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Educational Record

- North Carolina State University, Ph.D., Applied Mathematics, December 2003
- North Carolina State University, M.S., Computational Applied Mathematics, December 2000
- State University of New York at Plattsburgh, B.A., Mathematics (Magna Cum Laude), August 1996

Professional Record

- **Professor, Clarkson University** 2014-present
- **Associate Professor, Clarkson University** 2009–2014
- **Assistant Professor, Clarkson University** 2003–2009
- **Visiting Academic, U.S. Army Corps of Engineers Waterways Experimentation Station**, Vicksburg, MS, July 2006, July 2002, May–July 2001, June 2000, August 1999
- **GAANN Computational Science Fellow, North Carolina State University**, under the advisement of C.T. Kelley, 1998–2001
- **Research Assistant, North Carolina State University** under the advisement of C.T. Kelley, 2001-2003
- **Assistant Director and Mathematics Instructor, Huntington Learning Center**, Fayetteville, NC, 1996-1998

Fellowships and Awards

1. Million Dollar Club, October 2015
2. Kristen Craig Memorial Faculty Recognition Award for superb mentorship, constant service, and inspiring passion (Clarkson University Honors Program), 2012
3. Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member from the Mathematical Association of America (MAA), 2010
4. Outstanding Paper Award for *Hybrid Optimization Schemes for Simulation-based Problems* (G.A. Gray, K.R. Fowler, and J.D. Griffin), by Elsevier Journal of Computational Science presented at the International Conference on Computational Science in Amsterdam, The Netherlands, May 31-June 2, 2010
5. Tau Beta Pi Clarkson Faculty Award for Exemplary Performance in the Art of Teaching, 2009

6. Clarkson University Outstanding New Teacher Award 2005
7. Project NExT Fellow, 2003
8. GAANN Computational Science Fellowship, U.S. Department of Education, 1998–2001
9. SIAM Student Travel Award, SIAM Conference on Optimization, 2002
10. SIAM Student Travel Award, SIAM 50th Anniversary & 2002 Annual Meeting, 2002
11. SIAM Student Travel Award, SIAM Conference on Mathematical and Computational Issues in the Geosciences, 2003
12. Math Scholars Award, SUNY Plattsburgh, 1996

Research and Development Grants

Funded Proposals

1. New York State Department of Education Science Technology Entry Program, Grant, June 2015, \$2M for 5 years.
2. Integrated Analysis for Agricultural Management Systems, with L.S. Mattott, E.W. Jenkins workshop proposal (accepted 12/14 workshop to be held May 2015:
<http://aimath.org/workshops/upcoming/agmanagement/>)
3. Department of Defense, Carthage Central School District, Professional Development, with Peter Turner \$ 57,526, 7/12-7/14 .
4. Environmental Security Technology Certification Program (ESTCP), Sustained in Situ Chemical Oxidation (ISCO) of 1,4-Dioxane Using Slow Release Chemical Oxidant Candles, Principal Investigator Dr. Patrick Evans (CDM Smith), Co-PI on Clarkson contribution with Dr. Michelle Crimi, Development of a Slow-Release Oxidant Design Tool. \$898,000 (Clarkson: \$99,423,) 2013-2016.
5. The Moody's Foundation via Moody's Mega Math Challenge/Society for Industrial Applied Mathematics/National Science Foundation (via Modeling Across the Curriculum), Math Modeling: Getting Started and Getting Solutions handbook development, to be used for teacher professional development and a resource for students, with Drs. K.M. Bliss and B.J. Galluzzo, \$50,000, 1/13 - 3/14.
6. NYS Education Department Science and Technology Entry Program (STEP), PI: David Wick, Co-PIs: Kathleen Fowler, Peter Turner, Mike Ramsdell, \$800K, 7/11-7/15.
7. U.S. Army Corps of Engineers BAA (Research area CHL-7), Understanding the Impact of Boundary and Initial Condition Errors on the Solution to a Thermal Conductivity Inverse Problem, \$40,321, 8/10-10/10.
8. Air Force Research Lab, Achieving Mission Focused Security in Cyber-Physical Systems, (senior personnel) PI: J. Skufca, \$422,000, 8/10-10/11.
9. U.S. Army Corps of Engineers BAA (Research area CHL-7), Parameter Estimation Study for 1-D Heat Transport in the Shallow Subsurface, \$18,210, 9/09-10/09.

10. American Institute of Mathematics (AIM) and NSF funded SQuaRE (Structured Quartet Research Ensembles) program on Derivative-Free Hybrid Optimization Methods for Solving Simulation-Based Problems in Hydrology, 2009-2011. The purpose of a SQuaRE is to allow a dedicated group of four to eight mathematicians to spend one to three weeks at the AIM headquarters in Palo Alto, California, working on a focused research problem.
11. American Institute of Mathematics (AIM) and NSF funded AIM Research Conference Center focused workshop on Derivative-Free Hybrid Optimization Methods for Solving Simulation-Based Problems in Hydrology (PI: K. Fowler with Dr. Genetha Gray and Dr. Owen Eslinger). This competitive program provides full funding to hold a workshop for roughly 30 participants (October 6-10, 2008 in Palo Alto, CA).
12. U.S. Army Corps of Engineers, BAA, Fully-adaptive Methods For Unsaturated Flow Problems, 9/4/07-9/3/08, \$63,069.
13. NYS Education Department St. Lawrence County STEM Partnership, PI: Peter Turner, (Co-PI Kathleen Fowler and others), awarded \$2.4M over 3 years with \$900,000 to Clarkson University
14. NYS Education Department Science and Technology Entry Program (STEP), PI: Peter Turner, Co-PIs: Kathleen Fowler, David Wick, Mike Ramsdell, Gail Gothom, awarded \$1M over five years (2006-2011)
15. U.S. Army Corps of Engineers Faculty Research and Engineering Program, \$5,000 + travel money: visited the hydraulics lab in Vicksburg, MS for one week to implement and test a scheme for temporal adaption in a large-scale groundwater flow simulator and outline future work, July 2006
16. Clarkson Center for the Environment Seed Grant: *Hybrid Optimization Methods for Water Resources Management*, awarded \$500 for the visit of Thomas Hemker from the TU Darmstadt, December 2006.
17. Clarkson Center for the Environment Seed Grant: *Water Supply with Seawater Intrusion*, awarded \$1,500 for summer support for undergraduate research assistant, December 2005.
18. No Child Left Behind St. Lawrence County Math-Partnership Grant, PI: Peter Turner Co-PI: Kathleen Fowler and others, Amount received for 7/1/04-6/30/07: awarded \$1.7M over 3 years with \$273,476 to Clarkson.
19. NSF-AWM Mentor Travel Grant: To work with Evin Joyce Cramer at the Boeing Company, July 2004.
20. GAANN Computational Science Mini-Grant, U.S. Department of Education, March 2001, March 2000.

Unfunded Proposals

1. NSF INFEWS/T1: Making Tough Choices: A Collaborative Modeling Framework for Guiding Water Management Decisions in Agricultural Regions Under a Changing Climate, PI L. Jenkins (Clemson University), Co-PIs: K. Fowler, M. Heitzleman (Clarkson University), L.S. Matott (University at Buffalo) submitted March 2016, \$1M, not funded.

