

◀ MATHEMATICAL SCIENCES ▶

2008

HIGHLIGHTS

- ◇ UNDERGRADUATE MAJOR ELISABETH BROWN RECEIVED AN AWARD FOR EXCELLENCE AND KELLY ALSUP AND BOVARD TIBERI SPENT THE SUMMER IN NORWAY ON AN NSF FUNDED RESEARCH PROJECT.
- ◇ GRADUATE STUDENT JON WIXSON WAS SELECTED AS THE OUTSTANDING GRADUATE TEACHING ASSISTANT IN THE COLLEGE OF LETTERS AND SCIENCE.
- ◇ SHAE THOMPSON WAS SELECTED AS THE COLLEGE OF LETTERS AND SCIENCE OUTSTANDING ADJUNCT.
- ◇ PROFESSOR JOHN BORKOWSKI WAS AWARDED A FULBRIGHT FELLOWSHIP.
- ◇ PROFESSORS TOMAS GEDEON AND MARK PERNAROWSKI WERE ON SABBATICAL.
- ◇ A DEPARTMENT COLLOQUIUM SERIES WAS INITIATED.

Books	12
Technical Manuscripts	1
Refereed Articles	36
Presentations	63
FTE Faculty	26.6
Majors	201
Grant Expenditures	\$132,218

SUMMARY

TEACHING

In 2008 the Department of Mathematical Sciences had 99 undergraduate majors seeking a B.S. degree in one of four options (Applied Mathematics, Mathematics, Mathematics Teaching, Statistics). In addition we have 71 M.S. students and 31 Ph.D. candidates. In 2008, the Department awarded 35 Bachelor of Science degrees. Among these B.S. degrees were six who graduated with highest honors (cumulative Grade Point Average (GPA) greater than or equal to 3.70), seven who graduated with honors (cumulative GPA of 3.25 through 3.69), and two who completed the University Honors Program. Also awarded in 2008 were 29 Master of Science degrees and two Doctor of Philosophy degrees.

Our students have received several awards this year. Matthew Beamer, Casey Donovan, and Kevin Rice were Presidential Scholars. Elisabeth Brown received a Bozeman Area Chamber of Commerce and MSU Alumni Association Award for Excellence. Kelly Alsup and Bovard Tiberi were funded by the National Science Foundation for eight-week summer research projects on carbon sequestration in Norway at the University of Bergen and the Norwegian University of Science and Technology in Trondheim. Spring semester 2008 John Kirtley made the President's List with a perfect 4.00 GPA and 27 other majors made the Dean's List with a GPA of 3.50 through 3.99. Fall semester 2008 the President's List included Matthew Beamer, Danielle

Burrington, Jennifer Classen, Casey Donovan, Alexis Lund, and Tessa Mosdal while the Dean's List included an additional 16 majors.

Jon Wixson was honored as the Outstanding GTA in the College of Letters of Science. Andrea Katz, Kim Nordby, and Carl Olimb were departmental Outstanding GTAs. Shae Thompson, who provides mathematics instruction through the TRiO Student Support Services program, was selected as the College of Letters and Science Outstanding Adjunct.

RESEARCH

Faculty in the Department of Mathematical Sciences have had a productive year in advancing their research programs. Our faculty are working on numerous interdisciplinary research programs involving the Center for Adaptive Optics (CAO), the Center for Biofilm Engineering (CBE), the Center for Computational Biology (CCB), the Defense Advanced Research Projects Agency (DARPA), the Interagency Grizzly Bear Study Team, the Montana Office of Public Instruction, the Montana Water Center, the National Council of Teachers of Mathematics (NCTM), the National Institutes of Health (NIH), the National Park Service, the National Science Foundation (NSF), the Northern Yellowstone Carnivore Working Group, the Optical Sciences Company (tOSC), the State of Montana Fish, Wildlife, & Parks Department, the US Department of Education, the US Fish and Wildlife Service, the US Geological Survey (USGS), Yellowstone National Park, and the Whitebark Pine Monitoring Working Group. Cooperative on-campus projects involved the departments of Agricultural Economics & Economics, Animal & Range Sciences, Cell Biology & Neuroscience, Chemical Engineering, Civil Engineering, Earth Sciences, Ecology, Education,

Entomology, Land Resources & Environmental Sciences, Physics, and Psychology.

Several faculty were invited to give lectures abroad this year. Marcy Barge spoke at the Workshop on Topology of Tilings in Banff, Canada. John Borkowski was a Fulbright Fellow in the Department of Mathematics and Statistics at Thammasat University in Bangkok, Thailand and gave addresses at Thammasat University; King Mongkut University of Technology North Bangkok; Kasetsart University; and the National Institute of Development Administration, all in Thailand. He also spoke at Academia Sinica; the National Cheng Chi University; and the National Tsing Hua University in Taiwan. Warren Esty was invited to address the Conference on Quantifying Monetary Supplies in Greco-Roman Times in Rome, Italy. Tomas Gedeon presented a poster at the Gordon Conference on Theoretical Biology in Il Ciocco, Lucca, Italy; and spoke at the Conference on Sensors in Biology and Engineering in Paola, Italy; and the Conference on Mathematical Biology in Luminy, Marseille, France. Jarek Kwapisz spoke at the Conference on Combinatorial and Computational Aspects of Tilings at the Imperial College in London, England. Al Parker spent the 2007-08 year at the University of Otago in Dunedin, New Zealand and gave two addresses there.

