BAYLOR {mathematics}

WINTER 2011 NEWSLETTER

Message from the Chair

Happy Greetings students and math alumni! I hope that each and every one of you had a terrific Christmas and New Year's holiday.

This past semester was a fun, yet busy, semester with lots of wonderful departmental activities and interactions. We began the 2010 fall semester with the dedication of a state-of-the-art mathematics computer classroom in the department thanks to a very generous, and substantial, donation from Baylor graduates Jim and Lisa Meyerhoff (both BSc. 1978, M.S. 1983). This significant addition – which we will now remember as the *Meyerhoff Computer Lab* - provides us with opportunities to offer new mathematics and mathematics education classes that were not possible before.

Lance Littlejohn

The department is making a concerted effort to attract more mathematics majors. Mathematics is, and always will be, central to progress in most areas of scientific, technological, and economic development. Mathematics underpins the sciences and engineering and is crucial in the training of future teachers, scientists and leaders in business, economics, and finance.

Throughout the fall semester the department welcomed several distinguished visitors. We were fortunate to have Dr. Edward B. Burger, the 2010 recipient of Baylor's Robert Foster Cherry for Great Teaching Award, in our department for the entire semester. Ed taught two classes and gave several lectures - all outstanding and thought-provoking - across campus and for the Waco community. Ed's presence in our department, and in our classrooms, was a wonderful and special opportunity for our faculty and our students. In a 'word'....WHATABURGER!!

We welcomed three new faculty members to our department: Matthew Beauregard, Gail Brooks, and Jonatan Lenells. Matt is our newest post doctoral visiting professor from the University of Arizona; Gail, a 1994 Baylor graduate, is a part-time lecturer, and Jonatan is an Assistant Professor who earned his Ph.D. degree from Lund University in Sweden. We also welcomed several new graduate students into our program: Adam Anderson, James Kelly, Charles Nelms, Dylan Poulsen, Brian Streit, and Quinn Wicks. To promote collegiality and a tight-knit family atmosphere in the department, Mark Sepanski (our new Graduate Director) started once-a-month graduate pizza seminars in the department. During each of these seminars, two faculty members briefly discussed their research interests to allow our graduate students to, so to speak, 'window shop'. It was a good, fun experience for both faculty and students.

During the fall we had speakers in two of our three flagship lecture series visit the department. In mid October, Professor William Dunham, Truman Koehler Professor of Mathematics at Muhlenberg College, gave the third annual *Baylor Undergraduate Lecture Series in Mathematics* lectures. A noted mathematical historian, Professor Dunham gave two memorable talks to faculty and students to standing-room-only audiences.

Brian Pennington, Director of Risk and Quantitative Resources for GoldenTree Asset Management in New York City, gave the second annual *Life Experiences in Mathematics* lecture in November. Mr. Pennington, a 1984 graduate of Baylor's mathematics program, spoke to a crowded Kayser Auditorium in the Hankamer School of Business on the mathematics of investing. Throughout his terrific lecture, Brian strongly urged students – math majors or not - to focus on taking lots of college mathematics because of its ubiquitous importance in our lives. Excellent advice!!

In late September, the National Research Council released their comparisons on graduate programs in American universities. Since Baylor has one of the youngest Ph.D. programs in mathematics in the country, we were naturally on 'edge' leading up to the release of their findings -- even though we, as a Department, feel confident that our programs are very good and nationally competitive. It was wonderful news to learn that we are highly regarded in this national report. Baylor mathematics ranks sixth in the Big 12 according the NRC release. It's a good place for us to be at this early stage of our doctoral program; however, at the same time, we realize that we have a long ways to go to get to where we want to be. We are united, and committed, to becoming a top mathematics program in the country.

Last summer, Judge Ken Starr launched a major Scholarship Initiative drive which is unprecedented in Baylor's history. The goal is to reach $100 million dollars for student scholarships by May 2013. We need help from Baylor alumni across all disciplines to reach this lofty goal. If you are interested, please visit the web site President's Scholarship Initiative for more information. Naturally, we would be grateful if you would also consider adding to existing mathematics scholarships that we have, or, starting new endowed mathematics scholarhips.

We have set several major fund-raising goals in our department. Specifically, we want to:

(1) increase the number of mathematics scholarships in the department; the number of deserving undergraduate students always outnumbers the scholarships that our department has to offer. Information on current mathematics scholarships can be found at our Mathematics Scholarship page.

(2) endow several graduate assistantships in the department; this would allow us to nationalize and internationalize our applicant pool.

(3) endow visiting professorships in the department; we have limited resources available to bring in established mathematicians for short-term visits (up to one year). Short term visits by established mathematicians can be very stimulating and result in increased productivity for our faculty.

(4) obtain three fully endowed chairs in the department within the next 10 years. Every top department in the country has endowed chairs; they would help us significantly increase our profile and recognition in the United States. The department has hired extremely well over the years but we could make a significant leap forward if we had endowed chairs available to attract established, world-renowned teachers/researchers. Hiring mathematicians in endowed positions is expensive but an essential 'next step' in our growth. The ramifications would be significant; the entire Baylor campus would be positively impacted and, for certain, it would help attract even better students and faculty to all departments on campus.

If you would like to help, please give me a call (254 710-3165) or email me at Lance Littlejohn. Regardless if you can help financially or not, please keep in touch with us -- and come and visit our Department sometime!

Best wishes,

Baylor Undergraduate Lecture Series in Mathematics

Professor William Dunham, Truman Koehler Professor of Mathematics at Muhlenberg College, delivered the third annual Baylor Undergraduate Lecture Series in Mathematics lectures during his visit to campus on October 18-19, 2010. His two outstanding lectures - on the work and lives of Gottfried Leibniz, Isaac Newton, and Leonhard Euler - were given to standing-room-only audiences.


William Dunham

Professor Dunham is one of the preeminent mathematical historians in the United States and a popular speaker on the history of mathematics. Besides lecturing at several universities in the United States, Professor Dunham has lectured before the Australian Mathematical Society, at the Smithsonian Institution, at the Swiss Embassy in Washington, and has been a guest on NPR's "Talk of the Nation: Science Friday".

Professor Dunham earned his B.S. in mathematics from the University of Pittsburgh in 1969 and his Ph.D. from The Ohio State University in 1974. He has written four books and edited one on the history of mathematics. These books are: *Journey Through Genius: The Great Theorems of Mathematics*, *The Mathematical Universe*, *Euler: The Master of Us All*, and *Calculus Gallery: Masterpieces from Newton to Lebesgue*. In addition, he edited *The Genius of Euler: Selections from His Life and Work* that was published as part of the celebration of Euler's 300th birthday. In addition, he has written a number of articles on historical topics in mathematics, including *Euler and the Fundamental Theorem of Algebra* which received the 1992 George Polya Award from the MAA, *1996: A Triple Anniversary* which won the 1997 Trevor Evans Award from the MAA, and *Touring the Calculus Gallery* in which he received the 2006 Lester R. Ford Award from the MAA.

Life Experiences in Mathematics

Brian Pennington, Director of Risk & Quantitative Resources for GoldenTree Asset Management in New York City, and a 1984 graduate of the mathematics department at Baylor, delivered the second annual Life Experiences in Mathematics lecture on November 11 to a packed Kayser Auditorium in the Hankamer School of Business.

Brian received his Bachelor of Science degree in Mathematics from Baylor in 1984. While at Baylor, Brian was an honors program graduate and a member of Phi Beta Kappa, Mortar Board, and Sigma Chi fraternity. After graduation from Baylor, he studied finance and statistics at the University of Chicago where he earned his MBA degree in 1986. Brian completed all of his course work and examinations for a Ph.D. in Finance and Statistics at Chicago.


Brian Pennington

Brian is a member of the Bear Foundation, Endowed Scholarship Society, and a life member of the Founders Associates and the Alumni Association. In 2001, Baylor honored Mr. Pennington and his wife, Amy, with the James Huckins Medallion in recognition of their support of the university.