2. NSF INFEWS/T3: Resource recovery and reuse (R3) a sustainable foundation for societies of the future, (Senior Personnel), PI Stefan Grimberg, Co-PIs from Columbia, Clarkson, CUNY, Hawaii, Rutgers, submitted March 2016, \$1M, not funded.
3. Exploiting Expert Knowledge to Enhance Simulation-based Optimization of Hydrological Systems, with L.S. Mattott, E.W. Jenkins, G.A. Gray and M.D. Parno, workshop proposal submitted to the American Institute of Mathematics, November 2013, not funded.
4. NSF CyberSEES Grant, Towards a Sustainable and Secure Operation of Emerging Power Systems via Derivative-Free Optimization Algorithms. PI: Lei Wu, Co-PI: K. Fowler, February 2013, not funded.
5. NSF-MSP Grant, The Northern New York Partnership for Rural Integration of Science and Mathematics (NNY-PRISM), PI: Peter Turner, Co-PI: Katie Fowler, James Carrol, Mike Ramsdell, 2012, not funded.
6. Hybrid Derivative-free Methods for Constrained Optimization, Simons Foundation, March 2012, not funded.
7. Revitalizing a Middle School Mathematics Enrichment Program Through University Partnership in Rural Upstate NY, Mathematical Association of America, March 2012, not funded.
8. A Framework for UXO Discrimination at the 100% Detection Operation Point SERDP Project Pre-Proposal (2010) (co-PI, PI: J. Remus), not funded.
9. Building Connections Across the Arts and Sciences: Physics-based 3D Visualization with Numerical Modeling, Proctor & Gamble, co-PI with Dave Beck 2010, not funded
10. NSF-MSP Grant (2010), The Northern New York Partnership for Rural Integration of Science and Mathematics (NNY-PRISM), not funded.
11. NSF-GK12 Grant (2010), The Mathematics Applied to Science and Technology Education in a Rural Setting (MASTERS), not funded.
12. New York State Department of Education Math-Science Partnership grant, submitted January 2010, not funded.
13. ISCO Byproducts for Enhanced Natural Attenuation SERDP Project Pre-proposal in response to FY 2011 ER Statement of Need, "Improved Understanding of Impacts to Groundwater Quality Post-Remediation", January 2010, not funded.
14. Howard Hughes Medical Institution Undergraduate Science Education Grant (co-PI) 2010, \$2,184,210, not funded.
15. NSF Science Masters Program (NSF 09-607), Computational Nanotechnology (co-PI), submitted November 2009, not funded.
16. NSF-Math Science Partnership Grant (NSF 09-507), Northern New York Partnership for Rural Integration of Science and Mathematics (NNY-PRISM), submitted August 2009, not funded.

17. Strategic Environmental Research Development Program, Diffusion and Desorption of Chlorinated Solvents in Heterogeneous Media: Impact on Plume Characteristics and Behavior, submitted 3/09 (pre-proposal successful, full-proposal not funded). Pi: Michelle Crimi, Co-PI: Katie Fowler.
18. NSF Math Science Partnership (MSP) Program, The STEM Partnership: Developing Teacher Leaders to Stimulate Rural Communities of Practice, submitted 2/09 and in review, PI: Susan Powers, Co-PIs, Katie Fowler and others.
19. U.S. Army Corps of Engineers, BAA, Understanding Mass Conservation with Fully-adaptive Methods For Unsaturated Flow Problems, submitted 8/2009.
20. NSF Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) Q3 : Query-based Quality Learning to recruit and retain inquisitive STEM students, submitted 2/9/06, PI: Amy Zander, Co-PIs: Susan Powers, Christopher Robinson, Kathleen Fowler, and Dipanker Roy.
21. NSF Collaboration in Mathematical Geosciences: Collaborative Research on Multi-model, Hybrid Algorithm Approaches for Well Field Optimization, submitted 2/1/06, PI: Kathleen Fowler, Co-PI Alan Rabideau, SUNY Buffalo, Department of Civil, Structural, and Environmental Engineering.
22. DOE Early Career Principal Investigator Program in Applied Mathematics, Computer Science, and High-Performance Networks: Simulation and Optimization for Applications with Nonsmooth Models, submitted 3/05, PI: Kathleen Fowler.
23. NSF Collaboration in Mathematical Geosciences: Collaborative Research on Advances in Hydrologic Optimization, submitted 3/05, PI: Kathleen Fowler, Co-PI Alan Rabideau, SUNY Buffalo, Department of Civil, Structural, and Environmental Engineering.
24. NSF Information Technology Experiences for Students and Teachers, Integrated mathematics and Physics Information Technology, submitted 10/04, PI: Peter Turner, Co-PIs: Kathleen Fowler, David Wick, Brent Faber, Dennis Horn, Johndan Johnson-Eilola, Michael Ramsdell.
25. HP Technology for Teaching Grant Initiative, P. Turner (PI), K. Fowler (Co-PI), 2004.

Teaching

Teaching Philosophy

My intent in the classroom is to make connections to real-world applications and motivate the need and appreciation for mathematics while providing a comfortable setting for learning. I am a strong advocate of project-based learning and promote technical writing and communication across all courses I teach. I strive to ensure that students will *succeed after* leaving school, not just in my classroom.

Courses Developed

1. **MA579 Introduction to Applied Optimization**

The motivation for this course is that optimization problems arise routinely in most scientific disciplines—from designing an airline schedule to minimizing the cost to design a remediation strategy for a contaminated ground water site. In this course we focus on numerical techniques

to solve applied optimization problems of various formulations. Topics include solutions to nonlinear equations (in single and multi variables), a review of linear algebra and multivariable calculus, unconstrained and constrained optimization, black-box formulations and a glance at sampling methods, and if time allows, extra topics may include multi-objective optimization, mixed integer programming methods, and evolutionary algorithms. This course includes a computing component with MATLAB and possibly some off-the-shelf optimization packages.

The objectives are (a) to become familiar with a range of optimal design formulations and techniques appropriate for those formulations, (b) to motivate the need for efficient numerical methods for optimization problems, (c) to study these methods through implementation and analysis, (d) to become familiar with some existing software for optimization as well as write our own codes, and (e) to obtain a better understanding and appreciation for scientific computing in optimization.

2. **MA726 Graduate Seminar in Applied Mathematics Communication**

Students work beyond their ‘research’ area to understand and communicate ideas outside their field of expertise in applied mathematics. Students gain experience in technical communication, both written and oral. By the end of the semester, each student gains experience and improvement in delivering and critiquing a scientific talk, reviewing research articles, writing abstracts, and designing a poster. Extra topics include learning LaTeX and creating a curriculum vitae.

3. **MA451/453 Introduction to Mathematical Instruction and Teaching**

These unique, upper-level capstone courses focus on methods and tools needed to prepare students to be professional mathematicians. Topics include mathematical research papers and presentations, introduction to research journals, including databases and search tools, mathematical writing; mathematical authoring and presentation software; professionalism, diversity, and ethics in the mathematical professions. Elements of the student grade are drawn from performance in this class, from peer-evaluations, and from self-assessment surveys.

Students Advised

Doctor of Philosophy

1. Josh Beuregard, Hybridized Particle Swarm Optimization for Recharge Basin Network Design Using Simulations, 2015–present.
2. Ben Ritz, Hybrid Methods for Constrained Mixed-Integer Simulation-Based Optimization Problems, 2013–present.
3. Jesse Clark-Stone, Multi-objective Particle Swarm Optimization for Constrained Optimization, 2013–present.
4. Ahmad Almomani, Constraint Handling for Derivative-free Optimization, 2012.
5. Godfred Yamoah, Fully Adaptive Methods for Variably Saturated Flow Problems, 2009.

Master’s Degree

1. Stephen Carter (Thesis Project), Conjunctive Use of Farm Simulation and Optimization for Agricultural Management, 2012.

