FSUmath
THE FLORIDA STATE UNIVERSITY COLLEGE OF ARTS AND SCIENCES

New Mathematics Department Chair

Professor Xiaoming Wang

Dear Friends of the Mathematics Department,

I write to you as the new Chair of the Department of Mathematics of Florida State University.

After seven highly productive years as Chair, Phil Bowers stepped down in order to return to full-time research. During his tenure, Phil Bowers oversaw tremendous departmental growth and improvements, particularly in re-calibrating faculty assignments to increase teaching effectiveness and research productivity. One outcome has been a steady increase in graduate student recruitment and retention, and a three-fold increase in degree production. The Department owes a great deal to Phil's dedication, insights and hard work.

Bettye Anne Case has left her position as Associate Chair of Graduate Studies after six years. During her tenure, graduate student numbers and

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From left: Director Jack Quine, Director Kyle Gallivan, Assoc. Chair Steve Bellenot, Assoc. Chair Giray Okten, Director Richard Bertram, New Chair Xiaoming Wang, and Director Alec Kercheval

PhD production increased dramatically. Bettye Anne's innovative use of the web, development of an online database for graduate student information, encouragement of faculty involvement in recruiting and mentoring students, and her energy in obtaining student grant support were crucial in achieving these successes. Bettye Anne's contributions are much appreciated.

This year Giray Okten takes over the Associate Chair of Graduate Studies position. He will be working with Program Directors Kyle Gallivan (Applied and Computational Mathematics), Alec Kercheval (Financial Mathematics), Mark van Hoeij (Pure Mathematics), and Richard Bertram and Jack Quine (Biomedical Mathematics). Steve Bellenot stays on as the Associate Chair.

This fall has been an exciting time for the department. Sam Huckaba has been appointed as Dean of the College of Arts and Sciences in October, Craig Nolder was promoted to Full Professor, and Kyounghee Kim to Associate Professor with Tenure. Harsh Jain joins us as Assistant Professor in Biomedical Mathematics, Vijay Subramanian as Assistant in Mathematics, and Kevin Eady as Accounting Associate. With two more faculty hires in 2013, the department will be growing for the first time in several years, and we hope that this healthy trend will continue.

Members of our department continue to shine in the local, national and international spotlight. This year John Bryant, Robert Gilmer and De Witt Sumners were selected to the inaugural class of Fellows of the American Mathematical Society. The inaugural Brennan professor, Paolo Aluffi, delivered the first biennial Brennan Lecture in September, made possible by a generous donation from Carol Brennan, an alumna of the department (BS 76, MS 78). This September, the department co-sponsored the 2012 Workshop on Advances in Computational Mathematics and Engineering. The workshop is in honor of Yousuff Hussaini, who is the James Lighthill Professor and an Eminent Scholar. The first annual FSU High School Math Contest in October conceived and organized by Steve Blumsack and Alec Kercheval received warm reviews from high school teachers, and we are planning more outreach activities this spring.

In order to disseminate the many achievements of the department, we are increasing our presence on the web and social media. News from the department, faculty and student awards, and seminars and colloquiums will be posted regularly on Facebook. Please take a look, share your news, and become a member of our community!

Finally, I would like to thank the people who have supported the Mathematics Department this year and in the past. Your generous contributions make it possible for us to support student research, the department events, and community outreach. For more information please go to http://www.math.fsu.edu/donate/.

Wishing you and your family a great holiday season and a wonderful new year,

Xiaoming Wang, Mathematics Department Chair

Sam Huckaba is named new Dean of the College of Arts and Sciences

Photo courtesy of College of Arts and Sciences

The Provost and Executive Vice President for Academic Affairs, Garnett S. Stokes, has announced the appointment of Sam Huckaba as Dean of the College of Arts and Sciences at Florida State University, effective immediately.

Huckaba, former senior associate Dean of the College of Arts and Sciences and a professor of mathematics, was selected after a national search for dean. He had been serving as interim dean since July 2011 when Joseph Travis stepped down in order to devote more time to his research.

"Dr. Huckaba has an outstanding record of academic and administrative experience," Stokes said. "He is committed to academic excellence, the merits of diversity and the spirit of innovation, and he is dedicated to working closely with faculty, staff, students and alumni in leading the College of Arts and Sciences to even higher levels of achievement. It will be a pleasure to work with him in his new role."

As Dean, Huckaba will be the chief academic and administrative officer of Florida State's oldest and largest college. With nearly 500 faculty members, the College of Arts and Sciences is widely recognized for its outstanding academic programs and high productivity in research and creative activity, Stokes said, adding that the college has provided generations of undergraduate students instruction in the liberal arts disciplines.

The college is composed of 18 departments ranging from biological science to religion and 18 programs, centers and institutes. It enrolls about 1,700 graduate and 8,900 undergraduate students and offers 28 doctoral programs, 37 master's programs and 43 undergraduate majors.

Huckaba said he will work with the faculty to foster excellence in research, education and outreach programs while strengthening the core role of arts and sciences within the university and promoting collaboration across disciplinary boundaries.

