

- Jamey Lewis, Graph theoretical techniques for netlist layout. Vermont EPSCoR, Summer 2005.
- Jamey Lewis, Spring embedder driven netlist layout tools. Vermont Space Grant Student Mentoring Program, Spring 2005.
- Jamey Lewis, Graph theoretical techniques for netlist layout. Academic Programs and FDC, Fall 2004.
- Mary Cox and Marisa Debowksy (UVM graduate students), Applications of transition polynomials to DNA analysis. Vermont Genetics Network, Summer 2004.
- Jamey Lewis, Graph theoretical techniques in netlist layout. Vermont EPSCoR, jointly with industry (Cadence) and G. Pangborn (SMC computer science) Summer/Fall 2004.
- Patricia Bodkin and Whitney Sherman, Computation of graph polynomials for DNA sequencing. Vermont Genetics Network/BRIN, 2003-2004.
- Patricia Bodkin, Sarah Graham and Whitney Sherman, Computation of graph polynomials for DNA sequencing. Vermont Genetics Network/BRIN, Summer 2003.
- Laura McLane, Maplet Toolbox, tutorial and content website supported by a grant from Waterloo Maple, Inc., Summer 2003.
- Laura McLane and Colin Kriwox, Maplet development, Maple interface tools supported by a grant from Waterloo Maple, Inc., Spring 2003.
- Laura McLane, Graphical-layout, independent study, Fall 2002.
- Dan Nardi, pattern-recognition independent study, joint work with UVM Computer Science Department and IBM, Spring 2002–Summer 2003.

Recent Student Presentations:

CURM Research Conference, Brigham Young University, Utah

- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches “Design Optimization for DNA Nanostructures I: Problem Formulation,” March 2010.
- Mary Spuches, Brian Goodhue, Jake Girard, Daniel Koch, Andrew Parent and Thomas Dickerson “Design Optimizations for DNA Nanostructures II: Symmetries in the Octet Truss,” March 2010.
- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches “Design Optimization for DNA Nanostructures III: Realizable Graphs,” March 2010.

Discrete Math Days in the Northeast

- Thomas Dickerson, “Generating crystal lattices”, July, 2011.
- Jessica Adams, “Knotted crystals in the octet truss”, July 2011.
- Mary Spuches, “Design optimization for DNA nanostructures”, July 2011.
- Mary Hall, “Phylogenetic trees: graphical representations of evolutionary relationships”, July 2011.
- Brandon Doster, “The Eulerian superpath problem”.
- James Coolidge and Kevin O’Brien, “Utilizing the octet truss in the design of lateral transfer retroreflectors,” July 2011.

Hudson River Undergraduate Mathematics Conference:

- Marissa Berry, Anna Cook, Roxanne Withers – Maximally Efficient Threading Circuits for DNA Self-Assembly, April 2018