2. Ryan Lewis, *Overcoming Geographic Isolation: The Design and Implementation of a Web-based Collaborative Learning Environment*, 2011.
3. Katie Lozo, *A Mathematical Modelling Approach to Assessing Teacher Leaders*, 2010.
4. Jacob Orsini, *Understanding Video Games as a Learning Tool in an Introduction to Numerical Methods Course*, 2010.
5. Brian McClune, *New Hybrid and Surrogate Techniques for Simulation-based Optimization of a Polymer Extrusion Filter*, 2009.

Undergraduate Researchers (Honors, REUs, McNair Scholars, Funded Summer Research

1. Andres Rivas, *Using Simulation-Based Optimization to Guide Allocations of Surface and Ground Water Resources for Agricultural Water Use in South Carolina*, 2016
2. Rachel Timm, *3D printing to Teach Parametric Curves*, 2016.
3. Mattie Phillips, *3D Printing of Physics-based Roller Coasters*, 2015 SURE Symposium award from best poster *Mathematical Representations for Digital Arts and Sciences*, 2015, 2016.
4. Adres Rivas, *Dynamic Planting Decisions Using Hydrological and Agricultural Models and the DAKOTA Framework*, McNair Scholars Program, 2014.
5. Leah Granger and Ellie Seigfried, *Implementing a STEM Mentoring Network for Geographically Isolated High School Students*, Honors Summer Research, 2014.
6. Michael Fulton, *An Approach for Optimal Groundwater Remediation Using CORT3D*, Summer Research, 2014.
7. Joshua Beauregard, *Simulation and Sensitivity Analysis of Slow Release Permanganate Cylinders for Chemical Oxidation*, Environmental Engineering Summer REU, 2013.
8. Jayesh Bokhiria, *Implementing an Initial Farm Status for Optimal Crop Scheduling*, Summer Research, 2013.
9. Kevin Gibson, *Curriculum Development for K12-STEM Outreach: Roadmap to College*, Summer Research, 2013.
10. Will Shannon, *Understanding Neural Architectures for Threat Detection*, Summer Research, 2013.
11. Corey Ostrove, *Black-Box Formulation with FMP for Agricultural Management*, Summer Research 2013.
12. Edward Rogers, *Visualization of Crop Scheduling for Berry Farming*, Honors Summer Research, 2013.
13. Kathryn Voss and Jacob Sheehy, *The Development of a Personalized Cyber Tutoring and Quiz System for Distance Learning*, Summer 2012.

14. Cleann Davis, Teacher and Student Curriculum Development for Integrated STEM Research Projects, Summer 2012.
15. Ben Ritz, Honors Program Thesis Advisor, A Hybrid GA-implicit Filtering Algorithm for Mixed-integer Nonlinear Optimization Problems, 2010-present.
16. Jessica Burl, Honors Program Pre-Freshmen Summer Research, Understanding the Impact of Catchment Basins on Berry Farming in the Pajaro Valley, 2010.
17. Mark Minick won the *SIGMAA EM Award* at Mathfest, which recognizes exceptional presentations that involve work on problems arising from environmental sources for our 2010 summer research project with Ruby Fu, Optimizing Aquifer Water Consumption and Maximizing Profit for Strawberry Farmers, Honors Program Thesis Advisor class of 2012.
18. Brian Leventhal won the *Outstanding Presentation Award* for his talk on “Understanding How the Brain Detects Threats” at Mathfest, working during summer 2010 jointly with psychology junior Kylie Drouin, mentored by Fowler and Psychology Professor Robert Dowman. The research was part of a National Science Foundation-funded Undergraduate Biology-Mathematics (UBM) program designed to help students learn how to work as part of an interdisciplinary team to conduct research that might not be accessible from a single field.
19. Benjamin Ritz, Modeling the Spread of Porphyric Hemophilia (Vampirism), summer Honors Program 2010.
20. Nevin Brackett-Rozinsky, Honors Program Thesis Advisor, Sensitivity Analysis for a Polymer Extrusion Filter Model, 2010.
21. Brian Leventhal, Parameter Estimation for a Shallow Subsurface Heat Transport Model, Summer 2009-2011.
22. Daisy Barbecho, Sensitivity Analysis of a Colloid Transport Model, McNair Scholars Program, Summer 2009.
23. Samantha Batcheller, Implementation of the Umatillo Navy Waste Site Simulation, Summer 2009.
24. Ben Ritz, Clarice Dziak, and Kate Purdy, Mathematical Modelling for Middle School Classrooms, Pre-freshmen Summer Program 2009.
25. Matthew Parno, Particle Swarm Optimization with Surrogate Functions, Honors Program Thesis Advisor 2009.
26. Ruby Fu, Honors Program Summer Research 2008-2011 and Honors Program Thesis Advisor, The Effects of Heterogeneities on the Solution of Water Management Problems
27. Ryan Northrup, Honors Program Summer Research 2008, Validating an Interval Arithmetic ODE Algorithm
28. Andrew Davis, The Effects of Grid Resolution on the Solution, of Optimal Control Problems in Water Resources and Effects of Saltwater Intrusion on a Coastal Aquifer: Henry’s Problem and the Coastal Region of Hersonissos Crete, Honors Program Summer Research 2007.
29. Scott LaLonde, Maximizing the Performance of a Polymer Extrusion Filter via Derivative-free Optimization Methods, McNair Scholars Program 2007.

30. Tiffany Terpstra, Roller Coaster Project: Integrated Mathematics and Physics Curriculum for Middle and High School Students, McNair Scholars Program 2007.
31. Michael Petito, Adaptive Implicit Temporal Integration of ODEs with Interval Computations, Honors Program Thesis Advisor 2007.

Publications

Books

1. K.M. Bliss, B.J. Galluzzo, K.R. Fowler, et al, GAIMME: Guidelines for Assessment and Instruction in Mathematical Modeling Education (Chapter on Undergraduate Education), Sol Garfunkel and Michelle Montgomery, editors, COMAP and SIAM, Philadelphia, 2016.
2. W. Bauldry, K.R. Fowler, B. Galluzzo, R. Wagstrom, and M. Walter, *Report on Environmental Science and Climate Studies*, Chapter in the Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2015. The Mathematical Association of America: Washington, DC, to appear in 2015.
3. K.M. Bliss, K.R. Fowler, and B.J. Galluzzo *Math Models: Getting Started and Getting Solutions*, Society for Industrial and Applied Mathematics, 2014.
4. G. A. Gray and K. R. Fowler, *Traditional and Hybrid Derivative-free Optimization Approaches to Black-box Objective Functions*, chapter in Computational Optimization and Applications in Engineering and Industry, X-S. Yang and S. Koziel editors, Springer, July 2011.

Appeared or accepted to appear (students' names are underlined)

1. K.R. Fowler, C. Ostrove, M.D. Parno, J.C. Chrispell, M.W. Farthing, and E.W. Jenkins, *A Decision Making Framework with MODFLOW-FMP2 via Optimization: Determining Trade-offs in Crop Selection*, accepted to Environmental Modeling and Software, December 2014.
2. J. Bokhiria, K.R. Fowler, E.W. Jenkins, *Modeling and Optimization for Crop Portfolio Management Under Limited Irrigation Strategies*, Journal of Agriculture and Environmental Sciences, 2(1), 01-31, 2014.
3. B. Leventhal, X. Fu, K.R. Fowler, O. J. Eslinger, *Parameter Identification and Sensitivity Analysis for a Thermal Diffusivity Inverse Problem*, accepted to Involve, 2013.
4. A.B. Luttmann, K.R. Fowler, S. Mondal, *Interdisciplinary Biomathematics: Engaging Undergraduates in Research on the Fringe of Mathematical Biology*, PRIMUS, 23(9), 815-828, 2013.
5. M. Farthing, K.R. Fowler, X. Fu, A. Davis, and C.T. Miller, *The Effect of Model Resolution on a Set of Community Problems for Optimal Design in Water Resources*, Advances in Water Resources, 38, 27-37, 2012.
6. K.R. Fowler, E.W. Jenkins, B.M. McClune, *Polymer Extrusion Filter Design with a Hybrid PSO-GA Optimization Technique*, Filtration, 11(1), 58-64, 2011.
7. M. Parno, T. Hemker, K.R. Fowler, *Applicability of Surrogates to Improve The Efficiency of Particle Swarm Optimization*, Engineering Optimization, 44(5), 521-535, 2011.