"I am honored and humbled by the appointment and enthusiastic about the future," Huckaba said. "As I have learned over the past year, the job is thoroughly energizing. The faculty, students and staff are productive, and their accomplishments make the College of Arts and Sciences successful. I consider it a great privilege to serve as its leader, and I look forward to helping the college move forward."

Huckaba began his career at Florida State as an assistant professor of mathematics in 1987 and was promoted to associate professor in 1992 and full professor in 1998. He served as associate chair for graduate studies in the Mathematics Department, helping the department to double its graduate program in size from 2000 until 2004, when he was named an associate dean of the College of Arts and Sciences. In 2007 he was named senior associate dean in the college.

Huckaba has been recognized several times for his work in the classroom at Florida State, winning a University Teaching Award in 1991 and again in 2002. He also received an Arts and Sciences Teaching Award in 1991 and a Teaching Incentive Program Award in 1994. In addition, his scholarship was recognized in 1994 when he won a Developing Scholar Award.

Huckaba has published research in the areas of commutative algebra and algebraic geometry, two classical areas of pure mathematics, and has pursued interests toward applications of algebra, including cryptography and coding theory.

Huckaba earned his master's and doctoral degrees, both in mathematics, from Purdue University, in 1983 and 1986, respectively. He earned a bachelor's degree in mathematics from the University of Missouri in 1980. Parker Executive Search conducted the national search, and College of Music Dean Don Gibson chaired the 15-member search committee.

This article originally appeared in STATE, written by Jill Elish .

OUTGOING CHAIR SHARES REFLECTIONS, WISDOM

Philip L. Bowers
Dwight B. Goodner Professor of Mathematics

After serving as Associate Chair from August 1999 to August 2005, and as Chair from August 2005 to August 2012, Dr. Phil Bowers said he has a new appreciation for the work administrators do. Although he looks forward to getting back to his research and writing, his years spent as Chair were valuable, both to him and to the department. Even as he faced challenges such as budget concerns, Bowers was able to see many of his goals realized during his two terms as Chair.

Going into his first three-year term, Bowers said he had specific goals in mind: hiring new faculty, getting the budget in order, procuring new computer and office equipment, overhauling the administrative structure, and giving fairer credit for teaching across the department. He didn't take the job lightly, and began his term with a list of these goals and a process by which to tackle them.

Owing to budget constraints across the university in 2008, he had to shift some priorities (the number of new hires possible) but found in himself an unexpected penchant for certain areas of the job, such as managing the budget. Taking on the arduous and somewhat unfamiliar role of Chair would seem daunting to some, but Bowers reflected, saying "I just jumped into the job and made it my own. I think I have a good eye for budgets." He was able to keep the department strong even through what he aptly called "the lean years," as well as making possible four new hires in his first term, which did much to renew vigor in the department. He also recalled another success—the acquisition of new office and computer equipment. Bowers pointed out the great cooperation of the Dean and other administrators in facilitating the new equipment and felt he left the department in good shape in terms of technology.

Another of his term goals, fairer credit for teaching, was important to him as he sought to validate interaction in the department not necessarily regarded at the same level as traditional classroom time. During his time as Chair, Bowers was able to help revise that system of innovative scheduling so that seminars, work with graduate students, and administrative tasks could be recognized as contributions to teaching within the department, with faculty schedules modified to reflect those contributions.

A hefty part of his position, of course, was negotiating and managing resources with the Dean. He identified his biggest challenge of the two terms as hiring. While he began his work as Chair with 44 faculty members, he left with 35. He said of the faculty numbers, "We were at a critical point." However, he didn't wait for others to fix the problem, or resign himself to complaisance. Instead, realizing the faculty simply could not shrink any fur-

ther, Bowers created a document making a case for two new hires. As a result, the Dean found the funds. In fact, the need for new hires remains the issue Bowers views as most important as he passes the role of Chair on to Dr. Xiaoming Wang. He emphasized a focus on building a strong department, saying "We manage a large graduate student population, and we need to make sure we grow the graduate and undergraduate faculty." As the Math department provides one of the largest service components in the university through its course offerings, he'd really like to see that growth take place. "It'd be great for us to grow back to that size."

Reflecting on his uniquely administrative role in the department during his two terms, Bowers said, "When I became Chair, I started seeing the inner workings of things." The greatest challenge he faced individually, he recalled, was to keep his research going. Time spent in the office and with other members of the department simply didn't leave open the large blocks of time that foster research. He did begin work on a book as an outlet for those research-oriented desires, as well as continuing in his teaching responsibilities. Hosting long meetings, dealing with graduate funding requests, and managing interpersonal matters, all challenging tasks, helped Bowers develop greater understanding of what administrators do: "I have a different view of that now." He continued, "Being a good manager of people is probably one of the hardest jobs on campus. You've got to be fair, honest, above board. Sometimes you just have to make a decision and move on."

While preparing to complete his second term, Bowers made time to interact with the incoming Chair, Dr. Xiaoming Wang. "I had long conversations with Xiaoming. I actually have a list of little bits of wisdom that I passed on," he recalled. The list, including both found wisdom and Bower's own aphorisms, seems a great help to anyone facing the new challenges of managing departmental funds, time, and people, while still maintaining an optimistic approach. And while Bowers looks forward to getting back those big blocks of time for research and writing, he said, "I did enjoy being Chair. I hope I did a service to the department." It's certainly clear that he did.

