

NEWS from the Department of Mathematical Sciences

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FEATURES

CASEY DONOVEN: GOLDWATER SCHOLAR

Casey Donovan is a math major from Kremlin, Montana who recently won a Goldwater Scholarship. The Goldwater is the nation's premier scholarship for undergraduates studying math, natural sciences and engineering. The Goldwater Foundation was established in 1986 and MSU is one of the nation's top institutions for Goldwater recipients since that time. As a student at Havre High School, Casey sometimes taught math and chemistry when his teachers were gone for the day. As a high school senior, he was one of eight students across the state who competed in the "Who Wants to be a Mathematician?" contest when it came to Montana. Casey is a Vice-President of MSU's chapter of Phi Kappa Phi, a national honor society, and a member of the MSU Honors Program. He came to MSU because of his Presidential Scholarship and because of our strong math and science programs. Dr. Lukas Geyer taught Casey in several classes and supervised his undergraduate research project in fractal geometry. Lukas noted that Casey is creative, curious and has a good grasp of mathematical patterns. Casey was also one of three MSU students who went to Bergen, Norway in the summer of 2010 to research carbon sequestration.



Casey Donovan

WORKING OFF-CAMPUS

Many of our majors spend summers, semesters, or entire years off-campus, studying and conducting research. Three such students are Sarah Sandford, Christina Watts, and Katelyn Weber. Sarah studied abroad the entire 2010-11 year at the University of Plymouth on the southwest coast of England through the International Student Exchange Program (ISEP). In spite of the differences in the educational systems, she learned tremendous amounts and found her Nonlinear Systems class to be the most exciting because of the variety of real world applications. While in Plymouth she volunteered to help teach math at a language school for refugees and asylum seekers. She also traveled to London, Oxford and Madrid as well as many small towns on England's southwest coast. Christina spent the summer of 2010 on a Research Experiences for Undergraduates project at Humboldt State University modeling the population of the Western Snowy Plover, an endangered shorebird on the west coast. She followed that up with an Undergraduate Scholars Program award fall 2010 here on campus to complete her work. Then last June she attended the 2011 World Conference on Natural Resource Modeling in Ottawa, Canada where she presented her work. She won a student award: The Natural Resource Modeling Journal Prize for Student Presentations. She was the only undergraduate student to win an award! Katelyn was selected for a position in the National Institute of Standards and Technology (NIST) Summer Undergraduate Research Fellowship (SURF) program at its Engineering Laboratory in Gaithersburg, Maryland. Her project was in the Sustainable Manufacturing Division working to help US manufacturers measure the sustainability of their products in an effort to improve technology to meet international standards. She was involved in uncertainty quantification for their models, writing code to propagate variability through multiple calculations.

DAN CORNISH: MATHEMATICS, PHOTOGRAPHY AND MEDICAL SCHOOL



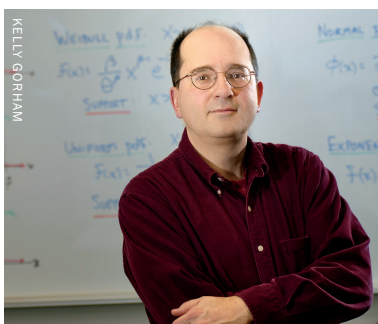
Dan Cornish

Dan Cornish of Butte, Montana is an MSU graduate in mathematics and photography who is currently taking pre-med courses at MSU. He recently received a Fulbright Fellowship to teach in Turkey. Dan credits excellent faculty at MSU who inspired him, including Dr. Russ Walker in mathematics. Dan was an ASMSU senator, played MSU team soccer and was a tutor for MSU's TRIO program for underrepresented students. While an undergraduate, he received an MSU Undergraduate Scholars Program grant to do a photography project in Turkey. He is excited to go back to photograph Turkish youth as well as teach English. Since graduating from MSU in 2009,

Dan worked for Canon Photography as a teacher and guide for photography caravan courses in national parks and also became a certified EMT.

JOHN BORKOWSKI RECEIVES INTERNATIONAL RECOGNITION

Dr. John Borkowski has spent considerable time in Thailand over the past several years, primarily at Thammasat University in Bangkok. This includes several invited visits and a longer stay as a Fulbright Fellow. This past summer he was awarded the Thammasat Honorary Plaque in recognition of his continuous and outstanding contributions to Thammasat University. This award is given annually to selected alumni, individuals or organizations who have contributed greatly to the esteem and prestige of the university. Recently John has worked here at MSU with four visiting scholars from Thailand.



