

Greta Pangborn

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Saint Michael's College
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Education

Cornell University, Ithaca, NY

Ph.D. in Operations Research

- Thesis topic: A Branch and Cut and Price Computation for Airline Crew Scheduling
- Thesis advisor: Professor Leslie E. Trotter Jr.
- Major in mathematical programming
- Minors in computer science and education
- Research Interests: integer programming, computational optimization, combinatorial optimization

M.S. in Operations Research

B.S. in Operations Research and Industrial Engineering

Academic Experience

Saint Michael's College, Colchester, VT

Associate Professor (Fall 2009 – Present)

Assistant Professor (Fall 2003 – Spring 2009)

Visiting Assistant Professor (Fall 2002 – Spring 2003)

- Introduction to Computing
- Introduction to Computer Science
- Introduction to Computer Graphics
- Data Structures and the Analysis of Algorithms
- Introduction to Machine Organization
- Programming Languages for Information Systems
- Organization of Programming Languages
- e-Commerce
- Advanced Algorithms and Their Complexity
- Finite Mathematics
- Special Topics - Operations Research

Wellesley College, Wellesley, MA

Visiting Instructor (Fall 2000 – Spring 2001)

- Calculus One
- Calculus Two
- Combinatorics and Graph Theory

Cornell University, Ithaca, NY

Research Assistant

- Implementation and design of Branch and Cut and Price algorithms for airline crew scheduling integer programs

Course Instructor

- Introduction to Operations Research
- Topics in Linear Optimization

Teaching Assistant

- Introduction to Operations Research
- Industrial Systems Analysis
- Optimization I
- Optimization II
- Material Handling Systems

Publications

- J. Ellis-Monaghan, A. McDowell, I. Moffatt, G. Pangborn, DNA origami and the complexity of Eulerian circuits with turning costs, *Natural Computing*, accepted pending revision.
- J. Ellis-Monaghan, G. Pangborn, L. Beaudin, D. Miller, N. Bruno, A. Hashimoto, Minimal Tile and Bond-Edge Types for Self-Assembling DNA Graphs, invited chapter for *Discrete and Topological Models in Molecular Biology*, Jonoska & Saito, Eds pp. 241-270, 2014.
- J. Ellis-Monaghan, G. Pangborn, An example of practical organization for undergraduate research experiences, *PRIMUS*23 (9), pp. 805-814, 2013..
- J. Ellis-Monaghan, G. Pangborn, Using DNA Self-assembly Design Strategies to Motivate Graph Theory Concepts, *Mathematical Modeling of Natural Phenomena*, 6, no. 6 (2011) 96-107.
- L. Beaudin, J. Ellis-Monaghan, G. Pangborn, R. Shrock, A Little Statistical Mechanics for the Graph Theorist, *Discrete Mathematics*, **310** (13-14), pp. 2037-2053, 2010.
- 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.
- A. Dean, J. Ellis-Monaghan, S. Hamilton, G. Pangborn, Unit Rectangle Visibility Graphs, *Electronic Journal of Combinatorics*, **15**, #R79, 2008.
- J. Ellis-Monaghan, P. Gutwin, J. Lewis, and G. Pangborn, Graph Drawing for Floorplanning with Flexible Blocks, *Congressus Numerantium* **178**, pp. 147-159, 2006.
- J. Ellis-Monaghan, P. Gutwin, J. Lewis, and G. Pangborn, Principles and Preliminary Results for Force-directed Floorplanning with Malleable Blocks, *Congressus Numerantium*, **175**, pp. 81-96, 2005.
- M. Battig and G. Pangborn, Pilot Studies Introducing Collaborative and Distance Learning Paradigms in a Residential Environment. *Information Systems Education Journal*, **3** (13), 2005. <http://isedj.org/3/13>. ISSN 1545-679X. (Also appears in *The Proceedings of ISECON 2004*: ISSN: 1542-7382.)
- G. Pangborn, Operations Research and the Information Systems Curriculum. *Information Systems Education Journal*, **3** (13), 2005. <http://isedj.org/3/15>. ISSN 1545-679X. (Also appears in *The Proceedings of ISECON 2004*: ISSN: 1542-7382.)
- J. Snowdon, R. Anbil, and G. Pangborn, The Airline Crew Scheduling Problem: Dual Simplex, Volume, and Volume/SPRINT Solutions, IBM Research Technical Report RC21642, 2000.