8. K. Lozo, S.Mondal, K.R. Fowler, B. Brydges, *A Mathematical Modeling Approach to Understanding the Impact of STEM Summer Institutes on Building Teacher Leaders*, International Journal of Arts and Sciences, 4(11), 2011.
9. N. Brackett-Rozinsky, S. Mondal, K. Fowler, L. Jenkins, *Analysis of Model Parameters for a Polymer Filtration Simulator*, Modeling and Simulation in Engineering, October 2011.
10. G. Jiang, M. Crimi, K. Fowler, X. Fu, *Experimental Design of Diffusion and Desorption of Contaminants in Heterogeneous Media*, Water Science and Technology, 64(4), 988-998, 2011.
11. J.D. Griffin, K.R. Fowler, G.A. Gray, T. Hemker, and M.D. Parno, *Derivative-free Optimization via Evolutionary Algorithms Guiding Local Search (EAGLS) for MINLP*, The Pacific Journal of Optimization, 7(3), 2011.
12. G.A. Gray and K.R. Fowler, *The Effectiveness of Derivative-free Hybrid Methods for Black-box Optimization*, The International Journal of Mathematical Modeling and Numerical Optimization, 2(2), 12-133, 2011.0.
13. J. Skufca and K.R. Fowler, *An Interdisciplinary Roller Coaster Design Project for Pre-Calculus*, NYS Mathematics Teacher's Journal, 60(3), December 2010.
14. K.R. Fowler, E.W. Jenkins, S.M. LaLonde, *Understanding the Effects of Polymer Extrusion Filter Layering Configurations Using Derivative-Free Optimization*, Optimization and Engineering, 11(2), 339-354, May 2010.
15. K.R. Fowler, E.W. Jenkins, S.M. LaLonde, Chris Cox, *A Simulation-based Optimization Approach to Polymer Extrusion Filter Design*, Filtration, 9(3), 224-230, July 2009.
16. Aiman Q. Jaradat, K. Fowler, Stefan J. Grimberg, and Thomas M. Holsen, and Rajat S. Ghosh, *Treatment of Storm Water Containing Low Levels of PCBs Using Natural Media Filtration (NMF)*, Environmental Engineering Science, 26(4) 799-808, April 2009.
17. Aiman Q. Jaradat, K. Fowler, Stefan J. Grimberg, and Thomas M. Holsen, *Transport of Colloids and Associated Hydrophobic Organic Chemicals Through a Natural Media Filter*, Journal of Environmental Engineering, 135(1), 36-45, January 2009.
18. V. Krishnamurthy, E. Sazonov, and K. Fowler, *Effect of Time Synchronization of Wireless Sensors on Modal Analysis of Structures*, Smart Materials and Structures, 7(15), July 2008.
19. T. Hemker, K.R. Fowler, M.W. Farthing, O. Von Stryk, *A Mixed-integer Simulation-based Optimization Approach With Surrogate Functions in Water Resources Management*, Optimization and Engineering, 9(4),341-360, December 2008.
20. K.R. Fowler, J.P. Reese, C.E. Kees, J.E. Dennis, Jr., C.T. Kelley, C.T. Miller, C. Audet, A.J. Booker, G. Couture, R.W. Darwin, M.W. Farthing, D.E. Finkel, J.M. Gablonsky, G. Gray, T.G. Kolda, *A Comparison of Derivative-free Optimization Methods for Water Supply and Hydraulic Capture Community Problems*, Advances in Water Resources, 31(5), 743-757, May 2008.
21. K.R. Fowler, G.A. Gray, M.S. Olufsen, *Modelling Heart Rate Regulation-Part II: Parameter Identification*, The Journal of Cardiovascular Engineering, 8(2), 109-119, April 2008.

22. J. Qian, A.R. Ferro, K.R. Fowler, *Estimating the Resuspension Rate and Residence Time of Indoor Particles*, The Journal of Air and Waste Management Association, Vol. 58, pp. 502-516, April 2008.
23. K.R. Fowler, B.M. McClune, E.W. Jenkins, C.L. Cox, B. Seyfzadeh, *Design Analysis of Polymer Filtration Using a Multi-objective Genetic Algorithm*, Separation Science and Technology, 43(4) 710-726, March 2008.
24. L.S. Mattot, S.L. Bartelt-Hunt, A.J. Rabideau, and K.R. Fowler, *Application of Heuristic Optimization Techniques and Algorithm Tuning to Multi-layered Sorptive Barrier Design*, Environmental Science & Technology, 40, 6354 - 6360, 2006.
25. K. R. Fowler, C. T. Kelley, *Pseudo-Transient Continuation for Nonsmooth Nonlinear Equations*, SIAM Journal of Numerical Analysis 43(4), pages 1385-1406, 2005.
26. K. R. Fowler, C. T. Kelley, C. T. Miller, Mark S. Reed, C. E. Kees, and Robert W. Darwin, *Solution of a Well-Field Design Problem with Implicit Filtering*, Optimization and Engineering(5) 207–234, May 2004.
27. A. Battermann, J. M. Gablonsky, A. Patrick, C. T. Kelley, K. R. Kavanagh (Fowler), T. Coffey, and C. T. Miller, *Solution of a Groundwater Flow Problem With Implicit Filtering*, Optimization and Engineering, (3), 2002, 189-199.

Submitted

1. M.P. Petito, K.R. Fowler, *Adaptive Implicit Temporal Integration of ODEs with Interval Computations*, (in revision).

Peer Reviewed Conference Proceedings

1. J.C. Chrispell, M.W. Farthing, K.R. Fowler, S.E. Howington, E.W. Jenkins, S.Dutta, B. Ji, *Optimization of a Managed Aquifer Recharge Network*, Water Resources Conference, Columbia, SC, 2014.
2. J.C. Chrispell, S.E. Howington, K.R. Fowler, E.W. Jenkins, M.J. Minick, T. Sendova, *Mathematical Modeling, Simulation, and Optimal Design for Agricultural Management*, Water Resources Conference, Columbia, SC, 2012.
3. D. Wick, M. Ramsdell, K.R. Fowler, P. Turner, P. Schalk, *University Outreach in STEM Education Through a Roller Coaster Science and Engineering Camp*, Frontiers in Education, Rapid City, South Dakota, 2011.
4. K.R. Fowler, T. Kopp, J. Orsini, J.D. Griffin, G.A. Gray, *An Asynchronous Parallel Hybrid Approach for MINLPs*, 23rd European Modeling and Simulation Symposium, Rome Italy, 2011.
5. K. Lowenstein, B. Leventhal, K. Drouin, R. Dowman, K.R. Fowler, S. Mondal, *Simulation and Model Calibration with Sensitivity Analysis for Threat Detection in the Brain*, 23rd European Modeling and Simulation Symposium, Rome Italy, 2011.
6. B. Zhang, K.R. Fowler, S. Mondal, S.J. Grimberg, *Model Calibration and Sensitivity Analysis of ADM1 Simulating Non-Steady State Anaerobic Digestion of Dairy Manure*, the Proceedings of the IWA World Water Congress and Exhibition in Montreal (Paper: IWA-3263), September 19-24, 2010.