Alumni News

On July 31, 2012, FSU PhD alumna Mariel Vazquez was among the recipients when President Barack Obama addressed the recipients of the Presidential Early Career Awards for Scientists and Engineers in the East Room of the White House. Dr. Vazquez is a pioneer in the emerging field of DNA topology, which applies pure math to the biological mysteries of DNA, and is committed to mentoring students who are underrepresented in the sciences. Having received her PhD in 2000 under the guidance of Dr. Sumners, Mariel is currently an Associate Professor of Mathematics at San Francisco State University. Congratulations Mariel!

Point of View: A Game Theorist's Perspective

Mike Mesterton-Gibbons, Professor of Mathematics

Among questions of interest to biologists who study animal behavior are these: When should an animal—for example, a fiddler crab—intervene to help a neighbor having a territorial dispute with an intruder? Does eavesdropping—for example, by green swordtail fish—increase or reduce the overall frequency of aggressive behavior in a population? How widespread in nature is mutual assessment of fighting abilities? To be sure, humans do it, but what about hermit crabs or sea anenomes? And if strength is indeed being assessed, when does it pay for a threat to be a bluff?

The list of such questions is virtually endless, and efforts to resolve them rely increasingly on collaborations between biologists and mathematicians using analytical tools called games. Constructing such games is the focus of my research. A game in this context is a mathematical model of strategic interaction, which arises whenever the outcome of one individual's actions depends on actions to be taken by others. Where I am concerned, that one individual is usually a non-human animal, and the others are the rest of its population. But games are also used by social scientists to explore the economy and other aspects of human behavior. Indeed game theory has morphed into so many subfields, it is hard for anyone to keep track of them all.

Whatever the question of interest, the answer is usually a function of circumstances, and that is in essence why mathematics is key. If some behavior has evolved by natural selection and become fixed in a population, then every feasible alternative behavior must yield a lower reward, for otherwise the alternative behavior would have spread into the population. So once a game has been constructed, the task becomes finding a so-called evolutionary stable strategy or ESS, a population strategy that yields a higher reward than any feasible alternative. A well designed model typically has an ESS that, although unique, is different across different circumstances, and it is primarily these differences that most interest both my collaborators and me. Take, for example, those fiddler crabs. Working with Tom Sherratt, a long-term collaborator from Carleton University in Ottawa, I constructed a model whose ESS depends on three size thresholds, in the following way: A territory owner who is sufficiently strong (above the first size threshold) should help a neighbor who is sufficiently weak (below the second threshold), but otherwise not help; and a "floater" seeking a territory should challenge for ownership only if sufficiently strong (above the third threshold). These three thresholds in turn depend in a fairly complicated way on a host of ecological factors, such as variance in size, reliability of size difference as a predictor of fight outcome, costs of fighting or of boundary renegotiation and effects of territorial pressure. Tom and I were able to characterize this dependence and compare our predictions with observed behavior. Field studies in fiddler crabs have shown that helpers are always larger and hence stronger, which makes sense on two levels: there is more to gain from helping a weak neighbor (because the helper can more easily enjoy a larger territory); and stronger neighbors can fend for themselves, so there is less need to get involved. Our predictions match these observations for any range of ecological parameters where the second threshold is always lower than the first. But our model also identifies other circumstances in which the second threshold is higher than the first, and so an animal should sometimes come to the aid of a neighbor who is stronger. This less intuitive prediction remains to be confirmed or refuted by future field studies, and serves as a test of our model.

Games allow us to explore the logic of a verbal argument rigorously and often demonstrate what can be difficult to intuit. For example, although in nature a contested food resource is most often monopolized by a clear winner, a recent study of roller beetles observed contests that resulted in sharing—most commonly when opponents were approximately equal in size. So mutual assessment was suggested by the study's authors as instrumental to the outcome. The idea is intuitively appealing. Yet there is virtually no evidence to support such mutual assessment. It is also not essential. Again working with Tom Sherratt, I constructed another game in which individuals vary in size but are unable to assess their opponent's size, yet the model still predicts sharing. Moreover, individuals observed sharing are unlikely to be closely matched, even

though closely matched individuals are likely to share. This result is not so easy to intuit, but there is proof in the mathematics.

Although Tom is my most frequent collaborator, I have also worked with other biologists. For example, with Ian Hardy (University of Nottingham, UK) and Jeremy Field (University of Sussex, UK) I have modeled reproductive queues, such as are observed in social wasps; with Eldridge Adams (University of Connecticut) I have modeled both bluffing by stomatopods and the use of landmarks as territorial boundaries in cicada killer wasps; and with Steve Heap (University of Melbourne, Australia) I am modeling self versus mutual assessment in all kinds of animal contests.