- Ahmed Albuwi—*Graph Isomorphism*, April 2017.
- Michaela Burns – *The Interlace Polynomial in Graph Theory*, April 2015.
- Colby Ajoku and Jeremy Wong – *The Martin Polynomial and the Circuit Partition Polynomial*, April 2015.
- Amber Emmell and Stephanie Nadow – *Characteristic Graph Polynomial*, April 2015.
- Maya Lopez and Logan Tracy – *The Matching Polynomial of A Graph*, April 2015.
- David Bouthillier and Zhendong Shang – *The Penrose polynomial and the 4-color map theorem*, April 2015.
- Maria Leuci, Eric Parziale, Michael Thompson – *Minimal Surfaces*, April 2013.
- Alexa Foote, Emma Hauser, Rob Hammond, Erika Gravelin – *Gomboc: An Exception to the Four Vertex Theorem*, April 2013.
- Alison Shappy, Patrick Knapp, Julie Malloweny, Colin Delaney – *Archimedean Screw*, April 2013.
- Eric Sherman, Saja Willard– *Self-assembling Objects with Central Vertices*, April 2013.
- Brianne Conlon, Rob Hammond – *Graph Optimization in Self-assembling DNA Nanostructures*, April 2013.
- Thomas Dickerson, Jessica George, Krista Bird—*Techniques for Fractal Terrain Generation*, April 2013.
- Thomas Dickerson – *Computational Generation of Crystal Nets*, April 2012.
- Mary Spuches – *Uniform Polyhedra in the Octet Truss*, April 2012.
- Saja Willard - *Self-Assembly Design Strategies*, April 2012.
- Rob Hammond – *Graph Theory and Water Habitat Conservation*, April 2012.
- Michaela Burns - *Epidemics and Graph Theory*, April 2012.
- Thomas Dickerson, “Generating Crystal Lattices with the Octahedral Symmetry Group”, April 2011.
- Jessica Adams and Kelsie King, “Knotted Crystals”, April 2011.
- Mary Spuches, “Design Optimization for DNA Nanostructures” , April 2011.
- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches “Design Optimization for DNA Nanostructures I: Problem Formulation,” April 2010.
- Mary Spuches, Brian Goodhue, Jake Girard, Daniel Koch, Andrew Parent and Thomas Dickerson “Design Optimizations for DNA Nanostructures II: Symmetries in the Octet Truss,” April 2010.
- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches “Design Optimization for DNA Nanostructures III: Realizable Graphs,” April 2010.
- Eric Gallager, Danile Lewis, William Jeralds, “Rising Waters: Flood Expectancies on the Winooski River,” April 2010.
- Nadine McBride, Mary Leavy, Catherine Dalton, “The Power of Water: Hydroelectricity and the Winooski One Hydro Station,” April 2010.
- Akie Hashimoto, “Building Graphical Complexes from DNA,” (co-advised with G. Pangborn), Spring 2008.
- Jonathan Kaptcianos, “Eulerian Circuits, de Bruijn Graphs, and DNA Fragment Assembly,” Spring 2008.

- Andrea Austin, “The Circuit Partition Polynomial and Applications to the Tutte Polynomial,” Spring 2007.
- Laura Beaudin, “Review of the Potts model,” Spring 2007.
- Sarah Hamilton, “Unit Rectangle Visibility Graphs,” (interdisciplinary advisors: A. Dean (Skidmore), J. Ellis-Monaghan (Mathematics), and G. Pangborn (Computer Science)), Spring 2007.
- Jonathan Kaptcianos, “Graph Theory aiding DNA Fragment Assembly,” Spring 2007.
- David Miller, “Latin Squares: A useful and entertaining piece of math,” Spring 2007.
- David Miller, “Minimal Tile/Edge Types for a Given Graph,” Spring 2007.
- Jamey Lewis, “Floorplanning with Force-Directed Graphing Using Flexible Blocks” (Interdisciplinary advisors: J. Ellis-Monaghan (Mathematics) and G. Pangborn (Computer Science), P. Gutwin (Cadence)), Spring 2006.
- Sarah Walker, “Determination of Strand Numbers for DNA Nanoconstructs” (Interdisciplinary advisors: J. Ellis-Monaghan (Mathematics), G. Pangborn (Computer Science), D. Green and M. Lubkowitz (Biology)), Spring 2006.
- Ben Epstein, “Chaos and the Motion of a Driven Pendulum System” (Interdisciplinary advisors: A. Brizard (Physics) and J. Ellis-Monaghan (Mathematics)), Spring 2005.
- Jamey Lewis, “Adaptations of Force-Directed Layout Techniques for Computer Chip Design” (Interdisciplinary advisors: J. Ellis-Monaghan (Mathematics) and G. Pangborn (Computer Science), P. Gutwin (Cadence)), Spring 2005.
- Patricia Bodkin, “The Pott’s Model Partition Function, an Application of the Tutte Polynomial,” Spring 2004.
- Patricia Bodkin and Whitney Sherman (joint talk), “An Introduction to the Tutte Polynomial,” Spring 2004.
- Jamey Lewis, “Applications of Force-Directed Graphing in Computer Chip Design,” Spring 2004.
- Whitney Sherman, “The Kauffman Bracket as an Evaluation of the Tutte Polynomial,” Spring 2004.
- Natalie Skall, “Group Theory Applied to the Warlpiri Tribe is Proved to Deter Incest,” Spring 2004.
- Michael White, “Knots and Stuck Unknots: Hydrocarbon Chains?” Spring 2004.
- Aaron Desrochers, “Applications of Graphs in the Study of Island Networks,” Spring 2003.
- Michael Duquette, “Progressively Finite Games with Emphasis on the Game of Nim,” Spring 2003.
- Colin Kriwox, “Among the Primes,” Spring 2003.
- Laura McLane, “Graphic Tool for Computer Chip Layout,” Spring 2003
- Angela Lavoie, “Did You Say It Was a Snark?” Spring 2000.
- Sarah Menard, “Graph Coloring,” Spring 1999.