Brian is currently Director of Risk & Quantitative Resources for GoldenTree Asset Management in New York City. Prior to joining GoldenTree, Brian Pennington was co-founder and Managing Partner of Rock Ridge Advisors L.L.C., a thematic global macro fund, where he was responsible for all aspects of management including capital commitment, quantitative resource development, risk measurement and business operations. Mr. Pennington began his investment career in 1986 at Salomon Brothers in the firm's renowned fixed-income proprietary trading unit and also headed the firm's yield curve and O.T.C options arbitrage. Mr. Pennington co-founded Convergence Asset Management, a registered commodity

pool operator in 1997. In 2001, he joined Caxton Associates as a leading investment advisor, where he was also a member of the Risk management Committee for Caxton Relative Value Holdings.

Brian and his wife reside in Greenwich, Connecticut with their two daughters and son.

2011 Headliner Lectures

Baylor Lecture Series in Mathematics

Ronald Graham, Irwin and Joan Jacobs Professor in Computer Science and Engineering at the University of California - San Diego, Chief Scientist at the California Institute for Telecommunications and Information Technology, and former President of the American Mathematical Society, will be the fifth speaker in the annual Baylor Lecture Series in Mathematics. Dates and details of his visit, planned for Fall semester 2011, will be made available soon.

Ronald Graham

Dr. Graham is credited by the American Mathematical Society as being “one of the principal architects of the rapid development worldwide of discrete mathematics in recent years.” He has done important work in scheduling theory, computational geometry, Ramsey theory, and quasi-randomness.

At the age of 15, Ron started his university studies at the University of Chicago. Dr. Graham received his Ph.D. in mathematics from the University of California, Berkeley in 1962. For the next 37 years, Dr. Graham worked at AT&T Bell Labratories in New Jersey working on several problems in pure and applied mathematics. His work at Bell Labs gave rise to worst-case analysis theory in scheduling, and helped lay the groundwork for the now-popular field of computational geometry. It also ignited interest in an obscure branch of discrete mathematics called Ramsey theory, which deals with the underlying order in apparently disordered situations. For his contributions to these fields, the American Mathematical Society awarded Graham the Steele Prize for Lifetime Achievement in 2003. In 1999, Ron returned home to California when he accepted a position at UC-San Diego.

An important 1977 paper by Dr. Graham considered a problem in Ramsey theory, and gave a "large number" as an upper bound for its solution. This number has since become well known as the largest number ever used in a mathematical proof (is listed as such in the Guinness Book of Records), and is now known as Graham's number.

Graham popularized the concept of the Erdõs number, named after the highly prolific Hungarian mathematician Paul Erdõs (1913–1996). He co-authored almost 30 papers with Erdõs, and was also a good friend.

Between 1993 and 1994 Graham served as President of the American Mathematical Society. Graham was also featured in Ripley's Believe It or Not for being not only "one of the world's foremost mathematicians", but also "a highly skilled trampolinist and juggler", and past president of the International Jugglers' Association.

In 2003, Graham won the American Mathematical Society's annual Steele Prize for Lifetime Achievement. In 1999 he was inducted as a Fellow of the Association for Computing Machinery. Graham was also one of the laureates of the prestigious Pólya Prize the first year it was ever awarded, and among the first to win the Euler Medal. The Mathematical Association of America has also awarded him both the Lester R. Ford prize which was "...established in 1964 to recognize authors of articles of expository excellence published in The American Mathematical Monthly...", and the Carl Allendoerfer prize which was established in 1976 for the same reasons, however for a different magazine, the Mathematics Magazine.

Baylor Undergraduate Lecture Series in Mathematics

David Bressoud, former President of the Mathematical Association of America, will be the speaker in the fourth annual Baylor Undergraduate Lecture Series during his October 12-15, 2011 visit to campus. Professor Bressoud is DeWitt Wallace Professor of Mathematics at Macalester College in St. Paul, MN. The titles of his two lectures are *Issues of the Transition to College Mathematics* and *Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture*. Abstracts of both lectures are below.


David Bressoud

David obtained his Bachelor of Arts degree from Swarthmore College and earned both his MA and Ph.D. degrees from Temple University, where his Ph.D. advisor was Emil Grosswald. He joined the Macalester faculty in 1994 after 17 years at Penn State. He has served as chair of Macalester's Department of Mathematics and Computer Science, chair of the Mathematical Association of America's Committee on the Undegraduate Program in Mathematics (CUPM), and chair of the College Board AP Calculus Development Committee, the committee that sets the AP Calculus syllabus and writes the exams. He is also one of the authors of the CUPM Curriculum Guide 2004. He has held several visiting academic positions, including the Institute for Advanced Study, the University of Wisconsin-Madison, the University of Minnesota, and the Université Louis Pasteur.

David has received the MAA Distinguished Teaching Award, the MAA Beckenbach Book Award for his text *Proofs and Confirmations*, and has been a Pólya Lecturer for the MAA. He is a recipient of Macalester's Jefferson Award which honors faculty members who exemplify the principles and ideals of Thomas Jefferson. David has won both a Fulbright Fellowship and Sloan Foundation Fellowship. He has published over fifty research articles in number theory, combinatorics, and special functions. His other books include *Factorization and Primality Testing*, *Second Year Calculus from Celestial Mechanics to Special Relativity*, *A Radical Approach to Real Analysis*, *Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture*, *A Radical Approach to Lebesgue's Theory of Integration*, and, with Stan Wagon, *A Course in Computational Number Theory*.

The titles, and abstracts, for his two lectures are:

Thursday, October 13, 2011 at 4:00 pm - room to be announced

Public Lecture: Issues of the Transition to College Mathematics

Abstract: Over the past quarter century, 2- and 4-year college enrollment in first semester calculus has remained constant while high school enrollment in calculus has grown tenfold, from 60,000 to 600,000, and continues to grow at 6% per year. We have passed the cross-over point where each year more students study first semester calculus in US high schools than in all 2- and 4-year colleges and universities in the United States. In theory, this should be an engine for directing more students toward careers in science, engineering, and mathematics. In fact, it is having the opposite effect. This talk will present what is known about the effects of this growth and what needs to happen in response within our high schools and universities.

Friday, October 14, 2011 at 4:00 pm - SR 344

Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture

Abstract: What is the role of proof in mathematics? Most of the time, the search for proof is less about establishing truth than it is about exploring unknown territory. In finding a route from what is known to the result one believes is out there, the mathematician often encounters unexpected insights into seemingly unrelated problems. I will illustrate this point with an example of recent research into a generalization of the permutation matrix known as the "alternating sign matrix." This is a story that began with Charles

Dodgson (aka Lewis Carroll), matured at the Institute for Defense Analysis, drew in researchers from combinatorics, analysis, and algebra, and ultimately was solved with insights from statistical mechanics.

Life Experiences in Mathematics

Ray Perryman, one of Texas' leading economists and a 1974 graduate of the mathematics department at Baylor, will give the third annual Life Experiences in Mathematics lecture. He earned his Ph.D. in Economics from Rice University is Founder and President of The Perryman Group (TPG), an economic and financial analysis firm headquartered in Waco, Texas. Dr. Perryman has held numerous academic positions in his career including ten years as Herman Brown Professor of Economics and five years as University Professor and Economist-in-Residence at Baylor University, as well as five years as Business Economist-in-Residence at Southern Methodist University. He is widely regarded as one of the world's most influential and innovative economists. Further details on the dates of his visit and information on his lecture will be made available soon.

Ray Perryman

Dr. Perryman's complex modeling systems form a basis for corporate and governmental planning around the globe. His thousands of academic and trade articles and presentations span a wide variety of topics, gaining him international respect and acclaim. He has also authored several books, including Survive & Conquer, an account of the Texas economy during the turbulent 1980s, and The Measurement of Monetary Policy, a treatise on Federal Reserve activity. A popular speaker, he addresses hundreds of audiences throughout the world every year.