I have now been a game theorist for more than two decades, and I plan to continue for at least two more. With five current graduate students and an apparently steady supply of future ones, it is hard to imagine that my research could ever revolve around anything else. Yet it's a far cry from anything I ever foresaw myself doing. Unlike so many of the mathematicians I read about, I did not always know I would become one. On the contrary, creative writing was always top of my list. (At present an occasional limerick is my only outlet for it, but I retain a stash of manuscripts, mainly children's stories from the 1970s, which I still plan to edit and publish some day). When I enrolled at the University of York in 1971, I was still majoring in English. Yet when I graduated from York in 1974, I had become solely a mathematics major. Why? If I am honest, mainly because jobs were more plentiful for mathematics majors, then as now. There had been no epiphany.

My first degree was almost entirely pure mathematics. But I knew that jobs were more plentiful for applied mathematicians, and so I duly became one in 1974 on moving to the University of Oxford. When I graduated in 1977, my DPhil thesis was on magnetohydrodynamics; in 1974, it had never even occurred to me that such a word could be found a use. While at Oxford, I had become interested in biology, and I subsequently applied for several postdocs. But how many biologists would hire a mathematician who had never taken a biology class in his life? Nowadays, more than you might think; in the late 1970s, not so many. Instead there followed forays into solar physics, helicopter dynamics and natural resource modeling. Each new topic was increasingly more remote from its predecessor, though of considerable interest to me at the time, if only until usurped by a newer interest. It often seemed there was no worse way to plan a career. But my restlessness made me comfortable with crossing disciplinary boundaries into areas I had not previously studied, and thus it paved the way for a life of game-theoretic modeling, which is a fundamentally interdisciplinary activity. For example, I have been an editor for American Naturalist, and I am currently an editor for Journal of Theoretical Biology. I have still never taken a biology class.

I would hesitate long before advising anyone to pattern their career strategy after mine. There is much truth in the adage: If you can't get what you like, like what you get. But like every adage, it is not a whole truth. If you have yet to discover what you like, how can you ever know you did not get it? Now that I have ultimately found my niche, I can look back and see how ironically my long and winding road towards it reflects what is surely game theory's most basic lesson: the best choice is never the same for every circumstance.

Department News

RECENT DOCTORAL DEGREE RECIPIENTS

Summer 2011

Saikat Biswas (Pure Math.)
Constructing non-trivial elements of the Shafarevich-Tate group of an abelian variety
Major Professor: Amod Agashe

Qin Li (Applied and Comp. Math.)
Sparse approximation and its applications
Major Professors: Gordon Erlebacher and Xiaoming Wang

Yuanying Guan (Financial Math.)
Asset market dynamics of heterogeneous agents models with learning
Major Professor: Alec Kercheval; Paul Beaumont

Fall 2011

Judson P. Stryker (Pure Math.)
Chern-Schwartz-MacPherson classes of graph hypersurfaces and Schubert varieties
Major Professor: Paolo Aluffi

Margaret A. Watts (Biomathematics)
Slow variable dominance in pancreatic beta-cell models
Major Professor: Richard Bertram

Aaron D. Valdivia (Pure Math.)
Pseudo-Anosov sequences with asymptotically small dilatation
Major Professor: Eriko Hironaka

Spring 2012

Jonathan K. Armstrong (Pure Math.)
Principal elements of mixed-sign Coxeter systems
Major Professors: Eriko Hironaka and Kathleen Petersen

He Huang (Financial Math.)
Modeling order book dynamics using queues and point processes
Major Professor: Alec Kercheval

Yu Fan (Biomathematics)
Learning shape metrics for inferring the nature of allometry and shape classification
Major Professor: Washington Mio

Tianyu Liang (Financial Math.)
Alternative models for stochastic volatility corrections for equity and interest rate derivatives
Major Professors: Alec Kercheval and Xiaoming Wang

Yang, Liu (Financial Math.)
Risk forecasting and portfolio optimization with GARCH, skewed-t distribution, and multiple timescales
Major Professor: Alec Kercheval

Quan Yuan (Pure Math.)
Finding all Bessel-type solutions for linear differential equations with rational function coefficients
Major Professor: Mark van Hoeij

Summer 2012

Joseph A. Boor (Financial Math.)
An analytic approach to estimating the required surplus, benchmark profit, and optimum reinsurance retention for an insurance enterprise
Major Professors: Patricia Born; Bettye Anne Case; Qihe Tang

James A. Fullwood (Pure Math.)
On elliptic fibrations and F-theory compactifications of string vacua
Major Professor: Paolo Aluffi

Randall J. Heaton (Pure Math.)
Algorithms for computing congruences between modular forms
Major Professors: Amod Agashe and Mark van Hoeij

Wondimu W Teka (Biomathematics)
Nonlinear dynamics underlying fast bursting in pituitary cells
Major Professor: Richard Bertram

New Fellows of AMS

The FSU mathematics department is proud to announce that three members of our faculty—John Bryant, Robert Gilmer and De Witt Sumners—were selected to the inaugural class of Fellows of the American Mathematical Society. Our colleagues will be among 1000 mathematicians from around the world recognized for their "outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics." The new Fellows will be welcomed at an event to be held during the Joint Mathematics Meetings in January 2013. A more extensive story about these honorees will appear in the next edition of the newsletter.