MAA Northeastern Section Student Talks

- Eva Ellis-Monaghan, “The Potts and Ising Models of Statistical Mechanics,” Summer 2008
- Thomas Dickerson, “Generating Crystal Lattices with the Octahedral Symmetry Group”, June, 2011.

- Jessica Adams, “Knotted Crystals”, June 2011.

Mathematical Biosciences Institute Undergraduate Capstone Conference

- David Perry, “Knotted and Unknotted A-trails on n-Tori”, August 2017.

MathFest

- Brenna Smith, “DNA Origami and Unknotted A-trails in Torus Graphs”, August 2017.
- “Mary Spuches, “Design Optimizations for DNA Nanostructures” August, 2010.
- Brian Adams, “Clap to it! An Examination of Steve Reich’s ‘Clapping Music,’” MathFest 1999, Providence, RI (cash award for best presentation in the session).

Mid-Hudson Mathematics Conference for Undergraduates

- Jacob Girard and Keith Randall, “Design strategies for DNA nanostructures,” October 2009.

NASA Goddard Space Flight Center, ATLAS group

- James Coolidge, “Utilizing the octet truss in the design of lateral transfer retroreflectors,” August 2011.
- Dan Lewis, “Self-assembling DNA nanostructures,” Fall 2009.
- Sarah Hamilton, “Unit rectangle visibility graphs,” Spring 2007.
- Jamey Lewis, “Further adaptations of force-directed layout techniques for computer chip design,” Spring 2005.

Northeastern Section MAA Meeting Poster Session

- Thomas Dickerson, “Generating Crystal Lattices with the Octahedral Symmetry Group”, June, 2011.
- Jessica Adams, “Knotted Crystals”, June 2011.

Parents’ Weekend

- Sarah Graham, “Instant insanity game,” Spring 2003.
- Whitney Sherman, “Graphs and cycles,” Spring 2003.

Saint Lawrence Valley Mathematics Symposium

- Mary Hall, “Phylogenetic Trees – Graphical Representations of Evolutionary Relationships”, October 2012.

Senior Seminar

- Lauren Rizzotti, “Mathematics behind the card game Set”, Spring 2009.
- David Miller, “Latin Squares,” Spring 2007.
- Nathan Rounds, “The Mathematics within Casino Games,” Spring 2007.
- Patrick Asaba, “Origami Mathematics,” Spring 2006.
- Amanda Dargie, “The Four Color Theorem,” Spring 2005.
- Cody Tiegens, “Fibonacci Numbers and Tiling with Dominoes,” Spring 2005.
- Kenneth Bopf, “Crystallographic Groups,” Spring 2004.
- Amanda Daniels, “Sea Shell Models,” Spring 2004.
- Whitney Sherman, “The Kauffman Bracket in Knot Theory,” Spring 2004.
- Michael Duquette, “Graph Coloring and the Five Color Theorem,” Spring 2003.
- Colin Kriwox, “Codes: Error Detection and Correction,” Spring 2003.
- Michael Bobela, “Scheduling Theory,” Spring 1999.
- Jennifer Hartell, “The Fibonacci Numbers,” Spring 1999.

SMC Chemistry Seminar

- Jonathan Kaptcianos, “The Eulerian superpath problem and DNA fragment assembly,”

Summer 2007.

