THE
N.C. STATE UNIVERSITY
UNDERGRADUATE MATHEMATICS NEWSLETTER

Meet Mette Olufsen

Dr. Mette Olufsen was born in Roskilde about 20 miles west of Copenhagen, the capital of Denmark. After finishing high school, Dr. Olufsen obtained a masters degree in mathematics and computer science at Roskilde University. Roskilde University is one of five Danish universities. It is the smallest and newest university, starting its functions in 1972. The approach at Roskilde University is unique and focused on research and problem-based teaching. Every semester students must complete a term-project in a team of 2-5 students. Dr. Olufsen is still dedicated to problem-based teaching, and has taken this approach with her to NCSU, where she uses her experience both within the Research for Undergraduates (REU) program. Here Dr. Olufsen feels her background at Roskilde has helped her mentor teams of very bright students assigned ten- week projects over the summer. Dr. Olufsen also applies this approach while teaching MA432.

After completing her master's degree, Dr. Olufsen won a one-year fellowship for studying abroad. She obtained the fellowship in a lottery open to all Danish students who obtain master's degrees in mathematics. This fellowship took her to Canberra, Australia where she visited the Australian Defense Force Academy. After Australia she visited the Courant Institute of Mathematical Sciences at New York University where she met an important mentor Dr. Charlie Peskin.

After completing her year abroad, Dr. Olufsen continued working towards her PhD in industrial mathematics. Her PhD was carried out at Roskilde University. She was associated with an EU project devoted to the development of an Anesthesia simulator. Her PhD work was centered on developing an 1D fluid dynamics model for prediction of blood flow in arteries. In particular, this work led to Dr. Olufsen developing one of the first multiscale models of the network of large arteries coupled to another network of smaller vessels. During her PhD studies she went back to NYU for another semester.

After this second visit she was excited about spending a longer period in the US. So, when she had completed her PhD in 1998, she went back to the US for a postdoctoral position at Boston University. After 3 years in Boston, Dr. Olufsen joined NCSU as an assistant professor in 2001. She moved to Raleigh together with her husband Troy Ghashghaei and their daughter Tina. Dr. Ghashghaei worked as a Postdoc at UNC-Chapel Hill but since 2006 has been an assistant professor in the Department of Molecular and Biomedical Sciences, which is located at the Vet-School.

Dr. Olufsen is actively involved in several research projects dedicated to the study of cardiovascular dynamics. She recently became a member of the National Center for System Biology devoted to development of a virtual physiological rat. The center's main location is in Wisconsin, but its' members are spread throughout the globe, in Europe, Australia, New Zealand, and the US. She is currently working with four PhD students, a Postdoc, and one undergraduate student, but is always interested in having more students participate in her projects AS A TEAM!

When not at NCSU, Dr. Olufsen enjoys riding her bike, or spending endless hours going to gymnastics competitions with her daughter Tina, who is competing as a level 6 gymnast. If Dr. Olufsen is not in Raleigh, it is also possible that you can find her back in Denmark, working with one of her old colleagues.

MA 205 (Fall 2012) and MA 493/591 (Spring 2013)
Special Two-Semester Linear Algebra Course
The first semester will concentrate on basic matrix skills as described in MA 205 and the student should have one semester of calculus. The second semester, MA 493 or MA 591, will build on the first semester and will be a little more theoretical. There will also be ample time to do some significant applications with about three lectures on each of the following:

- SVD and image compression,
- Haar transform and introduction to wavelets,
- FFT used in filters and Poisson solvers,
- Sturm-Liouville BVP and eigenfunctions, and
- Previews of related topics.

Students who successfully complete the two-semester course will satisfy the linear algebra requirement and a three-credit math elective. Students who enroll in the graduate level MA 591 will be required to do a project related to the above applications.