7. G.S. Yamoah, K.R. Fowler, O.J. Eslinger, *Spatially Adaptive Finite Elements with Temporal Adaptation Using Local Truncation Error Control for Variably Saturated Flow*, Proceedings of the XVIII International conference on Computational Methods in Water Resources, Barcelona, Spain, June 2010.
8. G.A. Gray, K.R. Fowler, J.D. Griffin, *Hybrid Optimization Schemes for Simulation-based Optimization*, the 2010 International Conference on Computational Science (Outstanding Paper Award), Amsterdam, May 2010.
9. K.R. Fowler, P. Turner, *A Holistic Approach to Applied Mathematics Education for Middle and High Schools*, the Proceedings of the ICMI/ICIAM Conference on Educational Interfaces Between Mathematics and Industry, Lisbon, Portugal, April 2010.
10. B. Zhang, K.R. Fowler, M. Grace, S. Mondal, S.J. Grimberg, *Optimization of Anaerobic Digestion Model No. 1 (ADM1): Simulation of Dairy Manure Digestion*, Proceedings of the American Society of Agricultural and Biological Engineers Annual International Meeting, Reno, Nevada, June 2009.
11. G.A. Gray, K.R. Fowler, J.D. Griffin, *A Hybrid Optimization Scheme for Solving the Hydraulic Capture Problem with an Unknown Number of Wells*, The First International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering Funchal, Madeira, Portugal 1-4 September 2009.
12. K.R. Fowler, S.M.Lalonde, E.W. Jenkins, C.L.Cox, *A Simulation-based Optimization Approach to Polymer Extrusion Filter Design*, the Proceedings of the American Filtration and Separations Society Annual Conference, (May 19-22) Valley Forge, PA 2008.
13. P.Turner, K.R. Fowler, D. Wick, M. Ramsdell, G. Gotham, E. Glasgow, C. French, *BOCES-University Partnerships as a Model for Educational Outreach: K-16 STEM Professional Development*, Proceedings for the Inaugural Math and Science Symposium, Knoxville, TN, October 2007.
14. G.A. Gray and K.R. Fowler, *Approaching the Groundwater Remediation Problem Using Multi-fidelity Optimization*, proceedings of the XVI International Conference on Computational Methods in Water Resources, Copenhagen, Denmark, June 2006.
15. T. Hemker, K.R. Fowler , and O. Van Stryk, *Derivative-Free Methods for Handling Fixed Costs in Optimal Groundwater Remediation Design*, proceedings of the XVI International Conference on Computational Methods in Water Resources, Copenhagen, Denmark, June 2006.
16. K.R. Fowler, C.T. Kelley, C.E. Kees, C.T. Miller, *A Hydraulic Capture Application for Optimal Remediation Design* Proceedings of the XV International conference on Computational Methods in Water Resources, C.T. Miller, M.W. Farthing, G.W. Gray. G.F. Pinder editors, 2004.
17. C.T. Kelley, K.R. Fowler, C.E. Kees, *Simulation of Nondifferentiable Models for Groundwater Flow and Transport* Proceedings of the XV International conference on Computational Methods in Water Resources, C.T. Miller, M.W. Farthing, G.W. Gray. G.F. Pinder editors, 2004.

18. K. R. Kavanagh (Fowler), C. T. Kelley, R. C. Berger, J. P. Hallberg, and Stacy E. Howington, *Nonsmooth Nonlinearities and Temporal Integration of Richards' Equation*. Proceedings of the XIV International Conference on Computational Methods in Water Resources, S.Majid Hassanizadeh, Ruud J. Schotting, W.G. Gray, and G.F. Pinder, editors, 2002, pp 947–954.

Media Contributions

1. PBS News Hour Science Nation: *How Math is Growing More Strawberries in California*, 2014.
(Website: <http://www.pbs.org/newshour/updates/math-grows-strawberries-southern-california/>)
2. E.W. Jenkins, K.R. Fowler, *A Role for Modeling, Simulation, and Optimization in an Agricultural Water Crisis*, to appear in SIAM News, 2014.
3. National Science Foundation Highlight: *Strawberries With a Thirst: Mathematicians Help California Drought-Weary Berry Growers Address Water Issues*, 2014.
(Website http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=131827)
4. *Wild About Math*, Podcast April 2013.
(Website: <http://wildaboutmath.com/2013/04/24/michelle-montgomery-katie-fowler-inspired-by-math-30/>)
5. *Raspberry Fields Forever Continued*, Mathematics of Planet Earth 2013 Blog, with E. W. Jenkins, April 2013.
(Website: <http://mpe.dimacs.rutgers.edu/2013/04/25/raspberry-fields-forever-contd/>)
6. *Waste Not, Want Not: Putting Recyclables in Their Place* (with K.M. Bliss), Challenge Problem for the Society for Industrial and Applied Mathematics Moody's Mega Math Challenge for high school students, March 2013.
(Website: <http://m3challenge.siam.org/about/archives/2013/problem13.php>)

Conference Participation

Organizer

1. **Mathematics Conference and Competition of Northern New York** with G. Yao and J. Foisy, February 28– Saturday March 1, 2014, Clarkson University with funding from the Mathematical Association of America and The Affiliated Colleges.
(Website: <http://people.clarkson.edu/kfowler/MCCNNY2.htm>)
2. **Derivative-Free Hybrid Optimization Methods for Solving Simulation-Based Problems in Hydrology** with O.J. Elsinger and G.A. Gray, October 6 to October 10, 2008 at the American Institute of Mathematics, Palo Alto, California
(Website: <http://www.aimath.org/pastworkshops/hydrology.html>)

Session Organizer

1. **The Mathematics of Sustainability**, with E.W. Jenkins, SIAM Annual Meeting, Chicago, IL, July 2014.

2. **The Realities of Using Derivative-free Optimization** (2 part minisymposium), with G.A. Gray, SIAM Conference on Computational Science and Engineering, Boston, MA, February 2013
3. **Simulation Based Optimization in Hydrology** (2 part minisymposium), with G.A. Gray, SIAM Conference on Computational Issues in the Geosciences, Leipzig, Germany June 14-19, 2009.
4. **Industrial Applications of Porous Media Flow**, with E.W. Jenkins, SIAM Conference on Computational Science and Engineering, Miami, FL, February 2009.
5. **Surrogate Optimization Techniques for Mixed-Integer Nonlinear Problems**, with T. Hemker, SIAM Optimization, Boston, MA, May 2008.
6. **Optimization Applications in Porous Media Flow**, with O.J. Eslinger, SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
7. **K-12 Outreach in CSE**, with P. Turner, SIAM conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
8. **Optimization in Water Resources**, with A. Mayer, The 15th International Conference on Computational Methods in Water Resources, Chapel Hill, NC June 2004.
9. **The Publication Process**, panel discussion session for new faculty members with panel participants Bill Briggs, University of Boulder, CO, Jeff Scroggs, NC State University, Barbara Reynolds, Cardinal Stritch University, and Luise-Charlotte Kappe, SUNY Binghamton, The Joint Meetings in Phoenix, AZ, January 2004.