SMC Dean's Reception Posters:

- Mary Spuches, "Design Optimization for DNA Nanostructures", April 2011.

SMC Mathematics Seminar:

- Dan Lewis, "Self-assembling DNA nanostructures," September 2009.

SMC URC Research Symposium Posters:

- Michaela Burns and Sam Blakely, "The Interlace Polynomial in Graph Theory", April 2015.
- Maria Leuci, Eric Parziale, Michael Thompson, "Minimal Surfaces", April 2013.
- Alexa Foote, Emma Hauser, Rob Hammond, Erika Gravelin, "Gomboc: An Exception to the Four Vertex Theorem", April 2013.
- Alison Shappy, Patrick Knapp, Julie Malloweny, Colin Delaney, "Archimedean Screw", April 2013
- Eric Sherman, Saja Willard, "Self-assembling Objects with Central Vertices", April 2013.
- Brianne Conlon, Rob Hammond, "Graph Optimization in Self-assembling DNA Nanostructures", April 2013.
- Thomas Dickerson, Jessica George, Krista Bird, "Techniques for Fractal Terrain Generation", April 2013.
- Maeve Carrol, Maura O'Riordan, Eric Sherman, "Triple Torus Knots", April 2013.
- Thomas Dickerson (talk), "Computational Generation of Crystal Nets", April 2012.
- Mary Spuches, "Uniform Polyhedra in the Octet Truss", April 2012.
- Saja Willard, "Self-Assembly Design Strategies", April 2012.
- Rob Hammond, "Graph Theory and Water Habitat Conservation", April 2012.
- Michaela Burns, "Epidemics and Graph Theory", April 2012.
- Jessica Adams and Kelsie King, "Knotted Crystals", April 2011.
- Mary Spuches, "Design Optimization for DNA Nanostructures", April 2011.
- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches, "Design Optimization for DNA Nanostructures I: Problem Formulation," April, 2010
- Mary Spuches, Brian Goodhue, Jake Girard, Daniel Koch, Andrew Parent, and Thomas Dickerson, "Design Optimizations for DNA Nanostructures II: Symmetries in the Octet Truss," April, 2010.
- Thomas Dickerson, Jacob Girard, Brian Goodhue, Daniel Koch, Andrew Parent, and Mary Spuches, "Design Optimization for DNA Nanostructures III: Realizable Graphs," April, 2010.
- Eric Gallager, Daniel Lewis, William Jeralds, "Rising Waters: Flood Expectancies on the Winooski River," April 2010.
- Nadine McBride, Mary Leavy, Catherine Dalton, "The Power of Water: Hydroelectricity and the Winooski One Hydro Station," April 2010.
- Nick Bruno, Paul Jarvis, Akie Hashimoto, "Mathematical models for building graphical complexes from DNA," April 2009.
- Eric Gallager, "The dots and boxes game," April 2009.
- Jonathan Kaptcianos, "A graph theoretical approach to DNA fragment assembly," April 2009.

- Laurent Rizzotti , “Mathematics behind the card game Set”, April 2009.

SMC/UVM Joint Combinatorics Seminar

- Jamey Lewis, “Force-directed floorplaning with flexible blocks,” Spring 2006.

Southeastern Section AMS Meeting, Tampa Florida

- Thomas Dickerson, “Computational Generation of Crystal Nets”, March 2012.