Among Dr. Perryman's numerous awards are (1) the Nation's Outstanding Young Economist and Social Scientist, (2) the Outstanding Young Person in the World in the Field of Economics and Business, (3) one of the Ten Outstanding Young Persons in the World, and (4) the Outstanding Texas Leader of 1990. During his nearly 30 years of experience, he has been presented citations for his efforts from both the Congress of the United States and the Texas Legislature. He has been honored by (1) The Democracy Foundation for his role in promoting capitalism in mainland China, (2) the Asia and World Institute for his efforts to encourage international academic exchange, and (3) the Systems Research Foundation for his contributions to the field of economic modeling. He is a Fellow of the International Institute for Advanced Studies and has received the Institute's prestigious Lifetime Achievement Award.

Dr. Perryman authors The Perryman Economic Forecast, a subscription service detailing projections of state and metro area business activity, and The Perryman Report & Texas Letter, a succinct newsletter providing vital information about various aspects of the Texas economy. Dr. Perryman also writes a weekly syndicated column, The Economist, and hosts a daily syndicated radio commentary on economic affairs, "The Perryman Report." In former positions as a research chair-holder, University Professor, and Economist-in-Residence at Baylor University and Business Economist-in-Residence at Southern Methodist University, Dr. Perryman pioneered the use of timely and reliable economic information for a spectrum of strategic purposes. His studies have played a role in the creation and retention of hundreds of thousands of jobs.

Cited by major media as "a world-class scholar" and "the most quoted man in Texas," Ray Perryman is an active participant in the state, national, and world economic scenes. He has been a member of dozens of state, federal, and international task forces, served as editor of both academic and trade journals, and led conferences within the fields of economics, statistics, forecasting, modeling, and simulation. A member of several corporate boards and advisor to numerous governmental leaders, Dr. Perryman has been honored by the Texas Legislature for his "tireless efforts in helping to build a better Texas."

Profiles of Two Current Mathematics Graduate Students

Pedro Morales: I am originally from Guatemala City, Guatemala. I did my undergraduate studies back home in Applied Mathematics (2006) and Electronics Engineering (2008) at Universidad de San Carlos de Guatemala. After getting done with my studies there, I started looking for schools in the United States in order to pursue my graduate studies in Mathematics, and my friend Jose Franco who was here at Baylor at the time kept telling me how much he liked being at the math department, so I decided to apply for the PhD program in Mathematics which I started in Spring 2008.

Pedro Morales

I found the people in the math department very welcoming, both students and faculty, easy to work with and open to start discussion about different topics. Being a small and very diverse department makes Baylor to be a good place to study math, since you can freely speak with people about what they are working on. Also, it gives you a lot of opportunities to participate in seminars and colloquia and to go to meetings and conferences, so you can keep up with the latest in math research that is been done at the moment.

Participating in these kind of activities helped me choose my current research area, which is mathematical physics, specifically in a quantum field effect called the Casimir effect. This has both practical and theoretical applications such as energy production, applications in nanotechnology, conclusions about the geometry of the universe at small and large scales and many more.

Besides doing research, I like to be involved in other different projects. After being part of the national team of mathematics in Guatemala and then being a trainer, I try to still keep up with all the activities that the organizing committee does over there for each year's competitions in which Guatemala participates, such as the Iberoamerican, the Central American and the Caribbean , and the International Mathematical Olympiads. Also I spend my time playing instruments, making and recording music, writing in my blogs and doing outside sports.

Jessica Stewart: Growing up as the child of two math teachers, it was not uncommon for dinnertime conversations to revolve around how to equally divide leftovers or other hypothetical situations centered around percentages and word problems. Family friends continually asked me whether I too would follow in my parents' footsteps; and my independent self resisted. Although I was always "good" at math, I never saw it as a subject that I would pursue as a career. As much as I tried to deny my love for math, I eventually fell for math by first becoming a math major; now going to graduate school; and in the future, centering my career around mathematics.

Jessica Stewart

It was during my undergraduate career at Elon University, located in Elon, North Carolina, that I first felt challenged in math courses and developed my fascination for math. I attribute my excitement for math to the Elon faculty. As a liberal arts university with 5,000 students, we had small classes and it was my professors who provided me with extra opportunities and encouragement that fostered my interest for mathematics. Weekly, we met for Math Tea to discuss interesting problems, design math t-shirts, or just chat about life.

During my sophomore year, I worked on an undergraduate research project with Dr. Todd Lee. In the virtual reality program, Second Life, we created a Galton board to study the distribution of balls as they fell through the board, comparing the model's results to those one would expect in a real world setting. I presented this research at the regional Mathematics Association of America meeting.

As part of the Elon College Fellows program, I spent my junior and senior years devoted to research on space-filling curves and digraph iterated function systems. This research was completed under Dr. Jeff Clark. This research was presented at the regional Mathematics of America meeting, the National Conference for Undergraduate Research (NCUR), and at the Joint Mathematics Meetings in Washington DC. I was presented with the annual award for undergraduate research in mathematics by the faculty in 2009.

During the spring semester of my junior year, I studied abroad at St. Andrews University in Scotland. This was an opportunity of a lifetime on many levels, but especially for my math career. I took two courses, one in Number Theory, the other in Fractal Geometry. The educational experience was definitely challenging-there were no homework assignments or quizzes, just a two-hour final exam to test your knowledge of the semester. Although I still remember the end-of-semester stress that I experienced studying for those exams, I primarily remember the first day of the Fractal Geometry course. The professor walked into the classroom, introduced himself as Kenneth Falconer, and held up the book he had written "Fractal Geometry: Mathematical Foundations and Applications." I almost fell out of my desk. I had studied this book extensively in my research on space-filling curves! I was in mathematics heaven getting to take a course from him!

When I returned to Elon for my senior year, I spent hours upon hours researching graduate schools, trying to find the best fit for me. I had ruled out Baylor as a possible choice for graduate school since it was located in Texas and was just too far away from my East coast friends and family. My mind was changed after I met Dr. Littlejohn and a former Baylor graduate student at the Joint Mathematics Meetings in January. Their vibrant personalities and excitement towards the program was contagious. I decided that I needed to apply-I had enjoyed my conversations at the Joint Mathematics meetings and really felt drawn to the small-campus, Christian atmosphere of Baylor. Following a spring visit to Baylor, I knew that Baylor was the correct choice for me. The building and one-person graduate offices were a definite draw, but what I was really encouraged by was the professors. Each professor that I met was interested in hearing about my aspirations and spoke highly of the program. It was obvious from these conversations that the students and professors were invested in the program. I felt that the professors wanted their students to have positive experiences in math and life, both in and out of the classroom. The conversations that I had with the professors during my visit reminded me of the tight knit community that I had experienced at Elon. When I arrived back at Elon, my first task was to accept my offer at Baylor-there was no question that I knew where I was supposed to be.

I had heard from other graduate students and professors that the first year of graduate school would be one of the most challenging. My first year certainly was challenging. Socially, I was getting used to a new environment and independent living. Academically, it was a new experience taking solely math courses. I really cannot complain though, I had supportive professors and the cohort of first years worked together well. I was pushed intellectually and could really feel myself learning. I am excited for the next three years as I am able to focus my classes and studies in research. I am sure that this will bring its own set of challenges, but each challenge is an opportunity for greater knowledge.

This semester, I completed my first semester of teaching. Contrary to the past when I had absolutely no desire to be a teacher, I have found that I really do enjoy teaching! I am excited for the upcoming semester, as I will no longer be a "rookie" and will be able to improve in several areas. After graduate school, I hope to work at a liberal arts college and mentor students in their own undergraduate research projects, as undergraduate research was such an influential experience in my life.

Profiles of Some Top Undergraduate Mathematics Majors

Myles Baker: I came to Baylor because Baylor offers an academic community that respects and acknowledges the depth that faith can have on an education.