Steve Cherry continued a research project with the US Geological Survey concerning wildlife habitat in and around Yellowstone National Park. John Borkowski was funded by the National Park Service (NPS) for habitat studies in Yellowstone. Megan Higgs was funded by the NPS for a project predicting pregnancy status in bison in Grand Teton. Beth Burroughs and Jennie Luebeck were funded by the Department of Education for a Mathematics and Science Partnerships project to improve mathematics instruction in the public schools. Thomas Gedeon continued work on a National Science

Foundation (NSF) grant on optimal sensor receptor arrays and completed an NSF/NIH grant to study NCR-circuit dynamics. He also had NSF funding for two separate projects. One involved the fluid-structure interactions in arthropods and one studied the dynamics of biochemical oscillators. Lastly he had Defense Advanced Research Projects Agency (DARPA) funding to design physiologically complex networks. Mark Greenwood was funded by the USGS to investigate wetland hydrology and vegetation data. Kathi Irvine was funded by the Inventory and Monitoring Program of five networks in the NPS. Isaac Klapper was funded by NSF with an Interdisciplinary Grant in the Mathematical Sciences in order to devote an entire year working in the lab of Dave Ward in the Department of Land Resources and Environmental Science at MSU. Jennie Luebeck continued work on the Department of Education funded Creating Opportunities in Mathematics for Exemplary Teaching (COMET) project, for which she served as the Principal Investigator. Al Parker concluded a Postdoctoral Fellowship in New Zealand funded jointly by the new Zealand Institute of Mathematics, the University of Auckland, and the University of Otago. Mark Pernarowski visited the University of British Columbia in Vancouver, Canada to collaborate with Michael Ward on electrode modelling. Jim Robison-Cox continued work on a whirling disease project funded by the US Fish & Wildlife Service. Curt Vogel was funded by NSF on a project involving adaptive optics scanning laser ophthalmoscopy and by the Optical Sciences Company to work on the Thirty Meter Telescope project.

This year two Ph.D. students graduated and many more were involved in exciting research ventures. Maurice Burke's Ph.D. student, Raquel Vallines Mira, finished her degree which studied effective mathematics teaching strategies for Native American students. Diana Colt completed her Ph.D. under Jennie Luebeck studying

online graduate mathematics courses. Thomas Gedeon worked with a team of graduate students including Jesse Berwald, Jake Brown, Mark Campanelli, Bree Cummings, Shaun Harker, and Kate Patterson on computational neuroscience and systems biology. Kathi Irvine worked with graduate student Kezia Manlove on water quality analysis for the Greater Yellowstone Network. Jarek Kwapisz worked with graduate students Veronica Baker, Andy Bouwman, David Buhannan, and Mark Mathison on problems in dynamical systems. John Borkowski directed Ph.D. student Wlpawan Laorun, at Thammasat University in Thailand working on number-theoretic methods in the generation of designed experiments. Maurice Burke worked with graduate students Taylor Jensen, Rejoice Mudzimiri, and Sara Segal on issues in mathematics education. Isaac Klapper's Ph.D. student, Shane Nowack, spent the year working in a biosciences laboratory. Jim Robison-Cox's Ph.D. student Ilai Keren worked on a project in land resources involving the preharvest application of herbicides on wheat crops.

SERVICE

The Department of Mathematical Sciences serves the local and campus community, as well as the region, state and nation in a variety of ways. All of the faculty contributed to department and campus activities. This year we instituted a new Colloquium Series, which was an outstanding success. The faculty panel that orchestrated this series was made up of Maurice Burke, Steve Cherry, Lisa Davis, and Russ Walker. In addition, our faculty contributed to numerous efforts to improve our state. Maurice Burke served on the State Mathematics and Science Teacher Initiative Committee. For the Montana Chapter of the American Statistical Association, Megan Higgs served as President, Kathi Irvine was the Vice-President, John Borkowski was the

Secretary/Treasurer and Mark Greenwood was the Chapter Representative. Jennie Luebeck served on the Montana Mathematics Standards Revision Team and was on both the Board of Directors of the Montana Council of Teachers of Mathematics and the Board of Directors of the Montana Learning Center for Mathematics and Science. Russ Walker was the MSU Unit Coordinator for the Montana University System (MUS) Transfer Initiative. As part of the Mathematics and Science Partnerships, David Yopp served as Inter-rater Reliability Trainer for four different projects in Montana.

