What’s happening in the department? Our Chair has the answers...

*n*-Dimensional Space by Mike Jacobson, Chair

Being the first issue in recent time, I want to take this opportunity, on behalf of the faculty and staff, to welcome you to the University of Colorado Denver, Department of Mathematical & Statistical Sciences Newsletter - *Critical Points*.

We hope over the next few pages to bring you information about the department and scientific community that you might find interesting and helpful. We hope to highlight individuals associated with the department. This issue we have chosen a faculty member as well as an undergraduate and graduate student to spotlight. In future issues, we expect to spotlight alum, and provide information about usual and unusual career paths followed by our past students. There will be a mathematical problem corner, to help stimulate your mathematical curiosity and an events calendar to keep you up to date and offer a chance to continue your relationship with the department.

It is expected that we will circulate a new *Critical Points* once per semester; keeping you apprised of interesting events and happenings, and help you (and us) maintain your connection with mathematical sciences and the department.

Finally, special thanks go out to Lindsay Hiatt, our department’s new Program Assistant, who has taken on the initiative of putting this publication together. I am confident that Critical Points will be a provocative and mathematically thought-provoking newsletter, which you hopefully will enjoy.

Michael S. Jacobson, Chair

Department of Mathematical & Statistical Sciences

University of Colorado Denver
Meet our newest professors

Welcome New Faculty!

Dr. Alexander Engau, a Ph.D. graduate in Mathematical Sciences from Clemson University, has joined the Department of Mathematical and Statistical Sciences at University of Colorado Denver as Assistant Professor in the fall of 2009. “This is an exciting opportunity to engage in two of my favorite research subjects – math and stats – as well as to start teaching and working with dedicated students on both the graduate and undergraduate levels,” says Alexander, who also holds a masters degree in Management Mathematics (with specialization in Optimization and Statistics) from Kaiserslautern University, Germany. Professor Engau joins UCD after a two-year postdoctoral fellowship in the Faculty of Engineering at University of Waterloo in Canada. His dissertation discussed domination concepts and decomposition techniques for optimization problems with multiple objectives. Prior to Canada Professor Engau received the Outstanding Graduate Researcher Award from the College of Engineering and Science at Clemson University, and actively maintains many other interests in theory and methodology of mathematical programming, optimization, and decision making within the broad field of operations research and its applications in the engineering, management, and life sciences. “My mother is a teacher as well, and I always liked the idea of helping students train their skills, learn new ones, and develop a critical and creative mind – it carries a lot of responsibility, but is a true and very rewarding privilege.” Whenever Alexander is not at work, you may see him outside running, biking, or hiking, hear him playing his saxophones or the piano, or catch him in discussion and laughing with his friends.

Dr. Mike Ferrara received his doctorate from Emory University in 2005, and was a Postdoc in the UCD Mathematical & Statistical Sciences Department from 2005-2007, under the supervision of Mike Jacobson. He then spent two years as an assistant professor at the University of Akron in Ohio and is thrilled to make his way back to the department and Denver. Mike’s research area is combinatorics, concentrating on structural and extremal graph theory. He also conducts research on problems related to degree sequences and combinatorial games and particularly enjoys working collaboratively. His other professional interests include the mathematical education of teachers along with giving presentations to middle school and high school students to build excitement for math and science. Outside of mathematics, Dr. Ferrara is an admitted pop culture “junkie” who loves to take in movies and plays with his wife Tracey. He also enjoys singing, reading science fiction (both good and terrible) and, if he ever finds the time, would like to some day return to acting.

Dr. Joshua French was a graduate teaching/research assistant at Colorado State University prior to beginning his faculty position at UCD. He received his PhD in Mathematics this past spring from CSU in addition to being awarded the Duane Boes Award for excellence in teaching. Dr. French completed his undergraduate work at Point Loma Nazarene University, a very prestigious institution which garnered the #1 ranking for surfer schools in the nation by Surfer Magazine. French joins the department with varied research interests including extreme value theory, stochastic processes, spatial statistics, and environmental and ecological applications. In addition to these interests, he indicated that “When I have free time, by far my favorite thing to do is to spend time with my lovely wife Julia and my precious son Asher. I also like to exercise, play sports, and read when I get the chance.