Myles Baker

Mathematics represents a unique bridge between creativity and analysis. The subject teaches one to think critically; this sort of education is very beneficial regardless of what sort of profession you plan to pursue.

The Mathematics Department has a superior faculty dedicated to research and teaching. Every mathematics professor I have had has been more than willing to meet for extended lengths with students in their office and provide individual assistance to willing students, uses the class time to its fullest capacity, and is dedicated to providing the willing student with the greatest depth and breadth of education.

I have had the privilege of independently researching with Dr. Qin Sheng in the Mathematics department and presenting my research at the regional AMS conference in the fall of 2009. I was one of only a few undergraduates to present and I actually presented twice. I attended a Research Experience for Undergraduates (REU) during the summer between my sophomore and junior years, presented at the national Joint Mathematics Meetings (JMM) 2010 in San Francisco where I was a winner of the undergraduate poster sessions. I chaired a session on Differential Equations during these meetings. I have been an invited student speaker for the TORUS conference, and was awarded the Jerry Jones Mathematics Scholarship.

I am currently applying to graduate PhD programs in applied mathematics. I want to study computational methods for solving mathematical systems of differential equations. I am interested in the topics of numerical analysis, partial differential equations, and numerical linear algebra. I want to teach at the university level or pursue a career in the oil, financial, or engineering industries.

Jaclyn Hazelwood: I was immediately drawn to Baylor because I wanted a school in Texas with a strong Christian foundation. Upon visiting Baylor's picturesque campus, the friendly, welcoming atmosphere of the students and faculty made me feel at home, and I knew my heart was set on spending my next few years in Waco.

Jaclyn Hazelwood

I initially applied to Baylor with a declared major in religion. During my senior year of high school, I found myself regularly volunteering to tutor students in mathematics for hours on end because I just could not get enough math. Thus, before attending freshman orientation, I had switched to a major in mathematics with a minor in religion. Since mathematics has always fascinated me and every class I have taken at Baylor has made the subject even more intriguing and beautiful, I have loved my mathematics major.

My first encounter with the math department was an impromptu meeting with the department head, Dr. Littlejohn, during freshman orientation. He immediately stopped everything he was doing to meet with my parents and me and made every effort to get to know me on a more personal level. Since then, every math professor with which I have interacted has genuinely cared about me as a student, a fellow mathematician, and a person. I cannot even begin to count how many times math professors have gone above and beyond with their willingness to share their wisdom and experience to help me succeed. For

instance, when I walk down the halls of Sid Richardson I regularly end up in intellectual conversations with professors, who may never have had me in their class. Overall, the Baylor math department continues to impress me with their constant investment of time and energy into the students.

I have competed in the Putnum test, a prestigious math test and placed 2nd and 3rd at Baylor. In addition, Baylor is sponsoring my attendance at the Nebraska Conference for Undergraduate Women in Mathematics at the end of January. I am currently applying to graduate schools for a PhD in pure mathematics, specifically algebra, with the hope of being a professor or doing mathematical research in the public or private sector in the future.

Michal Kokta: I originally came to Baylor in the fall of 2004, as I was recruited to play on the Baylor Men's Tennis team. The decision was actually pretty easy to make – during my recruiting visit, I was impressed by the facilities, my future teammates, and with the conversations I had with some of Baylor faculty. Ever since I first arrived on Baylor's campus, I've had a blast, and I feel like I'm maximizing my opportunities for the future, while also enjoying my college days.


Michal Kokta

The idea of majoring in mathematics actually came to me in a roundabout way. I merely wanted to take a couple of sophomore and junior-level classes to strengthen my potential applications to graduate programs in economics. However, the friendships I formed with some of the faculty, fellow students, and the subject matter of mathematics itself changed my mind, and I decided to pursue mathematics more fully. I'm especially intrigued with how mathematics, coupled together with other sciences, can be used to solve some of the challenges our world faces today in areas as diverse as space exploration, energy consumption, or finance.

What I think is the biggest strength of Baylor's math department is that it is a relatively small department, while also having faculty doing research in a broad range of areas. I have recently taken classes in analysis, differential equations, and matrix theory, and they were all taught by professors, whose research is in that particular area of mathematics. Furthermore, I enjoy the open door policy of the faculty – I feel like I can always go and talk to my professors about mathematics, or something else, and that the faculty thoroughly enjoy the professor-student interactions.

I've been relatively successful in tennis, being named an Academic All-American in 2007 and helping the Tennis Team win the Big XII in three consecutive seasons, but now I'm fully focused on my academic work and looking forward to graduate school applications. I would like to get a PhD degree in mathematics and then either work in academia or as a researcher for a company in the private sector. I'm not sure what my area of specialization is going to be yet, but I think that it is virtually impossible to make a wrong decision with the world of mathematics being full of beautiful challenges in all its areas.

Kaitlin Speer: Attending Baylor has felt similar to becoming acquainted with an unlikely friend. At first, I wasn't sure we had very much in common. I liked many aspects of Baylor: it was close to home, it upheld Christian values, and it offered me financial assistance, so it seemed a natural choice. However, I wasn't so sure about how the Honors Program worked, of which I am a part of the Baylor Interdisciplinary Core and University Scholars, or the mandatory chapel. I always thought one's journey toward God should be self-motivated, and thus that church attendance should be voluntary; chapel seemed to go against both of these principles. At least, that was my impression at the time. As I have gotten to know Baylor better, I have realized that going to Baylor was an even better idea that I had at first imagined. It has helped me find a purpose, the drive to succeed, and the capability to achieve my goals.


Kaitlin Speer

Unfortunately, I am not a real math major. As other math majors gently tease, I'm "just pretending." My major, officially, is University Scholars, and my concentrations are mathematics, French, and pre-medicine. When I first came to Baylor, my main goal centered on my pre-medicine concentration. After

graduation, I wanted to go to medical school and study to become a geriatrician. Ultimately, I think that the Big Guy up in the sky had something else in mind, because everything changed when I took my first math course at Baylor. Calculus III, which I took the fall semester of my freshman year, killed me. I studied harder than I had studied in any math class I had taken before, and I could not make an A in the course to save my life. This bothered me to no end, which to some may seem natural, but I had never thought of math as a priority in my life before, so it felt slightly. After a great amount of hard thought and life re-evaluation, I realized that there must be a good reason why I have always had math in my life. I had not realized it before, but I could not live without it. Middle and high school competitions, math summer camps, and rigorous math courses all throughout my secondary education fell into a light that I hadn't seen them in before. I had to learn more about this subject, and I felt driven to be as good as I could possibly be at it. Although my major is not officially mathematics, I have taken as many math classes as possible, and enjoyed the unique challenge each one has presented.

The math department has played an integral part in helping me discover myself and my goals, as well as helping me take steps to fulfilling them. Most of the professors from whom I have taken classes have been amazingly supportive both academically and personally, taking time out of their busy schedules to explain principles I am having troubles with, discuss future career possibilities, or any number of questions an undergraduate has about math and its intricacies. Their dedication to both teaching and research has inspired me time and time again, and their guidance has helped me form a coherent plan for my future.

Baylor is where I first learned how to perform research in mathematics. When I first decided that I wanted to figure out how one goes about math research, I inquired of several professors. They were all helpful in guiding me toward a subject that I would enjoy, one which I have subsequently become enamored with: differential equations. Under the guidance of Dr. Johnny Henderson, I participated in a difference equations seminar, during which several graduate students and I wrote a paper about some characteristics of solutions of a second-order difference equation. After much hard work, many mistakes, and more learning than I thought was possible, we submitted the paper to the journal Communications on Applied Nonlinear Analysis, and it was accepted and included in the April 2009 issue.