Summer Combo in Vermont

- David Perry, Brenna Smith, Anthony Zoellner, “When is a graph not O.K.?” , July 2017.
- Marissa Berry, Anna Cook, Roxanne Withers, “Maximally Efficient Threading Circuits for DNA Self-Assembly”, July 2017.
- Will Adkisson, Jessica Green, Ada Morse, David Perry, Brenna Smith, “Unknotted A-trails on n-tori”, July 2016.
- Will Adkisson, Jessica Green, Ada Morse, David Perry, Brenna Smith, “Knotted A-trails on n-tori”, July 2016.
- Anna Cook, Margherita Ferrari, Alana Houlihan, Rebecca Rouleau, “DNA Self-assembly with tiling”, July 2016.
- Anna Cook, Margherita Ferrari, Alana Houlihan, Rebecca Rouleau, “DNA Self-assembly with threading”, July 2016.
- Alexandra Brown and Sam Tremblay, “DNA Torus Knots”, July 2015.
- Alexandra Brown and Sam Tremblay, “DNA Cages”, July 2015.
- Brianna Healy and Melissa Westland, “Selecting Augmenting Edges for DNA Origami Designs”, July 2015.
- Conor Disher and Bharti Singh, “Finding Eulerian Circuits with Minimal Turning Costs”, July 2015.
- Sam Blakely, Mary Falcigno, Eric Sherman, “A Dynamic Programming Approach for the Eulerian Circuit with Turning Costs Problem”, July 2013.
- Nate Hodge, David Robbins, “Design Strategies for DNA Nanoscale Prisms”, July 2013.
- Mary Falcigno, “Tiling and Threading of Polyhedra”, July 2013.
- Mary Falcigno, Katelyn Heath, “Tiling and Threading of Polyhedra”, July 2012.
- Tyler Hotte, Miranda LaRocque, “Designs for Self-Assembling Cubmic Lattices”, July 2012.
- Eric Sherman, Saja Willard, “DNA Polytopes”, July 2012.

Vermont Academy of Arts and Sciences

- Mary Spuches – *Uniform Polyhedra in the Octet Truss*, April, 2012.
- Rob Hammond – *Graph Theory and Water Habitat Conservation*, April, 2012.
- Jamey Lewis, “A spring embedding program for netlist layout,” Spring 2004.
- Paul Frail, “Atomic orbital modeling,” (chemistry presentation using Maple to model electron orbits), April 1999.

Vermont EPSCoR People, Ideas, and Tools Conference

- Jamey Lewis, “Graph theoretical techniques for netlist layout,” Summer 2005.

Vermont Genetics Network Workshop

- Andrew Gilbert, Jacob Girard, Dan Lewis, “Design optimization for DNA nanostructures,” August 2009.
- Nick Bruno, Akie Hashimoto, Paul Jarvis, “Mathematical models for building graphical complexes from DNA ,” Summer 2008.

- Andrea Austin, “The circuit partition polynomial and relation to the Tutte polynomial,” Spring 2007.
- Laura Beaudin, “The Potts Model,” Spring 2007.
- Jonathan Kaptcianos, “Graph theory aiding DNA fragment assembly,” Spring 2007.
- David Miller, “Efficient DNA construction using minimization,” Spring 2007.
- Mary Cox, “Alpha-regular stick numbers for carbon complex knots,” Spring, 2006.
- Jessica Scheld, “DNA sequencing and Eulerian circuits,” Spring, 2006.
- Sarah Walker, “DNA nanotechnology,” Spring, 2006.
- Laura Beaudin, “Applications of the Potts Model,” Summer 2006.
- Mary Cox, “Hydrocarbon knots in the octet truss,” Summer 2006.
- David Miller, “Minimal tile types for a given graph,” Summer 2006.
- Mary Cox, “Knots and stuck unknots in hydrocarbon chains,” Summer 2005.
- Marisa Debowsky, “Biomolecular computing and topological graph theory,” Summer 2005.
- Jessica Scheld, “DNA sequencing and Eulerian circuits,” Summer 2005.

Vermont Space Grant Consortium Awards Ceremony

- Dan Lewis, “Self-assembling DNA nanostructures,” Fall 2009.

Reviewing and Refereeing:

Reviewer for *Mathematical Reviews*.