More details can be found at www4.ncsu.edu/~white/white/ma205/Special%20Two.pdf

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MA 402 *Computational Mathematics: Models, Methods and Analysis*
Time and Place: 10:15am-11:30am, TuTh, SAS 2102, Fall Semester of 2012
Instructor: Robert E. White, Professor of Mathematics, NCSU, SAS 3140, 515-7478, white@math.ncsu.edu
Prerequisites: Some programming language (MATLAB is preferred), PY 2**, and MA 341 as a co-requisite

One could view this course as numerical modeling using discrete partial differential equations. Numerical models of heat and mass transfer will be carefully considered. This course will give the student an overall view of the computational modeling process.
There will be four group (1, 2 or 3 students) computing projects with written reports, and this will be worth 50% of the course grade. The other 50% of the grade will come from weekly assignments.

More details are at www4.ncsu.edu/~white/white/ma402/ma402hp.htm

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MA 522 *Computer Algebra*
Prerequisites: linear algebra and abstract algebra

The course covers the foundations of the discipline of symbolic computation. It can help undergraduate students in their applications to graduate programs in pure and applied mathematics and in computer science.

See: www4.ncsu.edu/~kaltofen/courses/ComputAlgebra/Fall09/ for the 2009 edition of the course.

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<u>**Advanced Mathematics Courses**</u>
<u>**The following classes may be used as advanced math electives in the Summer/Fall 2012**</u>

MA 351: Introduction to Discrete Mathematical   Models
MA 401: Applied Differential Equations II
MA 402: Computational Mathematics: Models, Methods and
           Analysis
MA 407: Introduction to Modern Algebra for Mathematics
           Majors
MA 408: Foundations of Euclidean Geometry
MA 413: Short-Term Actuarial Models
MA 421: Introduction to Probability
MA 426: Mathematical Analysis II

MA 427: Introduction to Numerical Analysis I
MA 430: Mathematical Models in the Physical Sciences
MA 437: Applications of Algebra
MA 440: Game Theory
MA 444: Problem Solving Strategies for Competitions
MA 511: Advanced Calculus I
MA 522: Computer Algebra
MA 524: Combinatorics I
MA 532: Ordinary Differential Equations I
MA 573: Mathematical Modeling of Physical and Biological
                    Processes

News from the Math Honors Program
By Dr. Sandra Paur

Jacob Ward graduated in December. New students in the Math Honors Program include Khalida Hendricks, Eric McCabe, William Oakley, Phillip Phipps, Laura Poag, Sean Ressler and Alex Ruble. Forty-four students are currently participating in the Math Honors Program and invitations to join the program will be extended sometime during pre-registration. Every year approximately 20-25% of math graduates complete the Math Honors Program and about 80% of those students go on to graduate school. Schools they have attended include Berkeley, Princeton, Stanford, MIT, Cornell, NYU and UCLA. Math honors students have received 13 NSF Fellowships and four DoD Fellowships for graduate school as well as six Goldwater Scholarships and two Gates Fellowships. Besides taking more challenging courses to complete their math degrees, Math Honors Program students also do research either at NC State or in a summer Research Experience for Undergraduates (REU). More than 30 students have completed a study abroad program focusing on mathematics, either at the Budapest Semesters in Mathematics (BSM) or the Math in Moscow Program. Sean Plummer did the Budapest Semesters last semester and Alex Chin is currently participating in the BSM.

Participation in REUs, BSM and similar programs has played a major role in the success of our students in getting accepted into excellent graduate schools. Dr. Paur is happy to talk to any student interested in participating in the Math Honors Program –stop by her office in SAS 3144 or email her at sopaur@math.ncsu.edu for an appointment.

More information about the program can be found on the Math Honors website at www.math.ncsu.edu/honors

Uncertainty Quantification,
An Interdisciplinary Workshop for Undergraduate Students and Faculty
www.samsi.info/workshop/interdisciplinary-workshop-undergraduate-students-and-faculty-may-14-18-2012

Program: 2011-12 Education and Outreach Program
When: May 14, 2012 - 8:15am - May 18, 2012 - 12:00pm

The deadline to apply is April 2, 2012.

Due to space considerations, participation is restricted and will be offered to approximately 30 individuals selected from the applicant pool. Participants are expected to arrive for the workshop on Sunday, May 13, 2012 and remain in continuous attendance until 12:00 pm on Friday, May 18, 2012.