Having already been granted such a great learning experience, I could not ask for more from the department. But the benefits from taking classes from a dedicated group of professors do not seem to end. Excellent preparation from several courses has been a great aid in helping me succeed in two National Science Foundation-sponsored Undergraduate Research Experiences (REUs), one at Missouri State University – Springfield on modified predator-prey models, and another at the University of Nebraska – Lincoln on fractional difference equations. At both REUs, I was able to work with my partners to write a paper documenting our research. We have submitted the paper from the REU at Missouri State University to a journal, and I am currently working with the group from the REU at the University of Nebraska – Lincoln to finalize a paper documenting our research.

Throughout these research experiences, I have become sure that I would enjoy discovering and learning more about mathematics for the rest of my life. However, as I am getting to know Baylor better, I am also become more acquainted with myself, which has resulted in the realization that I care about educating others. I care very much, so much that I would like to be able to help improve not only math education, but all subjects taught in public primary and secondary schools. With the help of the math department, as well as many helpful people all over Baylor's campus, I embarked on a bewildering, challenging, and ultimately enlightening journey to figure out how to combine both a career in mathematics and in educational policy. During this process, I applied for the Harry S. Truman Scholarship and was awarded finalist status.

Being a part of Baylor, and moreover a student in the mathematics department, has been a great blessing. With the help of the math department, I have been able to achieve much more than I had ever dreamed of and been inspired to push farther than I thought I could handle, both personally and academically. Before Baylor, graduate school had never been in the picture. Now, not only do I plan on

completing graduate school, but I also plan on becoming a professor, and ultimately, using math to help improve our public school system. What more could one ask for in a friend?

Brittney Turner: My choice to attend Baylor started as a joke. My dad used to work frequently in Waco and my family always joked that I would end up at Baylor. So, on a whim, I signed up to go to a Baylor Premiere. While there, I fell in love with the beautiful campus and admired the school's dedication to integrating my Christian faith and academics. I decided to turn a joke into reality and apply. Baylor was the only school that I applied to and when I got my acceptance letter, I knew I'd be very happy in Waco.


Brittney Turner

Mathematics has always been my favorite subject in school. However, I was unsure whether I wanted to major in mathematics education or pure mathematics. While at the premiere, I attended both academic information sessions. Needless to say, pure mathematics stole my heart. The presentation by Dr. Raines was so filled with passion for his subject that it made me realize just how much I loved math. The idea of spending my undergraduate career studying math excited me then and to this day fills me with joy.

I absolutely love the Baylor math department. From homework help to advice about graduate school, the professors are extremely knowledgeable and eager to share, whether I am a student in their class or not. They lend honest opinions and genuinely care about their students. Also, I love the close-knit community that the math department enjoys. The many lectures offered throughout the semester keep students involved in math beyond what we learn in the classrooms. Finally, on a more aesthetic note, the Baylor math department facilities are very nice. The Sid Richardson building provides many study tables and white boards to allow for efficient independent and group study.

During my years as an undergraduate, I have been blessed with many scholarships from the math department. Without these scholarships, I may not have been able to attend Baylor at all. I am extremely grateful for these scholarships and the fact that they acknowledge students who have a passion for mathematics. With the solid foundation provided by the math department, I participated in an REU (Research Experience for Undergraduates) in matrix theory at the College of William and Mary last summer, where I was able to get a feel for mathematics research and what a life in academia would be like. Also, I will be attending a conference in mathematics for undergraduate women in Lincoln, Nebraska at the end of January, an opportunity that I would not have learned about without a heads up from a professor and would not have been able to attend without financial assistance from the mathematics department. At this conference, I will be presenting a poster of my research this past summer. Finally, simply being mentioned in this newsletter is an honor in itself.

After graduation in May, I hope to attend graduate school to obtain a doctorate in mathematics. With this education, I want to fulfill my lifelong dream of teaching math at either the high school or university level. I feel that when you have a passion for a subject like mathematics, which is either feared or despised by many, you have a responsibility to share that passion whether through your career or recreationally among friends. I would be blessed to do just that as an educator.

Adam Telatovich: I was born in Texas, but I mostly grew up overseas. I lived in Malaysia, Holland, Oman and Scotland after my family and I moved from Texas. What brought me to Baylor was my desire to return to the US for university, the warm weather that would let me - a tennis fanatic - play tennis year round, the honors program, and the tremendously friendly atmosphere.


Adam Telatovich

Usually, when people find out that I major in math, they begin to describe where their own math education went wrong. They also ask me, "What can you do with a math major?" I can identify with those people on the first issue: I temporarily fell out of love with math until I had very good teachers in the subject who made me realize that I

was good at it too. Teachers have a big impact. I met my best math teachers at Baylor, and it was in large part by their inspiration that I decided to take more math. As for the second issue, I can list a million reasonable "things I can do with a math major;" the Google search engine has 75,400,000 pages on that topic. In reality, however, my best reason for majoring in math is that I simply love the subject and enjoy sharing it with others. Once you get to know me, you will find that I often share problems with everyone, even if they claim to hate mathematics. I feel good if I can make anyone in the latter group slightly excited about math.

I love the Baylor math department. I'm so grateful to them for helping me realize my passion for math. They challenge me and serve as great role models. Their doors are often open past their office hours, during which time they never fail to share some incredibly cool math problems with me or give me hints on problems I need help with. They keep me updated on math events which help me get the most out of my major. Dr. Littlejohn never lets me miss a guest lecture, and he was also the first to inform me of the visiting, Cherry Award-winning professor, the wonderfully charismatic Dr. Burger, whose class I had the privilege of taking last semester. They have the courage to let me grade for them sometimes, which helps me to brush up on old material. I'm very lucky to be able to learn from such smart, friendly, approachable people.

If I'm not wrestling with a nice math problem, or showing people some of my favorite math problems at the front desk of my residence hall (where I work sometimes as a secretary) - I might be talking on Skype with my parents, who now live in Africa; or playing tennis on the Baylor club team at a tennis tournament at A&M or UT; or playing a game of squash with a few of the Baylor math faculty; or singing my tenor part in a barbershop quartet. Aside from chatting with my parents, those are my primary extracurricular activities.

I studied abroad last summer. I am an economics minor as well, and it was my interest in the subject, as well as the generous support of my parents, which led me to the London School of Economics. This experience turned out to be really cool and academically intense. While digesting all the information they gave me, I met some very interesting people from all over the world. I made friends with undergraduates from Australia, China, Holland and the US, a PhD student from Italy, and a Croatian who now works for the European Central Bank. In the near future, I hope to participate in a Research Experience for Undergraduates program this summer; if that doesn't work out, I might use that time to learn another language. Also, if I can, I would love to take a semester abroad in Hungary next fall. A friend of mine at Baylor told me about the program. I also hope that I can help the tennis club team that I'm on to qualify for Nationals this spring, so that we can go to North Carolina where the tournament will take place. In terms of career goals, I really don't know what I'm going to do. But to be honest, as long as it involves math, I think I'll be happy.

A Student Essay on the Great Swiss Mathematician Leonhard Euler

Professor David Arnold, Ralph and Jean Storm Professor of Mathematics, taught the Honor's section of Math 1301 (Ideas in Mathematics) in the fall semester of 2009. As part of their grade, each student was required to write an essay on a mathematics topic pertaining to the course. The following is an abridgement of the essay written by Robert Lewis, a freshman choral music major from Houston; for the full version, please visit the link Euler Essay. We're very proud to print it in our newsletter!


Robert Lewis

Leonhard Euler is unequivocally considered one of the most revolutionary figures in mathematics. His contributions to mathematics reach from geometry and algebra to number theory and combinatorics. His works are so numerous that the current project of publishing them has been in progress for 100 years and is still not finished.

Leonhard Euler was born in 1707 near Basel, Switzerland. His family was closely tied to the Protestant churches, so it was anticipated that he would follow his father to the pulpit. Euler, however, found his curiosity satisfied everywhere. He had a phenomenal memory—allowing him to memorize huge lists of information, such as poems, speeches, and mathematical tables. Also, he was a skilled mental calculator, performing complex mathematical computations without a pencil and paper.