FSU ranked high in grants awarded

FSU Math faculty members continue to bring in large private and federal grants. In a recent NSF report (http://www.nsf.gov/statistics/nsf12330/), FSU was ranked #42 in total and federally financed higher education R&D expenditures in the mathematical sciences, becoming the highest ranked university in Florida. The award encompasses the Departments of Mathematics, Statistics and Scientific Computing,

Department News

Graduate Student Awards

In a Poster Competition held September 2012 in honor of Prof. Yousuff Hussaini, First place went to Linlin Xu, second place to Mark Whidden, and third place to Yaning Liu.

Arij Daou is lead author of an article appearing in the Journal of Neuroscience Methods (vol. 210, pp.147-160) entitled "A Computational Tool for Automated Large-Scale Analysis and Measurement of Bird-Song Syntax." He also presented a poster entitled "A computational model and electrophysiological recordings of the different classes of neurons in the HVC of the zebra finch" at the Society for Neuroscience meeting in New Orleans on October 11-18, 2012 for which he was lead author.

Daozhi Han is the lead author of an article appearing in the Journal of Differential Equations (vol. 252, Issue 12, 15 June 2012, pp. 6387-6413) entitled "Boundary Layer for a Class of Nonlinear Pipe Flow." Co-authors are Anna L. Mazzucato, Dongjuan Niu, and Xiaoming Wang.

Vijay Kunwar presented a poster with his advisor Mark van Hoeij at ISSAC '12 in Grenoble, France on July 21-25.

Xia Liao published two articles this year: "Chern classes of logarithmic vector fields" appeared in Journal of Singularities (Volume 5, 2012, pp. 109-114), and his paper "Stable birational equivalence and geometric Chevalley-Warning" was accepted by the Proceedings of American Mathematical Society.

Diego Hernan Diaz Martinez presented his poster entitled "Analysis of Mass Growth Curves of Flour Beetles" at the Annual Meeting of the Histochemical Society at the Marine Biological Laboratory, Woods Hole, MA, 2012.

Yingyun Shen contributed a talk entitled "Use of lifespan-shortening Wolbachia to control dengue fever: Demographic factors" at the Society for Mathematical Biology Annual Meeting 2012, Knoxville, TN, USA, July 28, 2012.

Dong Sun presented a talk on "Two types of second order IMEX methods for Stokes-Darcy System" at the 36th Annual SIAM Southeastern Atlantic Section.

Gregory Toole and Monica Hurdal contributed a talk entitled "Modeling Cortical Folding with a Growing Domain Turing System" at the Society for Mathematical Biology Annual Meeting 2012, Knoxville, TN (July 25, 2012), a talk entitled "Growth in a Turing Model of Cortical Folding" at the BIOMATH 2012 International Conference on Mathematical Methods and Models in Biosciences, Sofia, Bulgaria, (June 17, 2012), and a talk entitled "Linear Stability Analysis of a Turing Reaction-Diffusion System on an Exponentially Growing Prolate Spheroidal Domain," at the American Mathematical Society 2012 Spring Southeastern Section Meeting (Mar 10, 2012).

Celestine Woodruff gave a talk at the 9th AIMS International Conference on Dynamical Systems, Differential Equations and Applications entitled "The effects of time iteration schemes on the climate of the Lorenz 96 model" (July 4, 2012). She also received the Wilson Auzenne Graduate Assistantship Award for Minorities.

Qiuping Xu presented a poster entitled "Feature Preserving Smoothing of 3D Shape" at the Annual Meeting of the Histochemical Society at the Marine Biological Laboratory, Woods Hole, MA, 2012. This work was supported by the NSF funded project Bioshapes.

Faculty Honors and Awards

Richard Bertram is involved in several large grants from the NSF and NIH. This year, he became Principal Investigator for an NSF grant for a project entitled "Mathematical Analysis of Electrical Oscillations in Anterior Pituitary Cells" (2012-2015). He is also a PI on an ongoing NSF grant investigating "Regulation of Prolactin Secretion at the Lactotroph" and is co-PI for a project on ``Spatial Organization of a Neural Network for Serial-Order Behavior"

Kyle Gallivan was general co-chair of ACM International Conference on Supercomputing, Venice Italy (June 25-29, 2012) and was appointed honorary ``Pascal" Chair in the Faculty of Sciences, Leiden University.

Wolfgang Heil gave a plenary talk at "School on Knot Theory and 3-Manifolds in honor of 70th birthday of Fico Gonzalez Acuna", December 17-20, 2012 at Centro de Investigacion en Matematicas, Guanajuato, Mexico.

Mark van Hoeij is Principal Investigator for an NSF grant for a project entitled "Solving Linear Differential Equations in terms of Special Functions." (2010-2013) He was also Program Committee Chair of the 37th International Symposium on Symbolic and Algebraic Computation held in Grenoble, France

Monica Hurdal gave a Plenary Talk at the MAA Section Meeting (Feb. 17-18, 2012) on the topic of Understanding Cortical Folding Patterns in Development, Aging and Disease as plenary speaker at the Florida Section of the MAA, Jacksonville, FL

Washington Mio is Principal Investigator and lead investigator of the NSF collaborative project "Biological Shape Spaces: Transforming Shape Into Knowledge," which involves eight PIs from eight different institutions, and addresses the quantification of biological shape over a range of case studies from sub-cellular to anatomical scales (2010--2013).