Beyond the borders of Montana, several faculty members contributed to their profession in a variety of ways. Robert Boik is an Editorial Board member for *Psychological Methods*. John Borkowski is an Associate Editor for both *The American Statistician* and *The Journal of Probability and Statistical Science*. He is also on the Editorial Review Board for *The Journal of Quality Technology* and *The Thailand Statistician*. Maurice Burke is the Editor of *The Navigations Series* produced by the National Council of Teachers of Mathematics. Beth Burroughs served on the Mathematical Association of America's (MAA) Committee on the Mathematical Education of Teachers as well as on the Association of Mathematics Teacher Educators (AMTE) review task force on the NCTM. Tomas Gedeon is an Associate Editor for the *Journal of the American Institute of Mathematical Sciences*, the *Rocky Mountain Journal of Mathematics* and *Discrete and Continuous Dynamical Systems B*. David Yopp served as an external evaluator for the Idaho Mathematics and Science Partnerships program.

PUBLICATIONS

A. BOOKS / EDITED COLLECTIONS / FULL-LENGTH WORKS

BORKOWSKI, J.

“Wildlife Responses to Park Visitors in Winter,” P.

White, J. Borkowski, T. Davis, R. Garrott, D. Reinhart and D. McClure, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press Terrestrial Ecology Series, Chapter 26, 581-601, (2008).

“Wolf Kill Rates: Predictably Variable?” M. Becker, R.

Garrott, P. White, R. Jaffe, J. Borkowski, C. Gower and E. Bergman, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 17, 339-369, (2008).

“Elk Nutrition After Wolf Recolonization of Central Yellowstone,” P. White, R. Garrott, J. Borkowski, K.

Hamlin and J. Berardinelli, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 22, 477-488, (2008).

“Bison Winter Road Travel: Facilitated by Road Grooming or a Manifestation of Natural Trends?” J.

Bruggeman, R. Garrott, P. White, D. Bjornlie, F. Watson and J. Borkowski, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 27, 603-621, (2008).

“Diet and Nutrition of Central Yellowstone Elk During

Winter,” P. White, R. Garrott, J. Borkowski, J. Berardinelli, D. Mertens and A. Pils, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 9, 157-176, (2008).

BURKE, M.

Navigating Through Reasoning and Proof in Grades 9-12, Edited by M. Burke with Chapters by M. Burke, J. Luebeck, T. Martin, S. McCrone, A. Piccolino and K. Riley, National Council of Teachers of Mathematics, Reston, Virginia, 198 pages, (2008).

CHERRY, S.

“Elk Winter Resource Selection in a Severe Snow Pack Environment,” M. Messer, R. Garrott, S. Cherry, P. White, F. Watson and E. Meredith, in: R. Garrott, J. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 8, 137-156, (2008).

“Elk Group Size and Wolf Predation: A Flexible Strategy When Faced with Variable Risk,” C. Gower, R. Garrott, P. White, S. Cherry and N. Yoccoz, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 19, 401- 422, (2008).

“Changes in Elk Resource Selection and Distribution with the Reestablishment of Wolf Predation Risk,” P. White, R. Garrott, S. Cherry, F. Watson, C. Gower, M. Becker and E. Meredith, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 21, 451- 476, (2008).

ESTY, W.

Proof: Introduction to Higher Mathematics, 4th Ed., W. Esty and N. Esty, 405 pages, (2008).

MEREDITH, E.

“Elk Winter Resource Selection in a Severe Snow Pack Environment,” M. Messer, R. Garrott, S. Cherry, P. White, F. Watson and E. Meredith, in: R. Garrott, J. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 8, 137-156, (2008).

“Changes in Elk Resource Selection and Distribution with the Reestablishment of Wolf Predation Risk,” P. White, R. Garrott, S. Cherry, Watson, C. Gower, M. Becker and E. Meredith, in: R. Garrott, P. White and F. Watson (Eds.), *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*, Elsevier/Academic Press, Terrestrial Ecology Series, Chapter 21, 451-476, (2008).

B. TECHNICAL MANUSCRIPTS

CHERRY, S.

Greater Yellowstone Whitebark Pine Monitoring Group, Appendix A: “Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem,” S. Cherry, J. Canfield, G. DeNitto, C. Jean, S. Prodruzny, D. Reinheart, C. Schwartz and E. Shanahan, in: C. Schwartz, M. Haroldson and K. West (Eds.), *Yellowstone Grizzly Bear Investigations: 2007 Annual Report of the Interagency Grizzly Bear Study Team*, U.S. Geological Survey, Bozeman, Montana, 50-56 (2008).

C. REFEREED JOURNAL ARTICLES

BARGE, M. .

“Cohomology in One Dimensional Substitution Tiling Spaces,” M. Barge and B. Diamond, *Proceedings of the American Mathematical Society*, 136, 2183-2191, (2008).

BOIK, R.

“Accurate Confidence Intervals in Regression Analysis of Non-Normal Data,” R. Boik, *Annals of the Institute of Statistical Mathematics*, 60, 61-83, (2008).

“An Implicit Function Approach to Constrained Optimization with Applications to Asymptotics,” R. Boik, *Journal of Multivariate Analysis*, 99, 465-489, (2008).