At age 14, Euler entered the University at Basel. Here, he came into contact with Johann Bernoulli, easily the greatest active mathematician in the world at that time. Bernoulli was quick to criticize and slow to compliment, but he became a mentor to Euler, and had a great effect on his life. Bernoulli would suggest readings to Euler and make himself available regularly to discuss the more difficult points.


Leonhard Euler

Euler's education was not limited to mathematics. He studied law, wrote on the subject of temperance, and eventually graduated with a Masters' degree in philosophy. He entered divinity school, apparently ready to follow in his father's footsteps, but soon gave it up in order to devote all of his time to mathematics.

Euler spent a few years developing his mathematical skills. At the age of 20, he earned Second Place in the Paris Academy's mathematics competition for an analysis of the placement of masts on sailing ships (rather surprising as he had lived his entire life in landlocked Switzerland) (O'Connor).

In 1725, Daniel Bernoulli (son of Euler's mentor) accepted a job in the math department at the St. Petersburg Academy. The next year, Euler was invited to join him. Euler would take a position in the physiology/medicine department. Not knowing anything about these subjects, he set out to learn them. However, when he arrived in St. Petersburg, he found he was assigned to the physics department instead. He spent several years living in Bernoulli's house, discussing mathematics with him regularly.

When Bernoulli left the St. Petersburg Academy for another post in Switzerland, Euler took over his position. Finding himself comfortably supported, he took a wife. He married Katharina Gsell, the daughter of a Swiss painter. They would eventually have 13 children, though only 5 would survive to adolescence.

Finally situated in life, Euler began the phase of his life that would make him famous. His first task involved solving the "Basel Problem", finding the sum of this infinite series:

$$\lim_{n\to\infty} \frac{1}{k^2} = 1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \cdots + \frac{1}{k^2}$$

Although mathematicians had known that the answer was somewhere around 8/5, evaluating the first thousand terms by brute force gives an answer that is correct to only two decimal places.

Euler's first attempt at this solution involved a masterful use of calculus and substitution. Euler began by expressing this equation as an integral:

$$I = \int_0^{\frac{1}{2}} -\frac{\ln(1-t)}{t}\,dt$$

Through substitution and integration, Euler arrived at the equation:

$$\sum_{k=1}^{\infty} \frac{1}{k^2} = \sum_{k=1}^{\infty} \frac{1}{k^2 2^{k-1}} + [\ln(2)]^2$$

Evaluating this answer to only 14 terms, Euler arrived at a number that is accurate to six decimal places. However, this was still only an approximation. Euler would have to wait a few more years and derive this formula for the sine of x:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \cdots$$

Using this formula, and some intuitive observations about polynomials, Euler arrived at the solution:

$$\sum_{i=1}^{\infty} \frac{1}{k^2} = \frac{\pi^2}{6}$$

Although Euler's proof was not by any means mathematically rigorous, later proofs have shown him to be right.

Interestingly, this same logic of reasoning, along with a formula he discovered in the process of solving this equation, gave him a formula for calculating the values of logarithms of sines and cosines.

Now that Euler had solved the first of his major problems, he began work in earnest. He published paper after paper for the next few years. In some issues of mathematical journals, half of the articles were his.

Unfortunately for Euler, his cozy world of St. Petersburg was about to get shaken up. With the death of Catherine I, the queen of Russia, native Russians began to become suspicious about foreigners. Also, his relationship with his boss, Johann Schumacher, was never comfortable. Finally, Euler's eyesight began to deteriorate, likely as the result of an infection.

However, none of this kept him from working diligently on in mathematics. During this time, Euler published a huge volume of works in classical and analytic number theory, and wrote a textbook on physics, presenting Newton's laws in the context of calculus.

In the area of Number Theory, one of Euler's most famous contributions was on the subject of "amicable numbers". Amicable numbers are a pair of numbers such that the "proper" divisors of one (all divisors other than itself) add up to the other. When two numbers meet this condition mutually, they are called amicable.

Amicable numbers had been known for years. However, only three pairs were known before Euler's time—the smallest amicable pair is 220 and 284. However, Euler found an equation and discovered 59 pairs.

Euler admitted that his method did not predict all amicable numbers, but it regularly predicted them. Essentially, all the proper results of this formula are amicable numbers, but not all amicable numbers are the result of this formula.

At this point, Euler's mathematical achievements were beginning to make his name known internationally. When Frederick the Great of Prussia offered him the chance to teach at the Berlin Academy, Euler jumped at the chance to get away from St. Petersburg. So, in 1741, Euler moved to Germany with family in tow.

At this point, Euler published two of his most well-known textbooks: The *Introductio in analysin infinitorum*, and the *Institutiones calculi differentialis*. He would later follow this up with the *Institutiones calculi integralis* (Rouse). In this time, he also developed his most famous formula:

$$e^{i\theta} = \cos\theta + i\sin\theta$$

which, in a special case, simplifies to:

$$e^{i\pi} + 1 = 0$$

Introductio is essentially a "pre-calculus" book. In it, Euler redefined several major concepts, including changing "function" from a geometric definition to a more analytical definition similar to what is used today. He also redefined logarithms, which would prove useful in his later works.

Logarithms had been an important concept in math since Napier and Briggs in the late 1500s. Napier and Briggs had used square roots and proportions to calculate logarithms of base 10, but by the middle of the next century, infinite series and integral calculus had also been connected (much easier to calculate than the others).

Euler was the first to note that a logarithm is the inverse of an exponent, thus, for a given a, x, and z both of these statements are true:

$$a^x = z$$

$$x = \log_a z$$

Euler showed how to use both of the aforementioned methods to calculate logs (the roots and the infinite series). But what was truly spectacular was how he explained the infinite series problem *without* resorting to calculus. Euler managed to calculate the natural log of 5 using infinite series and some rather exceptional substitutions.

Euler also discussed curves and polynomials as graphed in the third dimension in this book (Rouse). In this text, Euler was also the first to associate the number 2.7182818284… with the letter *e*, which has become ubiquitous today.

But his most famous work during this time was a series of letters written to the princess of Anhelt Dessau. These letters, later published under the title *Letters of Euler to a German Princess,* still stand as one of the greatest examples of popular science in history. They cover a variety of topics, from physics to language to astronomy. This was Euler's most widely read book—an unusual example of an accomplished scientist explaining things in layman's terms.

In this time, he also proved Fermat's Last Theorem for the case n=3 (O'Connor).

Euler also made great contributions to geometry. He proved Heron's formula in 1748:

Given a triangle with sides a, b, and c,
$s = \frac{a+b+c}{2}$ where s is the "semiperimeter" of the triangle,
and the area of the triangle is measured as follows:

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Euler would return to geometry later in life and prove that the orthocenter, the circumcenter, and the centroid of a triangle must lie in a straight line. This line is known as Euler's line for this reason.

But all was not perfect in Germany. Euler was not given the respect his reputation demanded in the courts of Frederick the Great. He fell afoul of Voltaire, a fellow member of the Academy. In 1766, Euler left the Berlin Academy and returned to Russia, where he was welcomed with open arms by his old comrades.

Back in Russia, Euler suffered more tragedy: first, the complete loss of his eyesight. As early as 1738, you will remember, his eyesight had been deteriorating. In 1771, Euler was completely blind. In that same year, his house burned down, taking many of his papers with it (Rouse). On top of all that, in 1773, his wife Katharina died.

For many, such losses would have been crippling. However, Euler not only maintained his mathematical output, he increased it. In 1775, he published some 50 mathematical essays—a rate of nearly one per week. This is doubly shocking when one realizes that Euler had to rely on others to read him scientific

information and record his dictations. He even had to work out the mathematics mentally, seeing everything in his mind's eye. It was at this time that Euler's remarkable memory came in handy.

In 1776, Euler married the half-sister of his late wife. She became the companion of his twilight years. On September 18, 1783, Euler tackled the mathematics of balloons and the orbit of Uranus, as well. He spent time with his great grandchildren. But that afternoon, Euler suffered a massive hemorrhage and died almost instantly.