UPCOMING EVENTS

CALCULUS: THE MUSICAL

This spring Calculus: The Musical is back! Last year’s performance was a favorite among faculty, students, and community members. Come see it again or for the first time and bring a friend. It will be playing for one day only on Friday, March 12, 2010 at 4:30pm in North Classroom Room 1130.

Calculus: The Musical! A blend of sketch comedy, musical theatre and classroom lecture. MATHEATRE has created a performance piece to show that although calculus is used in rocket science, well...it isn’t.
Faculty Spotlight

on Rich Lundgren

Not only have you been a professor for some time but you have also been department Chair in the past. Having such varied experience over the years, what major changes have you observed within the department?

In 1981 when I arrived the department was essentially a service department with a few majors and six students enrolled in the Master’s program. During the next 10 years there was significant improvement in the undergraduate major and the Master’s program along with the development of a new Ph.D. program. The number of graduate students increased from 6 to 100 and several faculty obtained major funding. From 1998-2003 we obtained a CCHE Center of Excellence Grant which enabled us to reduce the TA teaching load from two courses/semester to one. It was also during this time that we recruited nationally for a new Chair. From 2003-2009 as a result of these previous improvements, the department increased the number of out-of-state Ph.D. students from two to over 22.

One of our major sponsors of the department and the Ph.D. program are Warren and Marilyn Bateman. They established support for the program after their daughter Lynn died as a result of complications from Epilepsy. How are you still connected with them today and what do you remember about Lynn as a student and individual?

Lynn was our first out-of-state student to enter our graduate program, starting in 1984. She was a great teacher who took it upon herself to train new TAs; a wonderful individual who had a love for math. It was a tragedy that she died so young and that she did not get to live her dream of teaching college math. Thankfully, her legacy lives on through the generosity of her father, Warren Bateman. Many of the students who have won the Bateman teaching award have continued on to outstanding teaching careers. While the Bateman fellowships have enabled numerous students to graduate a year earlier than expected.

Warren and I reconnected in 2000 and immediately discovered our joint passions for teaching and golf. Since then my wife Linda and I have been getting together regularly with Warren and his wife Marilyn. Activities together range from events with students to golf matches, football games and sleigh rides in the mountains.

You’ve seen a number of Ph.D. students come through the program over the years and were integral in the development of the Ph.D. program. What are some of your fondest memories of students and faculty?

Getting the Ph.D. program approved was a monumental achievement for the department and changed it forever. There was a tremendous amount of work and politics involved, and it was a major group effort led by Harvey Greenberg, Bill Briggs, Steve McCormick, Tom Manteufel and myself as Chair. It was a great joy to work with this group and the supporting cast of assistant professors including Bill Cherowitzo and Weldon Lodwick.

I have been blessed with having wonderful Ph.D. students starting with Kim Factor in 1984 and continuing today. During my 25 year period here, I have always had at least one Ph.D. student working with me. A special treat for me is when former students such as Kim, Sarah Merz and Dave Brown visit and work with current students Breeann Tonnsen, Shilpa da Gupta and Hank Turowski.

What plans for the future are you working on?

Phased retirement has been great, so I plan to continue it for one or two more years. I also am working to help my current Ph.D. students graduate over the next 2-3 years in addition to spending time with my young grandchildren who are two and five.

This will come as no surprise but I plan on spending time playing lots of golf, skiing and continuing to visit the North and South Carolina coasts with Linda. We also have plans to take a special trip each year. Maybe next year Scandinavia, or the Greek Isles.

Some of my former Ph.D. students have a plan for all of us to write a Discrete Math Modeling book. I think they feel I might have too much free time.
Graduate Student Spotlight: **Chris Harder**

**You went to Metro State for your undergraduate degree. What prompted you to choose UC Denver for your graduate education?**

When looking into graduate programs I considered both UCD and Montana State but I realized that I prefer Denver. I grew up here and after speaking with faculty and students in the department I knew that this was where I should be.

**What are your research interests?**

I'm currently working on stabilized finite element methods. My dissertation topic is on stabilized methods for the Darcy problem. The Darcy Model describes the flow in a porous medium. The problem is that you are limited in choices you can make for the approximate solution to describe this numerically. I'm trying to describe one way to circumvent these restrictions under certain assumptions.