“Effects of Sampling Error and Temporal Correlations in Population Growth on Process Variance Estimators,” D. Staples, M. Taper, B. Dennis and R. Boik, *Environmental and Ecological Statistics*, appeared electronically at, <http://dx.doi.org/10.1007/s10651-008-0097-5>, (2008).

“Quantifying Synergism/Antagonism Using Nonlinear Mixed-Effects Modeling: A Simulation Study,” J. Boik, R. Newman and R. Boik, *Statistics in Medicine*, 27, 1040-1061, (2008).

“Newton Algorithms for Analytic Rotation: An Implicit Function Approach,” R. Boik, *Psychometrika*, 73, 231-259, (2008).

“Principal Components on Coefficient of Variation Matrices,” R. Boik and A. Shirvani, *Statistical Methodology*, appeared electronically at, <http://dx.doi.org/10.1016/j.statmet.2008.02.006>, (2008).

BORKOWSKI, J.

“Componentwise Variance Dispersion Graphs for Mixture Experiments,” J. Borkowski, B. Chomtee and K. Panishkan, *2007 Proceedings of the American Statistical*

Association, Section on Quality and Productivity, 1773-1782, (2008).

“Linear-Quadratic (LQ) Model Designs,” J. Borkowski, *Thailand Statistician*, 6, 47-64, (2008).

“Center Points,” J. Borkowski, *Encyclopedia of Statistics in Quality and Reliability*, 289-292, (2008).

“Yellowstone Pronghorn Alter Resource Selection after Sagebrush Decline,” S. Boccadori, P. White, R. Garrott, J. Borkowski and T. Davis, *Journal of Mammalogy*, 89(4), 1031-1040, (2008).

“New 3-Level Response Surface Designs,” N. Nguyen and J. Borkowski, *Journal of Statistical Planning*, 138, 294-305, (2008).

“Simple Latin Cubic Sampling +1 and -k Designs,” K. Boonhla, J. Borkowski, and K. Budsaba, *International Chinese Association of Quantitative Management, Proceedings of the 5th Sino-International Symposium on Probability, Statistics, and Quantitative Management*, 25-36, (2008).

“Avian Parental Care Had Dinosaur Origin,” D. Varricchio, J. Moore, G. Erickson, M. Norell, F. Jackson and J. Borkowski, *Science*, 322, 1826-1828, (2008).

BURKE, M.

“Reasoning and Proof in Geometry,” K. Riley and M. Burke, in M. Burke (Ed.), *Navigating Through Reasoning and Proof in Grades 9-12*, National Council of Teachers of Mathematics, Reston, Virginia, 33-49, (2008).

“On-Line Delivery of Graduate Courses in Mathematics Education,” M. Burke and V. Long, in R. Reys and J. Dossey (Eds.), *U.S. Doctorates in Mathematics Education: Developing Stewards of the Discipline, Volume 15 of the Conference Board of the Mathematical Sciences Series on Issues in Mathematics Education*, Providence, Rhode Island, 155-162, (2008).

BURROUGHS, E.

“A Reaction-Diffusion Equation Modeling the Invasion of the Argentine Ant Population (*Linepithema Humile*) at Jasper Ridge Biological Preserve,” K. Shryock, S. Brown, N. Sanders and E. Burroughs, *Natural Resource Modeling*, 21(2), 330-342, (2008).

“Poster Projects: Mathematics in Context,” S. Brown and E. Burroughs, *PRIMUS (Problems, Resources, and Issues in Mathematics Undergraduate Studies)*, 18(5), 475-487, (2008).

“A CSTP-Based Portfolio for a Secondary Mathematics Methods Course,” E. Burroughs, *California Association of Mathematics Teacher Educators Monograph*, 1, 87-93, (2008).

CHERRY, S.

“An Evaluation of the Rule Set Used to Distinguish Unique Females with Cubs-of-the Year in the Greater Yellowstone Ecosystem,” C. Schwartz, M. Haroldson, S. Cherry and K. Keating, *Journal of Wildlife Management*, 72, 543-554, (2008).

DAVIS, L.

“Sensitivity Analysis and Computational Uncertainty with Applications to Control of Nonlinear Parabolic Partial Differential Equations,” J. Burns and L. Davis, *Proceedings of the 47th IEEE Conference on Decision and Control*, IEEE Control Systems Society, appeared electronically at <http://dx.doi.org/10.1109/CDC.2008.4738861>, 3989-3994, (2008).

GEDEON, T.

“Binding Cooperativity in Phage Lambda is not Sufficient to Produce an Effective Switch,” T. Gedeon, K. Mischaikow, K. Patterson and E. Traldi, *Biophysical Journal*, 94(9), 3384-3392, (2008).

“When Activators Repress and Repressors Activate: a Qualitative Analysis of Shea-Ackers Model,” T. Gedeon,

K. Mischaikow, K. Patterson and E. Traldi, *Bulletin of Mathematical Biology*, 70(6), 1660-1683, (2008).

“Modeling Arthropod Hair Motion Using the Penalty Immersed Boundary Method,” J. Heys, T. Gedeon, B. Knott and Y. Kim, *Journal of Biomechanics*, 41(5), 977-984, (2008).