Book and Journal Reviewer for the following publishing companies:

- *De Gruyter publishing*
- *John Wiley and Sons*
- *Oxford University Press*
- *Princeton University Press*
- *Springer*
- *Taylor and Francis*

Referee for the following journals:

- *American Journal of Undergraduate Research.*
- *Annales de l'Institut Henri Poincaré.*
- *Annals of Combinatorics.*
- *Bioinformatics.*
- *Cambridge Philosophical Society*
- *Combinatorics, Probability, and Computing.*
- *DIMACS BioMath in the Schools Project Bioinformatics.*
- *Discrete Mathematics.*
- *DNA21.*
- *Electronic Journal of Combinatorics.*
- *European Journal of Applied Mathematics.*
- *European Journal of Combinatorics.*
- *Graph Drawing 2003.*
- *Graphs and Combinatorics.*
- *International Journal of Mathematics and Mathematical Sciences.*
- *Journal of Algebra.*

- *Journal of Applied Mathematics and Computing.*
- *Journal of Combinatorial Theory, Series B.*
- *Journal of Differential Geometry and Its Applications.*
- *Journal of Experimental Algorithms.*
- *Journal of Graph Theory.*
- *Journal of Mathematical Biology.*
- *Journal of Mathematical Chemistry.*
- *Journal of Pure and Applied Algebra.*
- *Journal of Statistical Physics.*
- *Journal of the Royal Society Interface.*
- *The London Mathematical Society.*
- *Mathematical Reviews*
- *Mathematics Scandinavica.*
- *PRIMUS.*
- *Royal Society Interface.*
- *SIAM Journal on Discrete Mathematics.*
- *Structural Combinatorics* (special volume of *Discrete Mathematics*).
- *Symmetry, Integrability, and Geometry: Methods and Applications.*

Grant reviewing:

- *National Science Foundation*
- *National Security Agency*
- *Natural Sciences and Engineering Research Council of Canada*
- *Vermont Genetics Network*
- *Vermont NASA Space Grant Consortium*

Service:

- Department chair, 2015-present.
- Dispute Resolution Committee, 2016-2018.
- Math department search committee, summer 2017.
- Math department search committee, summer 2016.
- Math department search committee, AY 2015-2016.
- Chaired the departmental self-study, 2014-2015.
- Presidential task force on faculty development, 2014-2015.
- Math department search committee, spring 2015.
- Participated in developing and implementing the calculus readiness test, and subsequent advising based on the test results.
- Judicial Review Board, AY 2012-2014.
- Faculty Advisor, Lyons Dorm, AY 2012-2013.
- Faculty Advisor, Joyce Dorm, AY 2011-2012.
- Participated in departmental planning for the 4-4 transition.
- Faculty Welfare Committee, AY 2008-2010.
- Coordinate HRUMC trip for students and faculty each spring, 2005-present.
- Vermont State Mathematics Coalition, Expanding Horizons Speaker, Fall 2002–present.
- Mathematics Department search committee, AY 2009-2010

- Faculty advisor, Joyce Dorm, Academic Year 2009-2010.
- Faculty advisor, Lyons Dorm, Academic Year 2008-2009
- NSF ANTC program graph theory panel, December, 2007.
- Liaison to Technology Steering Committee, Academic Years 2005-2006.
- Honors Committee, Academic Years 2004-2006.
- Jeanmarie Renovation Committee (Appointed by Chair), 2004-2006.
- Pontigny Society Advisory Board, Academic Year 2004-2005.
- St. Anne's Shrine Committee, Academic Year 2004-2005.
- Pension Committee, Academic Years 2003-2006.
- Art Committee, Academic Years 2003-2005.
- Anime Club advisor, 2003-2005.
- Educational Technology Committee, Saint Michael's College, 2002-2003 and 2005-2007.
- Organizer (with Dan Archdeacon) for "Discrete Methods in Geometry," a special session for the MAA summer meetings, MathFest 2002, Burlington, VT.
- Local Arrangements Committee for the MAA summer meetings, MathFest 2002, Burlington, VT.
- Joint Saint Michael's College/University of Vermont Applied Combinatorics Seminar Organizer, 2000–present.
- Faculty Advisor, Deaf Awareness House, Saint Michael's College, 1999–2000.
- Lounge Committee, Saint Michael's College, Fall 1998–Spring 2000, Fall 2002–Fall 2003.

Professional Memberships:

- American Mathematical Society.
- Association for Women in Mathematics.
- Mathematical Association of America