Invited Talks

1. Invitation to be a plenary speaker at the 2015 Mathematics of Planet Earth Workshop on Management of Natural Resources sponsored by DIMACS (The Center for Discrete Mathematics and Theoretical Computer Science, at Rutgers University), Howard University, Washington, DC June 4 - 6, 2015.
2. **Math Models: Getting Started and Getting Solutions**, Modeling Across the Curriculum Workshop, NSF-SIAM, Alexandria, VA, January 2014.
3. **Optimization to Understand Trade-offs in Agricultural Practices**, SIAM Conference on Computational Science and Engineering, Boston, MA February 2013.
4. **The Faculty Member as a Teacher-Scholar**, Panel Member, MAA Mathfest, Madison, WI July 2012.
5. **Designing and Teaching Math Intensive Interdisciplinary Courses**, Panel Member, MAA Mathfest, Madison, WI July 2012.
6. **Mathematical Modeling, Simulation, and Optimal Design for Agricultural Water Management**, Cornell University Center for Applied Mathematics, May 2012.
7. **Sustainability Problems Focused Workshop on Agricultural Management in the Pajaro Valley, CA**, American Institute of Mathematics (NSF Review), Palo Alto, CA, February 2012.

8. **Applied Mathematical Modeling and Research Opportunities for Middle School, High School, and pre-Freshmen Students**, MAA/AMS Joint Meetings, Boston, MA January 2012.
9. **Meeting Sustainability Constraints for Berry Farming in the Pajaro Valley**, North Carolina State University Center for Scientific Research, Raleigh, NC March 2011.
10. **Math Modeling for Middle School Students**, 2011 Joint Mathematics Meetings, New Orleans, LA January 2011.
11. **K12 Educational Outreach: What? Why? How? WOW!**, MAA Seaway Section Meeting Randolp Lecture, SUNY Plattsburgh, October 2010.
12. **Derivative-free Optimization: When Calculus Does Not Work!**, SUNY-Clarkson Mathematics REU, July 2010.
13. **Promoting Professional Development for Undergraduates Through Calculus Projects**, SIAM Annual Meeting, Pittsburgh, PA, July 2010.
14. **K-12 Outreach with Integrated Math and Physics for Roller Coaster Design**, SIAM Annual Meeting, Pittsburgh, PA, July 2010.
15. **Zombies, Gossip, and Math**, 12th Annual STEP Statewide Student Conference, Albany, NY March 2010.
16. **K-12 Outreach with Integrated Math and Physics for Roller Coaster Design**, MAA Joint Meetings, San Francisco, CA January 2010.
17. **Particle Swarm Optimization with Surrogate Functions for Water Management Problems**, SIAM Conference on Computational Issues in the Geosciences, Leipzig, Germany June 14-19, 2009.
18. **Survey for Success: A Game Show**, 11th Annual STEP Statewide Student Conference, Albany, NY March 2009.
19. **Optimization As a Tool for Understanding Polymer Filter Designs and Layer Configurations** SIAM Conference on Computational Science and Engineering, Miami, FL, February 2009.
20. **Assessing Polymer Extrusion Filter Performance with Gradient-Free Optimization Methods**, Lea Jenkins*, Kathleen Fowler, SIAM Optimization, Boston, MA, May 2008.
21. **Derivative-Free Benchmarking Problems from Water Resources Management**, SIAM Optimization, Boston, MA, May 2008.
22. **A Framework for Particle Swarm Optimization for Mixed-Integer Problems Using Surrogate Functions**, Matthew Parno*, Kathleen Fowler, Thomas Hemker, SIAM Optimization, Boston, MA, May 2008.
23. **Considerations in Evaluating Derivative-Free Methods for Simulation-Based Optimization Problems**, Genetha Gray*, Kathleen Fowler, SIAM Optimization, Boston, MA, May 2008.

24. **Integrated Calculus and Physics Projects Based on Roller Coaster Design**, Joint Mathematics Meetings, San Diego, California, January 2008.
25. **Selection of Parameters for Maximizing the Lifetime of a Polymer Extrusion Filter**, Second International Conference on Continuous Optimization, Hamilton, Ontario, August 2007.
26. **Some Derivative-Free Approaches to a Hydraulic Capture Benchmarking Problem**, SIAM Conference on Computational Issues in the Geosciences, Costa Mesa, CA, March 2007.
27. **Why do I have to Learn This? Real World Applications Making Connections**, co-keynote speaker, 8th Annual Regional Secondary Mathematics Conference, Ogdensburg, NY, March 2007.
28. **Derivative-Free Methods for Simulation-based Optimization in Engineering Design**, colloquium talk, Clemson University, May 2006.
29. **Derivative-Free Methods for Fixed Cost Formulations of Plume Containment Applications**, Civil and Environmental Engineering Seminar, Clarkson University, November 2006.
30. **Outreach to the K-12 Community**, SIAM Conference on Computational Science and Engineering, Orlando, FL, February 2005.
31. **A Comparison of Sampling Methods for Remediation Design**, The Graduate School on Modeling, Simulation, and Optimization, Technische Universitat Darmstadt, Germany, December 2004.
32. **Sampling Methods for Optimal Remediation Design**, The Computational Engineering Research Center, Technische Universitat Darmstadt, Germany, December 2004.
33. **A Comparison of Sampling Methods for Remediation Design**, SUNY Buffalo, Department of Civil, Structural, and Environmental Engineering, November 2004.
34. **Using Mathematics to Educate Students About Groundwater** SIAM 2004 Annual Meeting, Portland, OR, July 2004.
35. **Teaching Numerical Methods Through Projects** Joint Mathematics Meetings, Phoenix, AZ, January 2004.
36. **An Experience with Early Undergraduate Research in Modeling and Computational Mathematics** Joint Mathematics Meetings, Phoenix, AZ, January 2004.
37. **A Numerical Approach and Nonsmooth Analysis for Partially Saturated Flow in Nonuniform Porous Media** Solution Methods for Large-Scale Nonlinear Problems, Livermore, CA, August 2003.
38. **Optimal Design for Groundwater Flow and Remediation Problems** SAMSU Workshop on Simulation and Optimization, Raleigh, NC, April 2003.
39. **Implicit Temporal Integration and Preconditioner Management for Richards' Equation** SIAM 50th Anniversary & 2002 Annual Meeting, Philadelphia, PA, July 2002.

40. **Solving Groundwater Remediation Problems with Implicit Filtering** SIAM Conference on Optimization, Toronto, Canada, May 2002.
41. **Subsurface Control With Implicit Filtering** Sixth SIAM Conference on Mathematical and Computational Issues in the Geosciences, Boulder, CO, June 2001.
42. **Application and Analysis of a Heat Transport Model**, Universitat Trier, Trier, Germany, January 2001.

Contributed Talks and Poster Presentations

1. **Multi-level Undergraduate Research in Sustainable Water Use**, MAA/AMS Joint Mathematics Meeting, Baltimore, MD, January 2014.
2. **Challenges in Optimal and Sustainable Water Allocation for Berry Farming**, Optimization Days, GERAD (Group for Research in Decision Analysis), Montreal, Canada, May 2013.
3. **Crop Rotation Modeling to Meet A Sustainable Water Yield**, MAA/AMS Joint Mathematics Meetings, San Diego, CA January, 2013.
4. **Integrated Math and Physics for Entry to Undergraduate STEM: IMPETUS for Career Success**, The American Society for Engineering Education, Clarkson University, March 2012.
5. **An Asynchronous Parallel Hybrid Approach for MINLPs**, 23rd European Modeling and Simulation Symposium, Rome Italy, 2011.
6. **A Mathematical Modeling Approach to Understanding the Impact of STEM Summer Institutes on Building Teacher Leaders**, International Conference for Academic Disciplines, International Journal of Arts and Sciences, Boston MA, May 2011.
7. **Spatially Adaptive Finite Elements with Temporal Adaption Using Local Truncation Error Control for Variably Saturated Flow**, Computational Methods in Water Resources, Barcelona, Spain, June 2010.
8. **Selecting Appropriate Hybrid-optimization Techniques for Solving the Plume Containment Problem**, G.A. Gray*, K.R. Fowler, J. Griffin, M. Taddy, XVII International Conference on Computational Methods in Water Resources, San Francisco, CA, July 2008.
9. **The Effects of Mesh Coarsening on Mass Conservation for a Fully Adaptive Implementation of Richards' Equations**, Poster, G. S. Yamoah, K.R. Fowler, O. Eslinger, C.E. Kees, J. Pettway, and S. Howington, , XVII International Conference on Computational Methods in Water Resources, San Francisco, CA, July 2008.
10. **A Simulation-based Optimization Approach to Polymer Extrusion Filter Design**, S. LaLonde, K. Fowler, L. Jenkins*, C. Cox, American Filtration Society 2008 Annual Conference and Exposition, Valley Forge, PA May 2008.
11. **A Framework for Particle Swarm Optimization with Surrogate Functions**, Matthew Parno*, Kathleen Fowler, Thomas Hemker, 10th Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, April 2008.