“Annealing and the Normalized N-Cut,” T. Gedeon, A. Parker, C. Campion and Z. Aldworth, *Pattern Recognition*, 41(2), 592-606, (2008).

GEYER, L.

“Smooth Siegel Disks Without Number Theory,” L. Geyer, *Mathematical Proceedings of the Cambridge Philosophical Society*, 144(2), 439-442, (2008).

“Sharp Bounds for the Valence of Certain Harmonic Polynomials,” L. Geyer, *Proceedings of the American Mathematical Society*, 136(2), 549-555, (2008).

HAMILTON, M.

“Resilience of Planktonic and Biofilm Cultures to Supercritical Co₂,” A. Mitchell, A. Philips, M. Hamilton, R. Gerlach, W. Hollis, J. Kaszuba and A. Cunningham, *Journal of Supercritical Fluids*, 47, 318-325, (2008).

“Determining the Efficacy of Fluid Sporicides Against Spores of *Bacillus Subtilis* on a Hard Surface Using the Quantitative Three Step Method: Method Validation Study,” S. Tomasino, R. Pines, M. Cottrill and M. Hamilton, *Journal of the Association of Official Analytical Chemists International*, 91, 833-852, (2008).

IRVINE, K.

“Chemodiversity of Exudate Flavonoids in *Cassinia* and *Ozothamnus* (Asteraceae, Gnaphaliales),” E. Wollenweber, R. Fischer, M. Dorr, K. Irvine, C. Pereira and J. Stevens, *Verlag der Zeitschrift für Naturforschung, Tübingen*, 63c, 731-739, (2008).

KLAPPER, I.

“Measurements of Accumulation and Displacement at the Single Cell Level in *Pseudomonas Aeruginosa* Biofilms,” B. Klayman, I. Klapper, P. Stewart and A. Camper, *Environmental Microbiology*, 10, 2344-2354, (2008).

LUEBECK, J.

“Reasoning and Proof in Algebra,” J. Luebeck, in M. Burke (Ed.), *Navigating Through Reasoning and Proof in Grades 9-12*, National Council of Teachers of Mathematics, Reston, Virginia, 17-31, (2008).

PARKER, A.

“Annealing and the Normalized N-Cut,” T. Gedeon, A. Parker, C. Campion, and Z. Aldworth, *Pattern Recognition*, 41(2), 592-606, (2008).

PATTERSON, K.

“Binding Cooperativity in Phage Lambda is not Sufficient to Produce an Effective Switch,” T. Gedeon, K. Mischaikow, K. Patterson and E. Traldi, *Biophysical Journal*, 94(9), 3384-3392, (2008).

“When Activators Repress and Repressors Activate: a Qualitative Analysis of Shea-Ackers Model,” T. Gedeon, K. Mischaikow, K. Patterson and E. Traldi, *Bulletin of Mathematical Biology*, 70(6), 1660-1683, (2008).

YOPP, D.

“One U.S. Mathematics Educator's Professional Development Experience with In-Service Chinese Teachers,” D. Yopp, *Conference Proceeding-U.S.-Sino Workshop on Mathematics and Science Education*, 61-65, (2008).

“Portfolio and Scoring Rubrics in Technology-Aided Instruction,” D. Yopp, *Mathematical Association of America Focus*, 28(5), 14-16, (2008).

PRESENTATIONS

BARGE, M.

“State of the Art in 1-D Tilings,” Workshop on Topology of Tilings, Banff, Alberta, Canada, October, 2008.

“The Pisot Conjecture,” Rocky Mountain Dynamical Systems Conference, Park City, Utah, May, 2008.

“The Branch Locus in Pisot Tilings,” Special Session in Dynamics, 2008 Joint Mathematics Meetings,” San Diego, California, January, 2008.

BORKOWSKI, J.

“Using a Genetic Algorithm (GA) to Generate Small Exact Response Surface Designs,” Academia Sinica, Taiwan, August, 2008.

“Variance Dispersion Graphs for Mixture Experiments,” Thammasat University, Bangkok, Thailand, September, 2008.

“Variance Dispersion Graphs for Mixture Experiments,” King Mongkut University of Technology North (KMUTNB), Bangkok, Thailand, August, 2008.

“Variance Dispersion Graphs for Mixture Experiments,” Kasetsart University, Bangkok, Thailand, August, 2008.

“Variance Dispersion Graphs for Mixture Experiments,” National Tsing Hua University, Taiwan, August, 2008.

“Variance Dispersion Graphs for Mixture Experiments,” National Institute of Development Administration (NIDA), Bangkok, Thailand, August, 2008.

“Evaluating and Comparing Properties of Response Surface Designs,” King Mongkut University of Technology North Bangkok (KMUTNB), Bangkok, Thailand, August, 2008.

“Using a Genetic Algorithm (GA) to Generate Small Exact Response Surface Designs,” National Cheng Chi University, Taiwan, August, 2008.