Grants Received

- Travel funding and lodging for Teaching Discrete and Algebraic Mathematical Biology to Undergraduates, Workshop at the Ohio State University Mathematical Biosciences Institute.
- Joanna Ellis-Monaghan (PI), Greta Pangborn - NSF Algebra, Number Theory, and Combinatorics, New Graph Theory from and for Nanoconstruct Design Strategies, June 2010-May 2013.
- Greta Pangborn, Joanna Ellis-Monaghan, Katelyn Heath – Mentored student grant from the Vermont NASA-National Space Grant College and Fellowship Program, Summer 2012
- Greta Pangborn (PI), Joanna Ellis-Monaghan, Michael Battig - Enhancing Mathematics and Computer Science Opportunities in a Supportive Liberal Arts Environment, NSF STEM Scholarship Program, Fall 2008 through Spring 2013
- Greta Pangborn, Joanna Ellis-Monaghan, Patrick Redmond – Mentored student grant from the Vermont NASA-National Space Grant College and Fellowship Program, Summer 2008
- Designing Tile Types for Branched Junction Molecule Methods, SMC Junior Faculty Summer Research Grant, Summer 2008
- Greta Pangborn, Joanna Ellis-Monaghan, Sarah Hamilton – Mentored student grant from the Vermont NASA-National Space Grant College and Fellowship Program, Summer 2006 through Spring 2007
- Greta Pangborn (PI), Joanna Ellis-Monaghan - Graph Theoretical Approaches to Netlist Layout, NSF EPSCoR Grant, Summer 2006
- Joanna Ellis-Monaghan (PI), Greta Pangborn - Cadence Design Systems support for undergraduate research for netlist layout project, Spring-Summer 2006
- Joanna Ellis-Monaghan, Greta Pangborn - Mentored Student Support for Netlist Layout, SMC Faculty Development Committee Grant, Spring 2006
- Joanna Ellis-Monaghan (PI), Greta Pangborn - Graph Theoretical Techniques for Netlist Layout, NSF EPSCoR Grant, Summer 2005
- Joanna Ellis-Monaghan, Greta Pangborn - Mentored Student Support for Netlist Layout Tools, SMC Faculty Development Committee Grant, Spring 2005
- DIMACS Reconnect Conference, Integrating Information from Sequence and Evolution: An Introduction to Computational Biology, Sponsored by the National Science Foundation, August 2004
- Support for the development of a blended traditional/distance learning e-Commerce course, SMC Educational Technology Committee Grant, Spring 2003

Undergraduate Research and Independent Study Projects

Please note that the majority of students listed below were co-advised with Professor Joanna Ellis-Monaghan of the Saint Michael's College mathematics department.

- David Robbins, Design Strategies for DNA Nanoscale Prisms, Summer 2013
- Nate Hodge, Design Strategies for DNA Nanoscale Prisms, Summer 2013
- Sam Blakely, Minimum Turning Cost Eulerian Tours, Spring 2012, Summer 2013
- Brianne Conlon, Graph Theoretical Optimization for Self-Assembling DNA Nanostructures, Spring 2013
- Rob Hammond, Graph Theoretical Optimization for Self-Assembling DNA Nanostructures, Spring 2013
- Eric Sherman, DNA Polyhedra, Summer 2012, Spring 2013, Summer 2013

- Mary Falcigno, Tiling and Threading of Polyhedra, Summer 2012, Summer 2013
- Saja Willard, DNA Polyhedra, Fall 2011-Spring 2013
- Katelyn Heath, Tiling and Threading of Polyhedra, Summer 2012
- Tyler Hotte, Designs for Self-Assembling Cubic Lattices, Summer 2012
- Miranda LaRoque, Designs for Self-Assembling Cubic Lattices, Summer 2012
- Mary Hall, Phylogenetic Trees: Graphical Representations of Evolutionary Relationships, Summer 2011
- Brandon Doster, The Eulerian Superpath Problem, Summer 2011
- Kevin O'Brien and James Coolidge, Utilizing the Octet Truss in the Design of Lateral Transfer Retroreflectors, Summer 2011
- Thomas Dickerson, Generating Crystal Lattices with the Octahedral Symmetry Group (and other projects), Fall 2010- Spring 2013
- Mary Spuches, Design Optimization for DNA nanostructures, Fall 2010- Spring 2011
- Jessica Adams, Knotted Crystals in the Octet Truss, Spring 2011- Summer 2011
- Kelsie King, Knotted Crystals in the Octet Truss, Fall 2010- Spring 2011
- Patrick Redmond, Monte Carlo Simulations and the Potts Model, Summer 2008
- Akie Hashimoto, Mathematical Models for Building Graphical Complexes from DNA, Summer 2008
- Katie Berry, A Closer Look at some NP-Complete Problems, Spring 2007
- Sarah Hamilton, Properties of Unit Rectangle Visibility Graphs, with Dr. Joanna Ellis-Monaghan, Summer 2006 – Spring 2007
- Laura Beaudin, Applications of the Potts Model Partition Function and the Tutte Polynomial, with Dr. Joanna Ellis-Monaghan, Summer 2006 – Spring 2007
- Dave Miller, Determining the Minimum Number of Tile Types Needed to Form DNA Nanostructures, with Dr. Joanna Ellis-Monaghan, Summer 2006 – Spring 2007
- Christopher Jennings, Spring Embedded Graph Drawing for Netlist Layout, with Dr. Joanna Ellis-Monaghan, Summer 2006 - Fall 2006
- Sarah Walker, Determination of Strand Numbers for DNA Nanoconstructs, with Dr. Joanna Ellis-Monaghan and Dr. Doug Green, Spring 2006
- Sarah Walker, Algorithms for Constructing Phylogenetic Trees, Spring 2006
- Jamey Lewis, Spring Embedded Graph Drawing for Netlist Layout, with Dr. Joanna Ellis-Monaghan, Spring 2004 – Summer 2006
- Michele Fretta, Modeling the Genetics of Language Trees, Spring 2005
- Diana Coulter, Predicting the Outcomes of Tennis Matches, Spring 2005
- Jeremy Danyow, Network Simulation development, Spring 2004