John Borkowski

$$F_n = F_{n-1} + F_{n-2}$$

FACULTY NEWS

MAURICE BURKE AND A LOVE OF MATHEMATICS EDUCATION

Dr. Maurice Burke first came to our Department in September, 1971, as an undergraduate student pursuing a double major in mathematics and philosophy. He fondly remembers visiting with his advisor, Dr. Byron McAllister, in the old departmental offices that were housed in the annex of the Renne Library. Byron advised him to minor in computer science since “they say computers might be important some day.” Today, 40 years later, Maurice continues to be deeply interested in the uses of technology for the teaching of mathematics. He is also retiring from MSU after 24 years as a professor of mathematics education.

Upon graduating from Montana State University in 1974, Maurice attended Oxford University as a Rhodes Scholar, completing a degree in Mathematics and Philosophy

in 1976. While pursuing his doctorate in Mathematics (with a minor in Education) at the University of Wisconsin – Madison, he interrupted his graduate studies for two years to complete a secondary teacher certification program and to gain experience teaching mathematics at the high school level. He was awarded his Ph.D. in 1984.

After brief stays at the University of Texas at San Antonio and Weber State University, Dr. Burke joined our Department in January, 1988. He was responsible for millions of dollars in grants to MSU and the State of Montana and co-directed the Systemic Initiative for Montana Mathematics and Science (SIMMS) project (1992-1996), an effort to revise the high school mathematics curriculum into an integrated curriculum focusing on mathematical modeling using

technology. Between 1996 and 2000, he led the mathematics education group in transforming our masters degree for teachers into an online program. That program remains one of the best and most popular masters programs for mathematics teachers in the Western United States.

Dr. Burke has published numerous articles and book chapters in respected professional venues. He was the editor for the 2000 Yearbook of the National Council of Teachers of Mathematics (NCTM) and the high school editor for the NCTM *Navigations Series*. Maurice and his wife, Polly, will make Montana their permanent home.



Maurice Burke

INTERDISCIPLINARY NSF GRANTS INVESTIGATE MICROBIAL COMMUNITIES

Dr. Isaac Klapper is collaborating with multidisciplinary teams to develop modeling and



Mathematics graduate student Shane Nowack (left) and faculty member Isaac Klapper (right) collect samples from an Octopus Spring effluent channel in Yellowstone.

theoretical tools for understanding form and function of microbial communities, while at the same time aiming to train students capable of working across disciplines. This work was initially funded by a \$100,000 National Science Foundation (NSF) Interdisciplinary Grant in the Mathematical Sciences, where he devoted an entire year working in the lab of Dr. Dave Ward in the Department of Land Resources and Environmental Sciences at MSU. This funding was followed by a \$750,000 NSF Collaboration in Mathematical Geosciences grant where Isaac, together

with MSU colleagues from Mathematical Sciences and Engineering, are studying the biology, chemistry, and physics of microbially-induced carbonate mineralization and its applications to carbon sequestration and to bioremediation. In a third and most recent project, funded by a \$250,000 NSF grant, Isaac, together with colleagues from Agriculture and Engineering, are leading an effort to construct a computer model representation of a microbial ecosystem living in the effluent channel of a Yellowstone hot spring. Multidisciplinary cohorts like these that Isaac has forged are likely to be central to the future of research in microbiology.

STUDENT NEWS

MATHEMATICS COMPETITIONS

Nothing is more stereotypical than math students competing in a mathematical contest. Well, guess what? Last year we had two such events. One is the Putnam Math Competition, an annual contest for college students established in 1938. Each year over 2000 students spend 6 hours trying to solve 12 problems. Individual and team winners get some money and a few minutes of fame. This year our Math Department team outdid itself. Several MSU students scored well above the national median, and David Halat achieved our highest individual result, ranking 342nd among 4296 participants. Our team, consisting of Casey Donovan, David Halat, and Jeremy Schwend,

placed 86th out of 442 teams nationwide. Both individually and as a team, this is the best MSU has done in many years.

A less traditional competition is the Consortium for Mathematics and Its Applications (COMAP) Mathematical Contest in Modeling (MCM) competition. This presents teams of three undergraduate students with a choice of two highly open-ended “real-world” problems, for which teams have just over 4 days to research, model mathematically, and create a formal write up. This year we had three teams compete.

Math majors Eric Fink, David Halat, and Kelly Spendlove formed one team. In the nearly 30 hours they spent wrestling with their

ENROLLMENT: Enrollment at MSU saw yet another dramatic increase this fall to 14,153. Our department continues to mirror these increases. We have 24 new full-time graduate students, bringing our total full-time enrollment to 71. In addition, we have 30 teachers around the country enrolled in our distance delivery graduate program. We have an excellent new class of 22 undergraduate math majors and our undergraduate program now has 131 majors. Last year we awarded 23 B.S. degrees, 17 M.S. degrees, and one Ph.D. degree.

problem, they wrote over 1,000 lines of code, covered untold chalkboards, and eventually produced a 3,000 word paper, for which they received an “Honorable Mention” designation. There were 2,775 teams worldwide in the competition and only 30% earned this distinction.