“Considerations for Publishing in International Journals,” King Mongkut University of Technology North Bangkok (KMUTNB), Bangkok, Thailand, August, 2008.

“Evaluating and Comparing Properties of Response Surface Designs,” Thammasat University, Thailand, September, (2008).

“An Introduction to Mathematics and Scientific Document Preparation using LaTeX: Parts I, II,” Thammasat University, Bangkok, Thailand, September, 2008.

“Evaluating and Comparing Properties of Response Surface Designs,” Kasetsart University, Thailand, August, 2008.

“Evaluating and Comparing Properties of Response Surface Designs,” National Institute of Development Administration (NIDA), Bangkok, Thailand, August, 2008.

“A Comparison of Methods Used to Simulate a Neyman-Scott Process in Adaptive Cluster Sampling Research,” with P. Turk, Western North American Region (WNAR) of The International Biometric Society Annual Meeting, Presenter: P. Turk, Davis, California, June 2008.

“Simple Latin Cubic Sampling +1 / -k Designs,” with K. Boonhla, 2008 Conference on Statistics and its Applications, Presenter: K. Boonhla, Pattaya Choburee, Thailand, May 2008.

“Directions of Research in Statistics and Applied Statistics: Physical Sciences and Engineering,” 2008 Conference on Statistics and its Applications, Pattaya Choburee, Thailand, May, 2008.

BURKE, M.

“The Least Squares Line: You Pay to Play,” Montana Education Association/Montana Federation of Teachers Conference, Missoula, Montana, October, 2008.

“Don't Wait for Calculus to Understand the Least Squares Line: Use Algebra,” 2008 Annual Meeting of the National Council of Teachers of Mathematics, Salt Lake City, Utah, April, 2008.

BURROUGHS, E.

“Using Integer Rods to Visualize Induction,” 2008 Joint Mathematics Meetings, San Diego, California, January, 2008.

“Mathematics Outreach via a Live Call-in Show,” Mathematical Association of America, Northwest Sectional Meeting, Helena, Montana, June 2008.

“Action Research in Mathematics Education,” Mathematical Association of America, Northwest Sectional Meeting, Helena, Montana, June, 2008.

CHERRY, S.

“Modeling the Realized Niche with Nonparametric Multivariate Density Estimation.,” with K. Keating, Montana Chapter of The Wildlife Society, Presenter: K. Keating, Missoula, Montana, February, 2008.

DOCKERY, J.

“Quorum Sensing and Biofilm Modeling,” Mathematical Tools for Multi-Scale Biological Processes, Montana State University, Bozeman, Montana, June, 2008.

“Senescence and Microbial Persistence,” Pattern Formation and Development in Colonial Organisms, Mathematical Biosciences Institute, Ohio State University, Columbus, Ohio, October, 2008.

ESTY, W.

“The Geometric Model for Estimating the Number of Dies,” Quantifying Monetary Supplies in Greco-Roman Times, Rome, Italy, September, 2008.

GEDEON, T.

“Binding Cooperativity in Phage is Not Sufficient to Produce an Effective Switch,” Cell Biology and Neuroscience Department Seminar, Montana State University, Bozeman, Montana, August, 2008.

“Multi-Valued Characteristics and Morse Decompositions,” Mathematical Tools for Multi-Scale Biological Processes, Montana State University, Bozeman, Montana, June 2008.

“Binding Cooperativity in Phage is Not Sufficient to Produce an Effective Switch,” poster at Gordon Conference in Theoretical Biology, Il Ciocco, Lucca, Italy, June, 2008.

“Models of Gene Regulation,” Mathematical Biology, Luminy, Marseille, France, June, 2008.

“From Somitogenesis to Cell Cycle: Modeling Periodic Gene Expression,” Mathematical Biology Seminar, Rutgers University, New Jersey, November, 2008.

“Unsteady Stokes Model for Fluid-Structure Interaction: Response of Filiform Hairs to a Calling Song of a Cricket,” Sensors in Biology and Engineering, Paola, Italy, October, 2008.

GEYER, L.

“Thermodynamic Formalism for Siegel Disks,” Spring Topology and Dynamical Systems Conference 2008, Milwaukee, Wisconsin, March, 2008.

“Thermodynamics Formalism for Siegel Disks,” American Mathematical Society, Sectional Meeting, Bloomington, Indiana, April, 2008.

GREENWOOD, M.

“Feeding Grain Decreases Training Efficiency in 2-Year Old Quarter Horses,” with W. Black, M. Greenwood, J. Weeding, L. Gagnon, and J. Bowman, Western Society of Animal Science, Presenter: W. Black, Laramie, Wyoming, June, 2008.

“Spatial Analysis of Drumling Orientations,” Presenter: C. Gilstrap, Student Research Celebration, Montana State University, Bozeman, Montana, April, 2008.

“Additive Mixed Models for Assessing Change in Yearly Streamflow Timing Measures in the Western United States,” with M. Greenwood, J. Moore and J. Harper, Joint Statistical Meetings, Denver, Colorado, August, 2008.