Dan Oberlin is Principal Investigator for an NSF grant for a project entitled "Some Problems in Analysis." The award is effective July 15, 2012 and expires June 30, 2015.

Professor Emeritus DeWitt Sumners has been awarded the Microsoft Distinguished Visiting Fellowship to spend a month at the Isaac Newton Institute for Mathematical Sciences in Cambridge, United Kingdom. Sumners has been selected for the Topological Dynamics in the Physical and Biological Sciences program, to be held in late 2012.

Christopher Tam was invited by the Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, to give an opening presentation at their First International Workshop on Computational Experiment in Aeroacoustics 2012. The international workshop was held at Svetlogorsk, Kaliningrad Region, Russia, September 19-22, 2012.

Chris Tam has also recently published a new book entitled "Computational Aeroacoustics: a Wave Number Approach". It is the first book in the research area of computational aeroacoustics, and is designed for researchers and graduate students. Tam continues to receive substantial research support from industry, currently from the Boeing Company, the Goodrich Aerostructures Company, and the Aeroacoustics Research Consortium (a consortium of the GE Aviation Company, the Pratt & Whitney Engine Company, the Boeing Company, the Honeywell Aerospace Company and the NASA Glenn Research Center), for projects on aircraft noise.

Four FSU Mathematics faculty members have received grants funding research collaborations and travel from the recently established Simons Foundation:

Amod Agashe "Problems related to the Birch and Swinnerton-Dyer conjecture and Hilbert's twelfth problem" (2012-2017)

Paolo Aluffi "Invariants of algebraic varieties" (2012-2017)

Eriko Hironaka "Fibered 3-manifolds and their monodromy" (2011-2016)

Kathleen Petersen "Low dimensional topology and number theory" (2011-2016).

From Insights to Applications

Harsh Jain, Assistant Professor of Mathematics

When new faculty member Dr. Harsh Jain was attending high school in India, he had no idea he would go on to flourish in an exciting career in biomathematics. Dr. Jain describes his career choice as a "happy accident"—during high school he showed a strong dislike for mathematics but didn't know what other major to declare in college. Advised that with a mathematics degree he could pursue anything he chose, he passed his qualifiers for pure math and then stumbled into biomathematics, thinking, "Who had ever heard of biomath?"

After high school, Dr. Jain continued onto St. Stephen's College, at Delhi University in India, where he acquired a Bachelor of (Honors) Mathematics degree. He continued to the University of Cambridge, where he received another Bachelor of (Honors) Mathematics degree. At that point, Dr. Jain had thoroughly changed his view of mathematics, advancing to the University of Michigan to work towards his Doctorate in Mathematics. While in Ann Arbor, he worked under Tracy Jackson, a mentor whom Dr. Jain names as someone he greatly admires. In fact, Jain is grateful for the career course he chose due in part to the opportunity he found in working with her. Under Jackson, at the University of Michigan, his dissertation topic was "Multiscale Models of VEGF-Medicated Molecular Signaling Pathways.

Jain made his way to The Ohio State University, where he acted as a postdoctoral scholar at the Mathematical Biosciences Institute. Dr. Jain appreciates this experience because it gave him the chance to delve into his own research without narrow guidelines. His biggest complaint at OSU? "You can't get a good cup of coffee anywhere," he says. Leaving OSU to complete a visiting postdoctoral fellowship, Jain was able to follow mentor Helen Bryne to the Oxford Centre for Collaborative and Applied Mathematics at the University of Oxford. There he continued his research, developing new mathematical approaches to meet the challenges of translating insight from modeling into clinical practice. His research interests include the use of mathematical modeling to understand complex biological phenomena, with a focus on biomedical applications such as cancer growth and treatment, physiological and pathological angiogenesis (blood vessel growth), and foreign body response to implanted biomedical devices. His work on bridging the divide between modeling and clinical practice has recently been accepted for publication in *Proceedings of the National Academy of Sciences,* featured on the National Science Foundation and National Cancer Institute websites, and has appeared on a number of medical news websites.

Even before Dr. Jain came to Florida State University, several factors attracted him—the strong Biomath department, the great math faculty, and the fact that FSU had paved the way as one of the first schools involved in cancer research. In the current job market, which has left many post-graduates and instructors applying to a large number of institutions, he has distinguished himself by carefully choosing and applying to those institutions that strongly appealed to him. "Unlike most of my peers, I only applied to places I wanted to go," he says. After Jain sent out about twenty applications, FSU beckoned with the opportunity to work with cancer models, growth treatments, new targets, and wound healing.

While Dr. Jain's career is just beginning, his favorite career

Moment thus far has been "seeing the obvious application of research in the results." Although researching cancer treatments and developing models is a major part of his work, instructing also figures prominently. "Good teaching engages the class. It inspires a lot of questions; the message gets across. It motivates students to think further and gets students interested because the instructor conveys their interest in the subject."