12. **Derivative-Free Methods to Maximize the Lifetime of a Polymer Extrusion Filter**, contributed talk, SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
13. **Adaptive Temporal Integration of ODEs with Interval Computations**, Mike Petito* and K. Fowler, SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
14. **Plume Containment with Particle Swarm Optimization**, Matthew Parno* and K. Fowler, SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
15. **IMPETUS for Career Success**, SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
16. **Adaptive Temporal Integration of ODEs with Interval Computations**, poster with Mike Petito, 2006 SIAM Annual Meeting, Boston.
17. **Challenges in Modeling Variably Saturated Flow in Nonuniform Porous Media**, poster with Godfred Yamoah, Clarkson Center for the Environment Open House, February 2007.
18. **Plume Containment with Particle Swarm Optimization**, poster with Matthew Parno, Clarkson Center for the Environment Open House, February 2007.
19. **Enhancement of Mathematics with Technology and Theme-Based Learning**, National Consortium for Specialized Secondary Schools of Mathematics, Science, and Technology Expedition, St. Louis, MO, March 2005.
20. **A Hydraulic Capture Application for Optimal Remediation Design**, XV International Conference on Computational Methods in Water Resources, Chapel Hill, NC June 2004.
21. **Optimal Groundwater Remediation Design**, Eighth Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, March 2004.
22. **Implicit Temporal Integration with Error Control for Richards' Equation** Seventh SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin, TX, March 2003.
23. **Implicit Temporal Integration for Richards' Equation** Seventh Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, March 2002.

Professional Development

1. **Modeling Across the Curriculum Workshops I and II**, National Science Foundation and The Society for Industrial and Applied Mathematics, Alexandria, VA, August 2012, January 2014.
2. **Sustainability Problems Focused SQUARE on Agricultural Water Management in the Pajaro Valley, CA**, American Institute of Mathematics, Palo Alto, CA, February 2012, April 2013, April 2014.

3. **American Institute of Mathematics**, Workshop on Sustainability Problems, Palo Alto, CA, January 2011.
4. **American Institute of Mathematics**, Workshop on Short-term Cardiovascular Respiratory Control Mechanisms, Palo Alto, CA, November 2006.
5. **Faculty Research and Engineering Program**, Army Corps of Engineers, Waterways Experimentation Station, Vicksburg, MS, July 2006.
6. **Writing in the Disciplines Workshop**, School of Arts and Sciences, Clarkson University, 2005.
7. **Project NExT Fellow** New Experiences in Teaching July 2003–2004
This is a developmental program for new Ph.D's in the mathematical sciences and is designed to help improve teaching of undergraduate mathematics and direction of undergraduate research.
8. **AMS-MER Workshop on Excellence in Undergraduate Mathematics: Lessons Across the Curriculum**, Anchorage, Alaska, September 2003.
9. **SAMSI Associate**, Statistical and Applied Mathematical Sciences Institute, Research Triangle Park, NC, August 2002–2003
The Institute is funded by the National Science Foundation and my work contributed to the Large-Scale Computer Models for Environmental Systems program.
10. **Preparing the Professoriate**, N.C. State University, August 2000-May 2001
Co-taught MA427, Introduction to Numerical Analysis.
11. **Introduction to Using the IBM SP at NCSC**, North Carolina Supercomputing Center, September 2000.
12. **MPI, Message Passing Interface Course**, North Carolina Supercomputing Center, August 1999.

Professional Service

Professional and Honorary Societies

1. Phi Kappa Phi
2. Society for Industrial and Applied Mathematics
3. American Mathematical Society
4. Association for Women in Mathematics
5. Mathematical Association of America
6. Clarkson representative for the Consortium of Universities for the Advancement of Hydrologic Science

Editorial Services

1. Advances in Water Resources, Editorial Board Member

2. Pacific Journal of Optimization, Guest Editor for Special Issue on Derivative-free Hybrid Optimization, 2010
3. SIAM Undergraduate Research Online, Editorial Board Member

Journal Reviewer

1. SIAM Journal of Numerical Analysis
2. SIAM Journal of Optimization
3. Engineering Optimization
4. Environmental Modeling and Software
5. Optimization and Engineering
6. Groundwater
7. Computational Optimization and Applications
8. Mathematical Reviews for the American Mathematical Society (AMS) (2003-2006)

Professional Services (National Societies)

1. Member, MAA CUPM Working Group Environmental Science and Climate Studies, 2013 present.
2. Society for Industrial and Applied Mathematics M3 Challenge Problem Development Committee, 2012-present.
3. Association for Women in Mathematics Student Chapter Committee Chair, 2012-present.
4. American Society of Mathematics Frank and Brennie Morgan Prize Committee, 2011-present.
5. Mathematics of Planet Earth, Task Force (Water Resources), 2011–2013.
6. Project NExT (New Experiences in Teaching) Mentor for new or recent PhDs in Mathematical Sciences sponsored by the Mathematical Association of America, 2013- present.
7. Association for Women in Mathematics Mentoring Network, 2014-present.
8. American Institute of Mathematics, Human Resources Diversity Board Committee Member, 2010-present.

University Service

- Affiliate: Clarkson Institute for a Sustainable Environment (Formerly Clarkson Center for the Environment), Member 2003-present
- School of Arts and Sciences Faculty Mentoring Program, Panel Discussion participant 2014
- Honors Program, Summer Research Panel Discussion participant 2013, 2014
- Convocation Reading Group Leader 2013, 2014
- Sustainable Iron Chef Competitor, 2012, 2013
- Project Challenge Instructor, 2007, 2008

Faculty Advisor for Student Groups:

Clarkson Student Chapter of the Association for Women in Mathematics

I started this chapter in 2004 primarily to promote a sense of community among mathematics major, but the meetings and activities are open to all students regardless of gender or major. The primary goals are to expose students to the world of professional mathematics, help students obtain information about careers in mathematics, and help students develop leadership skills through service to the university and community. Some of our past activities include; Peer tutoring for the Freshmen ABC exams, MATLAB and MAPLE tutorials open to the campus, Middle School Math Essay Contest to celebrate Math Awareness Month, Math in Industry: a panel discussion with Dr. Kevin Vixie from Los Alamos National Labs, “Jobs in Industry: What’s it all about?” by Dr. Genetha Gray (invited speaker from Sandia National Labs), social events including Num3rs nights, Casino nights, and movie nights. Yearly events include creating a π -day celebration for over 200 local middle and high school students and joint movie and bowling nights with the SIAM student chapter in addition to some of the usual activities.