HIGGS, M.

“Prediction of Index of Biotic Integrity (IBI) Using Clipped Latent Variable Spatial Models,” Workshop on Environmetrics, National Center for Atmospheric Research, Boulder, Colorado, October, 2008.

KLAPPER, I.

“Microbial Biofilms,” Biocomplexity Colloquium, Notre Dame University, Notre Dame, Indiana, April, 2008.

“Microbial Biofilms,” Applied Mathematics Colloquium, University of Arizona, Tucson, Arizona, February, 2008.

“Microbial-Induced Mineralization in Biofilms,” Cells and Materials, Lake Arrowhead, California, December, 2008.

“Explaining Bacterial Persistence with Senescence,” Mathematical Tools for Multiscale Biological Processes, Montana State University, Bozeman, Montana, June, 2008.

“Physical Influences on Biofilm Structure,” Pattern Formation and Development in Colonial Organisms,

Mathematical Biosciences Institute, Ohio State University, Columbus, Ohio, October, 2008.

“Material Properties of Heterogeneous Viscous and Viscoelastic Fluids,” Transition Workshop, Research Triangle, North Carolina, May, 2008.

KWAPISZ, J.

“Mapping Class Group and Rigidity for Self-affine Tiling Spaces,” Combinatorial and Computational Aspects of Tilings, Imperial College, London, United Kingdom, July 2008.

LUEBECK, J.

“Mathematics Coaching Improvement Project for District Administrators and Principals,” Browning School District, Browning, Montana, January, 2008.

“Mathematics Coaching Improvement Project for Teachers” Browning School District, Browning, Montana, January, 2008.

“Mathematical Coaching Improvement Project for Teachers and Principals,” Browning School District, Browning, Montana, September, 2008.

“Action Research in Mathematics Education,” Mathematical Association of America, Northwest Sectional Meeting, Helena, Montana, June, 2008.

PARKER, A.

“Statistical Thinking in Antibiofilm Research,” Montana State University, Center for Biofilm Engineering, Bozeman, Montana, October, 2008.

“CG optimizers, Lanczos Eigensolvers, and Sampling,” University of Otago, Dunedin, New Zealand, March, 2008.

“Exact Versus Lanczos Eigensolvers,” University of Otago, Dunedin, New Zealand, February, 2008.

PARKER, B.

“Foundations of Epidemiology,” University of Otago, Dunedin, New Zealand, September, 2008.

SWANSON, R.

“What are Tiling Spaces?,” University of Maine, Orono, Maine, October, 2008.

“Tiling Spaces with Symmetry Groups,” University of Maine, Orono, Maine, October, 2008.

VOGEL, C.

“Deformable Mirror Modeling and Control,” Thirty Meter Telescope Headquarters, California Institute of Technology, Pasadena, California, December, 2008.

“Thirty Meter Telescope Adaptive Optics System Real Time Controller--Conceptual Design Trade Study Report,” Thirty Meter Telescope Headquarters, California Institute of Technology, Pasadena, California., October, 2008.

WEEDING, J.

“Feeding Grain Decreases Training Efficiency in 2-Year Old Quarter Horses,” with W. Black, M. Greenwood, J. Weeding, L. Gagnon, and J. Bowman, Western Society of Animal Science, Presenter: W. Black, Laramie, Wyoming, June, 2008.

YOPP, D.

“One U.S. Mathematics Educator's Professional Development Experience with In-service Chinese Teachers,” U.S.-Sino Workshop on Mathematics and Science Education, Murfreesboro, Tennessee, June, 2008.

“A Curriculum Focus Intervention's Effects on Students' Algebra Achievement,” Mathematical Association of America, Northwest Sectional Meeting, Helena, Montana, June, 2008.

ZHANG, T.

“Phase-Field Models for Biofilm Growth and Biofilm-Flow Interactions,” Computational Nanoscience and Mathematical Modeling Seminar Series, Industrial Mathematics Institute, University of South Carolina, Columbia, South Carolina, September, 2008.

GRANTS

A. FUNDED EXTERNAL GRANTS

BORKOWSKI, J

“Harvest Survey Sampling and Estimation,” Montana Department of Fish, Wildlife, and Parks, PI: J. Borkowski, \$49,936, (2007-2009).

“Evaluating Wildlife Responses to Winter Human Use in Yellowstone National Park,” National Park Service, PI: J. Borkowski, \$10,000, (2008-2009).

BURKE, M.

“Before It's Too Late-4,” Montana Commissioner of Higher Education, co-PIs: David Erickson and Maurice Burke, \$6,182 (2008).

BURROUGHS, E.

“ESEA Title II-B Mathematics & Science Partnerships: Broadwater & Bozeman Project,” U.S. Department of Education through the Montana Office of Public Instruction, co-PIs: E. Burroughs and J. Luebeck, \$50,000, (2008-2009).

CHERRY, S.