It's fortunate for Florida State University that Dr. Jain has brought his research and teaching philosophy to our campus. As a teenager, he intended to join the Indian Foreign Service because of the opportunities it afforded to travel and see the world. Thankfully, he followed the advice to explore mathematics, and has just begun to enjoy the city of Tallahassee, the research prospects available to him, and the beautiful campus at Florida State.

Alumni Profile

Professor Mike Kirby
FSUmath Class of 1997

The football games, the circus, the expansive and beautiful campus—some of the most memo- rable aspects of being a Florida State University student. Another aspect, rarely thought of, is the smell. How- ever, the smell of the union on Market Wednesdays is precisely what FSU alumnus Professor Mike Kirby reflects on when asked about his fondest memories of FSU. "It's the little things," he says, as he sifts through his memories. He also remembers the rule that "if you didn't bring an umbrella, it was guaranteed to rain," and the many concerts he attended—hosted by the music school (where his college sweetheart and wife was a student).

Now Kirby is a faculty member at the University of Utah, holding the positions of Director of Graduate Studies for the school of computing, Director of Scientific Computing Track and Computing Degree Program, and Adjunct Associate Professor for the departments of Bioengineering and Mathematics. Before arriving at the University of Utah, Kirby studied at Florida State,where he achieved a Bachelor of Science degree in the majors of Applied Mathematics and Computer and Information Sciences. He recalls the privilege of being allowed to take 176 course hours during his time at FSU, all while balancing 30-hour work weeks, and explains he is happy he began in Tallahassee because "FSU had faculty who were hungry for interaction." His undergraduate studies followed a chaotic path, shifting from pure math, to real analysis sequence, to computer science, then applied math, and finally numerical analysis. While strenuous, his course loads and efforts were aimed at a goal he'd had in place since he was a teen- ager: becoming a faculty member.

After graduating Summa Cum Laude, Kirby joined the ranks of Brown University in the Master's program of Applied Mathematics under the supervision (and as the research assistant) of George Em Karniadakis. One of the things

Kirby appreciated most about Brown was that "as you arrived, you were on a first name basis with faculty." He says, "They treated you as if they could see what you would be." Kirby remained at Brown to acquire a Master of Science degree in Computer Science; he reflected on fond memories of the grad student pub, and working alone from, say, seven to nine o'clock, then coming and working "together" as everyone relaxed at the pub from nine to midnight. After completing the Master's programs in his two fields, Kirby continued in his studies, receiving his PhD in Applied Mathematics, and developed an intuition for mentoring and instructing, an experience that made him unique in his area.

While journeying through his career, Kirby says that his favorite part was the experience of teaching and mentoring PhD students at Cambridge in England while on sabbatical. There he recognized a difference in PhD students, saying, "what distinguishes a PhD student is that they can learn anything on their own, but it's interesting to see a PhD student go back to undergrad material with new understanding." As a professor in two departments and a mentor of graduate students at the University of Utah, he's built his teaching philosophy upon thorough experience: "stretching students slightly beyond what they think they can do, but not until they break." This mentality has contributed to his current research interests and projects.

At the University of Utah, Professor Kirby is surrounded by a wide spectrum of undergraduate students but finds that because of this, more of his time is spent mentoring and finding "diamonds in the rough." He says that what distinguishes this school is that, although a state school, the University of Utah fosters a family-like atmosphere. And even with a limited budget as compared to FSU, he's attracted to the way energy is spent there, as well as the space to expand without the judgment. His current research interests involve material science and teaching himself new areas in his field. Kirby's strong critical thinking abilities have assisted him in his endeavor to invest his time in a variety of projects. One of the most prominent of these research endeavors is a CRA (Cooperative Research Agreement) with the army; they are funding a project to help create an energy- efficient soldier. Other projects involve visualization of high order methods and mapping algorithms.

Professor Kirby emphasizes that he is thrilled with his career choice and is happy going to work each day; he volunteers that his wife thinks he has too much fun for it to be considered work. It is clear that this FSU alumnus left Tallahassee with a bright future—a concrete source of education to grow upon, a flourishing marriage, and because of so many dates to concerts, the knowledge that he dislikes flutes alone, finding that "the orchestra masks sounds you don't want to hear."

RETIRED PROFESSOR LOOKS BACK ON LONG CAREER, GREAT IMPROVEMENTS

Wilber J. Stiles
Professor of Mathematics, Emeritus

Dr. Wilbur Stiles graduated from Lehigh University in 1954 with a B.S. in Civil Engineering and a lieutenant's commission in the United States Air Force. He spent the next year in the USAF learning to fly, and the following three years in the USAF as an instructor pilot teaching AF officers how to fly single engine jet aircrafts. He married Miss Evalyn Long in June 1956; their first son was born in May 1959. He entered Georgia Tech, one month after his son's birth, to work on a second undergraduate degree in Mathematics. Reflecting on his choice, he said, "I got hooked on functional analysis." He says of math, "It was the only thing I liked to do," so he just kept going. After completing his B.S. the following spring, he stayed on at Georgia Tech, working through a Master's degree as well as earning his Ph.D. in Mathematics in spring 1965. He said simply, "I had no intention of getting a Ph.D. I enjoyed it so much I decided to keep going." During that time, his second son was born (in the fall of 1962).