**What is one example of how this may be applied?**

Solutions to the Darcy problem can be useful when modeling the flow of contaminants in ground water. This information can in turn be useful in reclamation projects.

**Have you ever been published? If so, how can publishing affect your career goals?**

Yes, I have published an article about my research in the French Journal CRAS. I also did a lecture at the 2006 World Conference on Computational Mechanics which was an amazing experience. By having some of my work published, this will definitely assist me in my search for an Academic Teaching Position after earning my Ph.D.

**What have you enjoyed most about the graduate program here at UCD?**

I've really enjoyed the opportunities to meet various researchers. My advisor Leo Franca has been instrumental in this. Also, I love teaching and have enjoyed this immensely. I enjoy seeing the students process and grasp the concepts as well as the opportunity to work with them one on one.

Undergraduate Q&A with **Michelle Rendon**

**What year of study are you currently in and what are your goals and/or career plans post-graduation?**

I am a senior and will be graduating this May. My areas of interest include probability and statistics. After earning my Baccalaureate I have numerous possibilities. I may apply to business school, work as an analyst for a Lockheed Martin, or possibly try to work for the Census Bureau.

**Before coming to UC Denver, you were at the UC Boulder. Why did you switch and describe your experiences been at both campuses?**

I enjoyed UC Boulder, however, I realized I wasn't concentrating as much on my studies there. Here at UC Denver I feel like students are more academically focused whereas at Boulder many tend to focus on socializing.

**Why math? What directed you toward an interest in mathematics as opposed to another field?**

I chose mathematics as my area of studies because it is so varied in its applications. My degree will help me gain access to a number of different career fields because a strong background in mathematics is essential for work in the public and private sectors.

**What else have you been doing in addition to your studies?**

I have been given so many opportunities and access to excellent faculty. In addition to my studies I am involved in the Math Modeling Competition, the Math Club, and a student member of the Undergraduate Committee. These experiences really have helped build a stronger sense of community not just between me but between professors and all students.
Julien Langou’s research wins grant!

Acute Angles

In September 2008, Julien Langou received funding from NSF-CCF to support a three-year research project on parallel linear algebra software for multi-core architectures. The code name of the project is PLASMA. The initial funding was $214,800 and a supplement of $42,961 was awarded in September 2009.

The project aims to address the critical and highly disruptive situation that is facing the Linear Algebra and High Performance Computing community due to the introduction of multi-core architectures. This is a collaborative proposal with the University of Tennessee where our collaborators are responsible for the software framework while we are responsible for the development of new and scalable algorithms. There is a definite need for both. The mathematics involved include Numerical Linear Algebra Scheduling, Numerical Stability, Parallel Algorithms and Complexity Analysis.

The most recent results have exhibited a family of new algorithms for numerical linear algebra. These new algorithms have a very fine granularity and so they provide great parallelism; these algorithms perform a minimum number of communication. Our research can now be found in literature and is referenced under the names “tile algorithms” or “communication avoiding algorithms”.

Currently, Lee Rosenberg (an undergraduate research assistant), Henc Bouwmeester (a graduate research assistant) and Matthew Nabity (GK-12 fellow) are working on the project along with Dr. Langou.

Julien Langou would like to invite any students interested in his research to stop by and see him in the CU Building. He is located in the department on the 6th floor, room 646. Additional information about the project can be found at: http://www-math.cudenver.edu/~langou/plasma.

Example of DAG for a Cholesky Factorization

In future issues, look for information on other faculty members and their research. We hope to introduce you soon to Dr. Diana White. Her NSF funded Noyce scholarships assist math majors who are interested in becoming certified teachers and it’s making quite an impact!
THE PUZZLER by Stan Payne

A point \((x,y)\) of the real plane \(R^2\) will be called a lattice point provided both \(x\) and \(y\) are integers. For each positive integer \(k\) construct a triangle \(T\) with the following properties:

- The three vertices of \(T\) are lattice points:
- The only points on the sides of \(T\) that are lattice points are the vertices of \(T\):
- The area of \(T\) is greater than or equal to \(k\).

Think you can solve it? Email your solution to lindsay.hiatt@ucdenver.edu