“Modeling Habitat-Specific Probability of Occurrence for Grizzly Bears (*Ursus Arctos*) in the Greater Yellowstone Ecosystem,” U.S. Fish and Wildlife and U.S. Geological Survey, PI: K. Keating, co-PI: C. Schwartz, S. Cherry, \$187,700, (2008-2010).

GEDEON, T.

“Optimality of a Sensor Receptor Array,” National Science Foundation-CRCNS, PI: T. Gedeon, co-PIs: J. Miller and G. Jacobs \$599,634, (2005-2009).

“Collaborative Proposal: NCR-Circuit Dynamics,” National Science Foundation/National Institutes of Health, PI: T. Gedeon, co-PIs: E. Boczko, K. Mischaikow and T. Cooper, \$157,263, (2005-2008).

“Fluid-Structure Interaction in Arthropod Mechanoreceptors,” National Science Foundation, PI: T. Gedeon co-PIs: J. Miller and J. Heys \$399,943, (2008-2009).

“International Conference: Mathematical Tools for Multi-Scale Biological Processes,” National Science Foundation-DMS, PI: T. Gedeon, co-PI: P. De Leenheer, \$16,000 (2008).

“Dynamics and Synchronization of Biochemical Oscillators,” National Science Foundation-DMS, PI: T. Gedeon, \$156,770 (2008-2011),

“Designing Networks with Physiological Complexity,” Defense Advanced Research Projects Agency, \$13,310 (2008-2009).

GREENWOOD, M.

“Investigating Patterns in Wetland Hydrology and Vegetation Data,” U.S. Geological Survey, PI: M. Greenwood, Co-PI: R. Sojda, \$17,625 (2008-2010).

HIGGS, M.

“Analysis of Bison Disease, Demographic, Habitat Use, and Migration Data,” National Park Service, PI: M. Higgs, \$5,000, (2008-2010).

IRVINE, K.

“National Park Service Statistical Assistance,” National Park Service, PI: K. Irvine, \$52,933, (2008-2009).

KLAPPER, I.

“Microbial Ecology and Diversity: Genomics and Metagenomics in a Yellowstone Hotspring,” National Science Foundation, PI: I. Klapper, co-PI: P. Lutz, \$99,986 (2008-2009).

LUEBECK, J.

“Two Year Continuation of Creating Opportunities in Mathematics for Exemplary Teaching (COMET),” U.S. Department of Education, PI: J. Luebeck, co-PI: J. Howard, \$75,000, (2007-2008).

“ESEA Title II-B Mathematics & Science Partnerships: Broadwater to Bozeman Project,” U.S. Department of Education through the Montana Office of Public Instruction, co-PIs: E. Burroughs and J. Luebeck, co-PI: E. Burroughs, \$50,000 (2008-2009).

“ESEA Title II-B Mathematics & Science Partnerships: Gallatin to Glacier Project (G2G),” U.S. Department of Education through the Montana Office of Public Instruction, PI: J. Luebeck, co-PI: J. Howard, \$320,000, (2006-2008).

ROBISON-COX, J.

“An Ecological Assessment of Large-Scale Spatial and Temporal Patterns of Whirling Disease Risk in Salmonid Populations,” MSU Water Center, US Fish & Wildlife, co-PIs: B. Kerans, T. McMahon and J. Robison-Cox, (2006-2009).

VOGEL, C.

“Prescribed Stimulus Delivery Capability and Stabilized Video Presentation for Adaptive Optics Scanning Laser Ophthalmoscope,” NSF Center for Adaptive Optics, PI: D. Arathorn, co-PI: C. Vogel, \$100,000, (2007-2008).

“Further Advancement of Prescribed Stimulus Delivery Capability for Adaptive Optics Scanning Laser Ophthalmoscope,” National Science Foundation Center

for Adaptive Optics, PI: D. Arathorn, co-PIs: C. Vogel, Q. Yang and Austin Roorda, \$68,428, (2008-2009).

“Conceptual Design Study for Real-Time Computer for the Thirty Meter Telescope Project,” The Optical Sciences Company (TOSC), PI: C. Vogel, \$30,000, (2008).

B. FUNDED INTERNAL GRANTS

BURROUGHS, E.

“Enhancing the Secondary Mathematics Education Program through Research,” ADVANCE Leadership Award Grants for Women Faculty, \$8,700, (2008-2009).

DOCKERY, J.

“Speaker Award-J. Keener,” College of Letters and Sciences Research Enhancement Award, PI: T. Gedeon, co-PI: J. Dockery, \$1,245, (2008)

GEDEON, T.

“Speaker Award-J. Keener,” College of Letters and Sciences Research Enhancement Award, PI: T. Gedeon, co-PI: J. Dockery, \$1,245, (2008)

“International Conference on Mathematical Tools for Multi-Scale Biological Processes,” College of Letters and Sciences Research Enhancement Award, PI: T. Gedeon, \$1,000, (2008).

LUEBECK, J.

“Enhancing the Secondary Mathematics Education Program through Research,” ADVANCE Leadership Award Grants for Women Faculty, \$8,700, (2008-2009).