Hired by the FSU Math Department in fall 1965, Stiles came in as a functional analyst. He was a regular tenured faculty member, with teaching and research assignments, until fall 1994, during which he served as the major professor for two successful doctoral students. He spoke fondly of both students and colleagues, and it's clear that he was deeply involved in the department, at all levels, throughout his 46 years at FSU. He assumed role of Director of Basic Mathematics position in the fall of 1994, during the second year of Dr. Chris Hunter's six-year tenure as department Chair. Though his original DBM duties included a bevy of tasks—supervising a group of six basic math faculty known as 'The Six,' coordinating and supervising course offerings and course instruction in all the first-year basic math courses, teaching courses, and providing academic advising—he would soon become involved in adoption of a new technology system which would forever change the instruction of Basic Mathematics.

In 1998, the FSU Provost, Dr. Larry Abele, learned that the Virginia Tech Math department was having great success with their new Math Emporium. He asked Stiles to look into the work at VT and consider the possibility of setting up a similar emporium at FSU. Stiles, along with Annette Blackwelder, talked to the VT math chair about the emporium, as well as contacting math textbook publishers to learn about their computerized teaching material. Stiles spoke glowingly of all the members of the Basic Math program: "I can't say enough good stuff about Annette. She was just terrific…knowledgeable, dependable." At that time, FSU's Basic Math program was busy with the daily work of teaching, testing, and grading the majority of the freshmen coming into FSU. Stiles said, "When I first took the job, we used to give paper tests. It was a big deal." There were freshman math courses, requiring countless hours of organizing tests and grading. "We got these big lecture rooms or whatever we could find," he said. "Just about everybody coming in had to take 1102."

After much dissatisfying searching, they found Dr. John Orr of the University of Nebraska, who had produced test-delivery software that seemed ideal. Stiles said, "They'd written a program that would deliver tests…. I knew right away when I saw it that that was just what I was looking for." So they came up with a plan to use the software delivery system, but create their own exams for the department, investing much time and energy into the well being of the program. Stiles informed the FSU administration of plans to use Orr's software, in tandem with their own test questions, to computerize the basic math courses at FSU, assuring the administration that this new

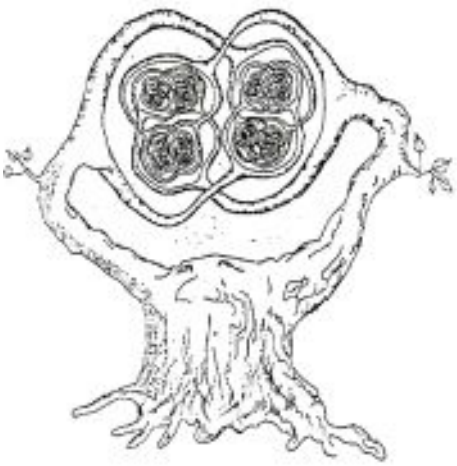
program would improve students' grades as well as reduce TA workloads. The administration liked his plan so much that they were willing to computerize the four classrooms on the bottom floor of HTL, allowing the department to use those rooms for what Stiles called Computer Assisted Instruction (CAI). Thinking back to the initial transition to CAI, Stiles recalled, "There were all kinds of possibilities. It was really good.... As things developed we got more computers and we expanded."

The FSU administration fully supported development of the CAI program, providing grants each year for several years to develop test questions and other important CAI material. And the change they had anticipated came. "When we went to CAI, the recitation was in the computer lab. That was a good thing; they could work problems and have them graded and the instructor could come back and tell them why they got it wrong. It was just terrific."

Dean Foss and Provost Abele were so pleased with the results of the new program that those working with the Basic Mathematics programs were awarded the FSU President's Technology Award for our CAI program. Dr. Stiles, while happy to have ushered in this new method of instruction, remains humble about the whole process, saying only, "They needed somebody to do the job, and I'd been teaching for 30 years."

Dr. Stiles retired in May 2011 after working forty-six years at FSU. He's very optimistic about the growth in the department, as well as new programs and course offerings. He considers his major accomplishments at FSU to be setting up the CAI program, writing many computer programs to streamline and improve Basic Math activities, writing (free) on-line texts for precalculus algebra and trigonometry, and increasing the Basic Math faculty from six people to nine people. His clear, smart advice for those considering pursuing a scholarly life in math is this: "I did something I liked to do, and I'm glad I did it. If you love it, do it."

What makes this tree special to topologists?



This tree (without the leaves) is topologically the same as a solid round ball. Its skin (called an Alexander sphere) is the same as a nice round sphere. However the space outside this tree is not the same as the outside of a nice round ball in3-space. For example, a rubber band encircling one of the branches of the tree can not be shrunk (outside the tree) to a point.

-- Professor Wolfgang Heil

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FSUmath

The newsletter of the Department of Mathematics at Florida State University.

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Special thanks to Alec Kercheval and Mike Mesterton-Gibbons for spotting errors in an earlier release, and to Mike Mesterton-Gibbons, Giray Okten, and Mark Russell for helping to put together the final copy.