Presentations

- Graph theory in DNA self-assembly: early entry point for interdisciplinary student research, Teaching Discrete and Algebraic Mathematical Biology to Undergraduates, Workshop at the Ohio State University Mathematical Biosciences Institute.
- Phylogenetic Trees: Graphical Representations of Evolutionary Relationships, Middlebury Computer Science Colloquium, April 2013
- Ellis-Monaghan and Pangborn, “Rigid tile design strategies for self-assembling DNA constructs”, poster presentation, Vermont Genetics Network, August 2010.

- Unit Rectangle Visibility Graphs, Middlebury College Mathematics Colloquium, September 2008
- Minimal Tile and Bond-Edge Types for Self-Assembling DNA Graphs, Saint Michael's College – University of Vermont Combinatorics Seminar, July 2008
- Minimal Tile and Bond-Edge Types for Self-Assembling DNA Graphs, SIAM Conference on Discrete Mathematics, University of Vermont, June 2008
- Unit Rectangle Visibility Graphs, Joint Saint Michael's College – University of Vermont Combinatorics Seminar, July 2007
- Graph Theoretical Approaches to Netlist Layout (Poster), Vermont EPSCoR Annual Meeting, March 2007
- A Force-Directed Graph Drawing Approach for Computer Chip Layout, SIAM Minisymposium on Geometric Representation of Graphs at the Meeting of the American Mathematical Society, San Antonio, Texas, January, 2006
- Graph Theoretical Techniques for Netlist Layout (Poster), Vermont EPSCoR Annual Meeting, August 2005
- Operations Research and the Information Systems Curriculum, Information Systems Education Conference, Newport, Rhode Island, November, 2004
- Pilot Studies Introducing Collaborative and Distance Learning Paradigms in a Residential Environment, Information Systems Education Conference, Newport, Rhode Island, November, 2004

Industry Experience

IBM Corporation, Yorktown Heights, NY

Intern – T.J Watson Research Center, Mathematical Sciences Department

- Integrated an airline crew pairing generation software package (IBM Mini-CPOS) into a parallel Branch and Cut and Price optimization framework (COIN/Bcp)
- Compared the effectiveness of various linear programming algorithms for column generation

Intel Corporation, Portland, OR; Folsom, CA

Intern – Prototype and Production Services, Production Planning Team

Intern – Corporate Information Services, Problem Management Redesign Project

Service

College Committee Service

- Computer Science Department Chair – Fall 2013 through present
- Dean's Search Committee
- Secretary of the Faculty Assembly – Fall 2013 & Spring 2014
- Oral Communication Group (for the new curriculum) – Spring 2013
- Faculty Welfare Committee – Fall 2010 through Spring 2012
- Course Evaluation Task Force – Fall 2010
- Health Care Task Force – Spring 2010
- Faculty Development Committee – Fall 2009 through Spring 2010
- Enrollment Management Committee – Fall 2006 through Spring 2008
 - Secretary – Fall 2006 through Spring 2008
- Enrollment Management Task Force - Summer 2007
- Web Council – Spring 2005 through Spring 2006

- Educational Technology Committee – Fall 2004 through Spring 2006, Fall 2008 through Spring 2009
 - Chair - Fall 2005 through Spring 2006
- Intellectual Property Policy Task Force – Summer 2004
- Course Management System Task Force – Spring 2004

Additional College Service

- Faculty Visitor Program – Fall 2004, Fall 2007, and Fall 2010
- Admissions office interviews - Fall 2006 and 2007

Professional Service

- Reviewer for ACM SIGCSE conferences (2006-2013)
- Dissertation Committee Member, Business Analytics Program, Bentley College Spring 2011
- NSF Grant Review Panel, Fall 2009
- Organizing Committee Summer Combo in Vermont Miniconference, July 2008, July 2012, and July 2013
- Organizing Committee Discrete Math Days in the Northeast, Vermont Meeting, June 2009 and July 2011
- Local Arrangements Committee member for MAA Northeast Section Meeting, May 2008

Professional Affiliations

ACM – Association for Computing Machinery

ACM SIGSCSE – Special Interest Group, Computer Science Education