COMAP International Contest in Mathematical Modeling 2005-present

I revived Clarkson’s participation in COMAP in 2005 after Prof. David Powers had stopped coaching several years before. This contest challenges teams of students to clarify, analyze, and propose solutions to open-ended problems. The contest attracts diverse students and faculty advisors from over 500 institutions around the world. At Clarkson University, COMAP has attracted students from varying backgrounds and disciplines. In 2009, a team of sophomores received the MAA Prize for best paper—meaning they had one of the top 5 papers out of roughly 1500 entries. Prof. Skufca and I lead the training sessions as a one credit, ten week course.

University Committees

Institute for a Sustainable Environment Graduate Committee, 2014-present

Clarkson Tenure Committee, 2014-present

Academic Success Program to Improve Retention and Education (ASPIRE) Mentoring Program, 2013-present

Travel and Entertainment Committee, 2010

Grievances Committee, 2010

Member, Awards Committee, 2005

Student Affairs Focus Group, October 2003

Department Committees

Member, Undergraduate Committee, 2003-present

Member, Recruitment Committee 2003-present

Member, Applied Math Hiring Committee, 2006, 2007, 2011, 2012

Graduate Advisory Committees

1. Binqin Hu, PhD Electrical Engineering, Expected graduation 2015.
2. Robert Jaspersohn, PhD in Physics, Expected graduation 2015.
3. Mike Fowler, PhD in Mathematics, 2014.
4. Gerlinde Wolf, MS in Environmental Science and Engineering, 2013.
5. Sean Kramer, PhD in Mathematics, 2013.
6. Guannan Jiang, MS in Environmental Engineering, 2012.
7. Bo Zhang, MS in Environmental Engineering, 2010
8. Lauren Sampson, MS in Mathematics, 2008
9. Babek Enayati, Electrical Engineering 2008
10. Madhav Karri, Ph.D Candidate in Mechanical and Aeronautical Engineering
11. Ye Chen, Ph.D. Candidate in Mathematics
12. Chow Compoo-Inwai, Ph.D. in Electrical Engineering, 2008
13. Xunyang Shen, Ph.D. in Mathematics, 2007
14. Mehul Vora, Ph.D. in Computer Science, 2006
15. Lotten Mthombeni, Ph.D in Electrical Engineering, 2006
16. Jin Qian, MS in Civil and Environmental Engineering, 2004

Educational Outreach Activities

Background

Clarkson University is located in St. Lawrence County which comprises eighteen rural school districts. The communities served are characterized by unemployment levels above the state average, per capita income below other rural communities in upstate New York, and an astounding 25% of children living below the poverty level. Over the last few years an educational partnership between the Clarkson University and the St. Lawrence-Lewis BOCES has emerged to tackle the need for change. I will highlight some of the outcomes below.

1. *Teacher Institutes*

These week long workshops are designed for local teachers. The focus is on professional development, improving mathematical knowledge, curriculum development, and project-based learning. Each institute includes real world applications, core mathematics, technology, and an emphasis on New York State standards.

- (a) C-STEM2-day Math Modeling Workshop , August 2014
 - (b) Math Modeling in Classrooms Professional Development Workshop, Quinnipiac University, with K. Bliss, funded by SIAM, May 2014.
 - (c) C-STEM Academy, August 2013 (Department of Defense Carthage-STEM Grant)
 - (d) C-STEM Academy, August 2012 (Department of Defense Carthage-STEM Grant)
 - (e) Developing Mathematical Models and Incorporating Them in the Classroom, Clarkson University, with K. Black, funded by SIAM, November 15, 2012
 - (f) Contest to Classroom Workshop, September 2009 (St. Lawrence County STEM Partnership Grant)
 - (g) Real Solutions to Real Problems: Middle School Math Saves the Day, July 2009 (St. Lawrence County STEM Partnership Grant)
 - (h) Integrated Mathematics and Physics: The Roller Coaster Project, August 2009 (St. Lawrence County STEM Partnership Grant)
 - (i) Clarkson Summer Institute: Integrated Mathematics and Physics Projects for Middle and High Schools, July 23-27, 2007 (St. Lawrence County STEM Partnership Grant)
 - (j) FEH BOCCES 2-day Teacher Institute on Theme-based Learning, July 2006
 - (k) Clarkson Summer Institute on Applications and Technology to Enhance Math and Science Education, July 24-28, 2006 (St. Lawrence County MATH Partnership Grant)
 - (l) Clarkson Summer Institute on Problem Solving and Applications, August 1-5 2005 (St. Lawrence County MATH Partnership Grant)
 - (m) Clarkson Summer Institute on Mathematics with Technology, August 8-12 2005 (Title II D, with FEH BOCES)
 - (n) Clarkson Summer Institute on Enhancing Mathematics Education through Technology, August 9-12 2004 (Title II D, with FEH BOCES)
2. **Integrated Mathematics and Physics for Entry To Undergraduate STEM (IMPETUS)** for Career Success, NYSED Science, Technology Entry Program, 2005-present
 This is a student oriented program meant to assist students in exploring higher education possibilities in the STEM disciplines. The motivating theme is the understanding of roller coaster engineering through a school year program and week long summer camp. The program provides academic support, tutoring, mentoring, career planning, research experiences, as well as enriching learning activities to roughly 150 7-12 grade students in 11 school districts. (Website: <http://web2.clarkson.edu/projects/impetus/>)
3. This year, through a partnership between the Society of Industrial Applied Mathematics and the Consortium for Mathematics and Its Applications, I was selected to co-author Guidelines for Assessment and Instruction in Math Modeling Education (**GAIMME**). This report aims to establish that the modeling process is understood as part of STEM studies and research, and as a basic tool for problem solving and logical thinking. GAIMME will help define core competencies to be included in student experiences, explore existing effective work, and provide direction to enhance math modeling education at all levels. This work is supported by two NSF-SIAM workshops on Modeling Across the Curriculum. The expected due date is May 2015.

4. *MATHCOUNTS co-coordinator, 2006-present*
MATHCOUNTS is a national enrichment program that promotes middle school mathematics achievement. As a co-coordinator, my activities include training and scheduling Clarkson students to help local teacher coaches prepare students for the competition, and hosting the local competitions on Clarkson campus.
5. *Project Challenge: The Roller Coaster Project, 2007, 2008*
This is a five week course taught on Saturdays to local high school students. The course was developed and co-taught with Dr. Peter Turner, Dr. Mike Ramsdell, and Dr. David Wick. The course provides an introductory understanding of the mathematics and physics of roller coaster design. The classwork includes the use of altimeters and motion sensors to collect data, computer labs to analyze data and web-based investigation on key features of roller coasters, and the basics of kinetic energy. The class is supported by mathematical modeling, computational methods, and pencil-and-paper activities. Students apply these ideas to a toy car 'roller coaster' travelling along a large 5 meter track whose shape can be altered to accomodate multiple hills, valleys, loops, and jump scenarios. In addition, students explore the safety and thrill factors of coaster design via the NOLIMITS software and by taking a ride in the MAXFLIGHT2002 Virtual Reality Roller Coaster that resides on Clarkson's campus.
6. Potsdam High School Senior Capstone Project Panelist, 2012, 2013, 2014.
7. Mythical Scientists and Imaginary Mathematicians, 13th Annual STEP Statewide Student Conference, Albany, NY March 2011.
8. Promoting Mathematics and Physics Using Roller Coaster Design, NY State STEM Education Collaborative Summer Institute, Oswego, NY August 2010.
9. Zombies, Gossip, and Math, 12th Annual STEP Statewide Student Conference, Abany, NY March 2010.
10. Survey for Success: A Game Show, 11th Annual STEP Statewide Student Conference, Abany, NY March 2009.