Euler was a master of mathematics and science. His discoveries impacted every major mathematical field and most sciences. It was with great reason that Laplace told his students to "Read Euler…He is the master of us all."

BIBLIOGRAPHY

Unless otherwise noted, all information comes from:

Dunham, William. *Euler: the Master of Us All*. [Washington, D.C.]: Mathematical Association of America, 1999. Print.

Other Sources:

Rouse Ball, W. W. "Leonhard Euler (1707 - 1783)." *A Short Account of the History of Mathematics*. 4th ed. 1908. *TCD School of Mathematics*. Web. 01 Dec. 2010. <http://www.maths.tcd.ie/pub/HistMath/People/Euler/RouseBall/RB_Euler.html>.

O'Connor, J. J., and E. F. Robertson. "Reference "N" "*MacTutor History of Mathematics*. Sept. 1998. Web. 01 Dec. 2010. <http://www-history.mcs.st-and.ac.uk/Biographies/Euler.html>.

Meaghan McNeill (Baylor, 2010) Working on Ph.D. Degree at Rice University

To be honest, majoring in mathematics and attending Baylor University were not quite what I envisioned during high school. God, however, has a funny way of changing my plans into His! During my senior year, I visited Baylor campus and enjoyed the Christian atmosphere, the dedication to learning, and the excellence in biology (since I intended to go to veterinary school). What really struck me, though, was that the Baylor Science Building was inscribed with the verse: "By Him all things were created; in Him all things hold together." I knew I could do no better than attend a school where the scientists see God's hand in creation.

Because of various scheduling difficulties during my freshman spring, I found myself taking Dr. Mathis's Calculus III class simply because I could (I discovered later that I shared this class with my now fiancé!). The class was amazing. 3-D drawings, partial derivatives, multiple integrals – what fun! I realized that I could not leave my life-long love of math behind, so I added a math major to my biology degree. Little did I know what a delightful program I had just gotten myself into: Dr. Littlejohn's Linear Algebra class and manipulating multiple equations, Dr. Henderson "Hershey bar-ing it out," learning about rigorous proofs, seeing the beauty of ODEs and PDEs, attending lectures with soap bubbles and higher dimensions, and living with my friends in the basement of the library during Advanced Calculus. I learned life lessons like, "Things aren't always what they seem" (2 + 2 can equal zero), "You have to start somewhere" (proofs begin with P-r-o-o-f), and, "If plan A doesn't work, try plan B" (start off trying to prove the theorem directly, then try induction, and if all else fails, assume it's false and try to contradict yourself, hoping the universe doesn't explode in the process). I'll admit that I had to grit my teeth to get through some of the math – don't we all – but


Meaghan McNeill

the professors and classmates I met during my years as a Baylor math major opened my eyes to the beauty of numbers and theorems.

I graduated Summa Cum Laude from Baylor in May 2010 with a B.S. in Mathematics and Biology. I was inducted into Phi Beta Kappa and graduated with a 4.0. I was in the Baylor Interdisciplinary Core, received an Outstanding on my Honors thesis, and co-authored a recent paper in Tissue Engineering. I am now at Rice University on a National Science Foundation Fellowship working on my PhD in Bioengineering. I hope to use my training in mathematics and biology to create simple, affordable, and accurate medical diagnostic tools for people in low-resource areas. This summer I'll be marrying the wonderful Greg Bond, and when we both finally finish school, I hope to gain experience by working in the medical industry and then to eventually return to teach. I know that my time at Baylor and in the math department – the peers and professors who have become friends, the wonderful knowledge I have gained, and the opportunities I have been given – are an incredible blessing from above, even if it's not quite what I had planned. Thank you, Baylor Math Department!

Simon Guest Finishing up Post Doctoral Experience at Baylor

Simon Guest arrived at Baylor in the fall semester of 2008 as the very first three-year post doctorate visiting professor in the Department of Mathematics. As he finishes up his last year, the department is thrilled that he chose Baylor for his first academic position.

"I am very grateful that Simon chose Baylor over his other job offers", says Lance Littlejohn, chair of the department. "He is a superb mathematician, an excellent teacher, and a terrific departmental colleague and friend. He's going to have a successful and impactful academic career."


Simon Guest

Dr. Guest, born and raised in Isleworth, England, graduated with his Ph.D. degree from the University of Southern California in 2008 under the direction of Dr. Robert Guralnick, one of the leading group theorists in the world. Prior to his graduate studies at USC, Simon studied at Oxford University, where he obtained his M. Math (First Class Honours) in 2003. Simon's wife, Shannon, whom he met at Oxford, is from the Houston area. This past year, Shannon started teaching mathematics in middle school in the Waco area.

Simon's work in group theory is highly regarded by his mathematical peers. He has several publications in top journals. He was invited to spend six months working with Dr. Cheryl Praeger, another world-class group theorist, and her research team at the University of Western Australia in Perth, Australia last January. Simon took a leave of absence from Baylor to accept this opportunity.

"I have thoroughly enjoyed my time at Baylor," says Simon. "I've really appreciated the welcoming atmosphere of the Baylor community. Everyone in the mathematics department has been so helpful and made it so much easier for me to settle into my first academic position."

In his spare time, Simon is an avid tennis and squash player and a loyal fan of Liverpool football, the Houston Astros, and the Houston Texans. He also enjoys going for long walks in Cameron Park and along the Brazos River.

Faculty News

The mathematics faculty remained very active in research during 2010. Forty nine papers were published by our faculty in various journals this past year. In addition, we note the following scholarly achievements from our faculty during the calendar year 2010.

David Arnold, the Ralph and Jean Storm Professor of Mathematics, gave a lecture entitled "A Mathematical Course for Liberal Arts Majors" at the University of Mary Hardin Baylor (UMHB) last September. This visit, by invitation of the Dean of Arts and Sciences at UMHB, included a discussion with mathematics faculty members about impending changes of general education mathematics requirements.

Matthew Beauregard, our newest post doctoral fellow, gave an invited lecture at Franklin Olin College of Engineering and three lectures at the University of Arizona during 2010.

Ray Cannon is the Chair of Baylor's Faculty Senate for the 2010-2011 academic year. Ray continues to be very active with College Board workshops and AP Institutes including giving presentations in 2010 in Dallas, Little Rock, Houston, and San Antonio. Ray also served on a mathematics education committee that traveled to China in October.

John Davis gave an invited address at the Texas Section Meeting of the Mathematical Association of America in Abilene as the recipient of the Distinguished Teaching Award for the Texas section and spoke in a special session of an AMS meeting in San Francisco. He spent a week at the Institute of Pure and Applied Mathematics (IPAM) at UCLA this fall participating in the program on Algebraic Geometry and Convex Optimization. His research continues to be supported by an NSF grant in dynamical systems. He is currently completing a textbook, Partial Differential Equations, which is to be published next year.

Manfred Dugas gave invited lectures this past year at the Southern Regional Algebra Conference at Auburn University and at the 30th Ohio State-Denison Mathematics Conference in Columbus, Ohio.

Guglielmo Fucci gave invited lectures this past year at Baylor University and at the Quantum Vacuum Workshop at Texas A&M University.

Simon Guest gave invited talks this past year at the AMS Regional meeting at UCLA, the Southwestern Group Theory meeting in Tucson, Arizona and at the University of Western Australia in Perth, Australia.

Paul Hagelstein presented a paper "Recent Developments Regarding the Halo Conjecture" at the International Congress of Mathematicians in Hyderabad, India.

Jon Harrison gave an invited lecture at the Analysis on Graphs and its Applications meeting held at the Newton Institute, Cambridge UK, and a colloquium lecture at Texas A&M University.

Johnny Henderson, Distinguished Professor of Mathematics, accepted two additional editorial appointments this year pushing his total to 15 editorial boards. He also received the Elsevier Award for having the top cited article for the period 2005-2010 in the Journal of Mathematical Analysis and Applications. During 2010, Johnny gave invited lectures at Abilene Christian University, East Central Oklahoma University, and in a special session of the American Mathematical Society meeting in San Francisco.

Markus Hunziker gave four one-hour lectures under the title Combinatorics, unitary representations, and algebraic geometry related to Hermitian symmetric spaces at the summer school Geometry and Representation Theory at the University of Georgia last May.

Baxter Johns is the department's Undergraduate Director. Anything and everything undergraduate falls under the responsibility of Baxter, including being a key liaison between the department and the School of Education (SOE). Baxter was recently instrumental in seeing a new concentration approved in conjunction with the SOE enabling mathematics majors to earn their teaching certificates.

Klaus Kirsten has a three year $150,000 grant from the National Science Foundation. His proposal is entitled "The Casimir effect: Geometry and Boundary Condition Dependence". In 2010, Klaus gave invited lectures in Barcelona (Spain), Santiago de Compostela (Spain), University of Oklahoma, Dresden University of Technology (Germany), Jena University (Germany), Penn State University, and Baylor University.

Jonatan Lenells, our newest tenure-track faculty member, is part of a $737,000 grant from the Engineering and Physical Sciences Research Council that was given to the University of Cambridge in England. Jonatan gave invited lectures during 2010 at Texas A&M University, University of Texas at Arlington, Jacobs University (Bremen, Germany), University of Bonn (Germany), and Baylor University.

Lance Littlejohn gave the Millican Lecture at the University of North Texas in April. He also gave a plenary address at the Functions and Operators conference in Kraków, Poland in June and a colloquium talk at Texas A&M University.

Frank Mathis is Associate Chair in the department and Associate Dean in the College of Arts and Sciences. In addition, he is the interim Chair of the Department of Aviation Science. Despite his many administrative duties, Frank remains very active in the Mathematical Association of America and the Texas Association of Academic Administrators in the Mathematical Sciences.

Leonardo Mihalcea organized, and spoke at, a minisymposium on Schubert Calculus at the SIAM Discrete Mathematics meeting in Austin in July. He also gave several invited lectures during the past year at SUNY Albany, Texas Christian University, University of Louisiana-Lafayette, Louisiana State University, Texas A&M University, University of North Carolina Chapel Hill, Tulane University, and at the Canadian Mathematics Society summer meeting in New Brunswick.

Ron Morgan gave an invited lecture at the Copper Mountain Conference on Iterative Methods held at Copper Mountain, Colorado. Ron also learned that he had a paper reach the "100 citations" plateau this past year.

Ed Oxford and Kathy Hutchison continue their work on the mathematics of apportionment in the U.S. House of Representatives. The fall 2010 department newsletter contains an article explaining some of their work on this subject.

Robert Piziak "retired" in 2008 but, lucky for us, you would never know it! Upon the completion of his first book with Pat Odell, Matrix Theory: From Generalized Inverses to Jordan Form, and realizing how much had to be left out of this book for length considerations, he began work on a second book, Hermitian Matrices. This book, which is nearing completion, will be at a more advanced level and is more of a challenge to write as he must decipher many journal articles to include material not usually found in book form.

Brian Raines has an NSF grant for his project "Classifying a model for the Henon attractor: a U.S.-Croatia Collaboration". Brian gave invited lectures this past year in Birmingham, England and at the University of Auckland in New Zealand.

David Ryden co-organized a special session on Continuum Theory for the 44th annual Spring Topology and Dynamical Systems Conference in March.

Mark Sepanski is the Graduate Director in the mathematics department, having started this appointment last June. Mark has been named an Editor of the Central European Journal of Mathematics. He also gave an invited lecture at Louisiana State University last semester.

Mary Margaret Shoaf and Tommy Bryan are the Principle Project Directors for a $400,000 Teacher Quality Grant from the Texas Higher Education Governing Board for the time period 2009-2012. The goal of their project is to give middle and high school mathematics teachers the training in content, technology, pedagogy, and continued support that will enable them to teach TEKS-defined topics in pre-algebra and algebra through a functions/activity based approach.

Tim Sheng became Editor-in-Chief for the International Journal of Computer Mathematics. Tim's research continues to be supported by the U.S. Air Force Research Laboratory. In addition, Tim directed three undergraduate theses this past year and he gave several invited lectures in Spain, England, and at various universities in the United States.

Ron Stanke finished up a six year term as the department's Graduate Director in 2010. Under Ron's leadership and direction in this position, the department's graduate program grew tremendously from a mere handful of graduate students to a total of 25.

Briefs

(1) Mrs. Anita Rolf, wife of long-time Baylor mathematics chair Howard Rolf, suffered a stroke in mid December. She is now recuperating and making progress at a rehabilitation center in Austin. Please keep Anita and her family in your thoughts and prayers.

(2) James S. W. Wong (B.Sc., Baylor 1960, Ph.D., Cal Tech 1965) visited Baylor this past July. James is a leading authority in the world in differential equations and a highly successful Hong Kong businessman. A recent article about James, and two of his Baylor classmates from Hong Kong, appeared in a recent edition of the Baylor Magazine.

(3) Ed Burger, Cherry Award recipient for 2010, was recently featured in issues of Baylor Magazine and Baylor's College of Arts and Sciences magazine. To read these interesting articles, please click Baylor Magazine and Arts and Sciences Magazine.

(4) The top three calculus students for MTH 1321 in the fall semester 2010 were Dana Reed (Engineering), Cami Hebert (University Scholars), and Kinzie Zitzman (Engineering). Congratulations ladies - we're very proud of you!

(5) Dr. Scott Wilde was promoted to Senior Lecturer of Mathematics in December. Scott is in his seventh year as a member of our faculty. Way to go, Scott!

(6) Gail Brooks will be running in the Houston Marathon on January 30. Last year, Gail broke the three-hour barrier in this race (quite a feat with her feet, wouldn't you say?) and she is hoping to run even faster this year. Good luck, Gail!

(7) Our Homecoming Reunion in the department this past October was a huge success! We saw several math alumni that Saturday morning at our breakfast in the Sid Richardson building. Let's plan on getting even more of us together next Homecoming! It's wonderful to meet our math alumni. On January 4, I got a surprise visit from Steve Mason (Baylor, '72), a former math student who is now a lawyer and living in the Tyler area. He was passing through Waco and decided, on a whim, to stop by the department. It was terrific to meet you, Steve, and I hope more math alumni drop by to see us just like you did!

(8) The department is thrilled that Dr. Eugene Tidmore was coaxed out of retirement to teach a class during Spring Semester 2011. Gene will be teaching Math Modeling (MTH 3374) in the new Meyerhoff Classroom. Welcome back, Gene!

Keep in Touch!

We would love to hear from you! We are working on a database of our mathematics alumni and always looking for stories from our graduates that we can print in our newsletter and on our department web site. So let us know what you are doing and please share your stories with us. We always enjoy talking with old friends and we look forward to hearing about your successes!

Our current students welcome information about internships and other opportunities, and students greatly appreciate presentations by alumni and others who talk about their careers and share their insights into the employment landscape. If you are interested in giving a talk to our majors, please contact Lance Littlejohn.

Each of the 28 chairs within the College of Arts and Sciences administers a discretionary fund that directly supports his or her department. The Mathematics Excellence Fund supports, among other

projects, undergraduate and graduate student travel to conferences/workshops and the departmental colloquium series. If you are interested in contributing to this fund, please contact Eric Abercrombie in university development.

As we pursue our goal of becoming one of the nation's top mathematics programs, endowed chairs, endowed visiting professors, undergraduate scholarships, and graduate assistantships can play a vital and important role. If you are interested in supporting the department in any of these, or other ways, please contact Lance Littlejohn or Eric Abercrombie in university development.

If you are in the area, please come by and visit the department. You are welcome anytime and we would love to see you!