Upon acceptance for the program, individuals must confirm by email within three days their intention to participate (otherwise their place will be given to another applicant). Accepted participants will be advised regarding airfares and will need to purchase plane tickets with a three-week advance fare.

SUM Series -Math and pizza!

The SUM Series features informal talks on mathematical topics. The talks are held Wednesdays from 4:00 to 4:50, in 2102 SAS Hall. You will have a few minutes to help yourself to pizza before the talk. For upcoming topics, check out the SUM Series website: go.ncsu.edu/sumseries. There is a low volume (weekly) email list dedicated to announcements of upcoming SUM Series talks. Instructions for joining the list are on the website.

Mathematics REU program at NCSU
By Dr. Molly Fenn

The department will once again be hosting a group of around 40 undergraduate students from all over the country this summer for its Research Experience for Undergraduates (REU) program in Modeling and Industrial Applied Mathematics. While the projects for this summer's REU are not yet finalized, previous years' topics have included modeling of the effect of environmental toxins on the body in conjunction with mentors from the U.S. EPA; studying financial mathematics and risk analysis with faculty from the Financial Mathematics Master's degree program; modeling blood pressure control, cell growth and rearrangements, and the spread of diseases; and studying randomized matrix algorithms and data mining with faculty members from the department.

Students participating in the program spend ten weeks working on their assigned research project with guidance from faculty, graduate students, and industry mentors. Throughout their time here, students give talks on their research, produce a research poster they can display at conferences during the year, and sometimes write papers to submit for publication in research journals. Our past REU students have had very positive experiences in the program and have won awards at national conferences for the quality of their research posters. Many of them choose to go on to graduate school in mathematics or related fields, and because of the wonderful experience they have in our department, many of them choose to come here for graduate school. The REU program has many benefits for both the students and faculty involved.

More information about the program can be found on the program's website: www.math.ncsu.edu/REU/index.php

My Experience at the UNCG Mathematics Conference
By Alice Toms (Mathematics B.S., Class of 2013)

I was humbled to have presented at my first math conference at UNCG on November 5, 2011. When I arrived, I found that the most interesting aspect was meeting new people because I was happy to network with people outside of North Carolina. Most surprisingly, I had fun presenting because although I was initially nervous, it feels amazing to have the full attention of an audience consisting of students and professors. It's difficult to explain research when the audience only gets a 15 minute glimpse into what I have been working on for months but it helps you practice presenting ideas concisely. What I took away from this conference is that despite how great some of the research can potentially be, it's necessary to have strong communication skills in order to actually make progress in the field of mathematics.

PRESENT YOUR RESEARCH

Francis Marion University, Florence, SC. Friday, March 30th

The Department of Mathematics at Francis Marion University invites undergraduates from across the region to present their research at the Francis Marion Undergraduate Mathematics Conference. The conference will feature undergraduate research presentations and a keynote address from Chris Rodger of Auburn University. To present a talk, register, or get more information, please visit departments.fmarion.edu/mathematics/conference/homepage.htm.
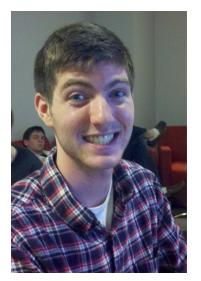
*Registration Deadline for Francis Marion: Friday, March 18,

Have fun with Sudoku!

			3	6		7	5	2
				4			6	9
		7				3		
3			2				9	
		8				6		
	4				1			7
		3				9		
7	9			5				
1	2	5		8	3			

For the Answer Visit:
www.math.ncsu.edu/undergrad/newsletter/

Meet the new SUM Club leader!

For those of you who don't know me my name is James Davis and I'm currently a junior majoring in Applied Mathematics with a concentration in Computer Science. I enjoy logic-based games like chess and cards and I enjoy long distance running. I took part in the Krispy Kreme challenge this year but I was only able to eat nine of the twelve doughnuts. I recently became the president of the Sum club and am very grateful for the opportunity to be able to lead the students involved with Sum club. After the exemplary leadership of last semester's president, Star-Lena Quintana, I am determined to keep up the momentum the club as gained and nurture whatever needs might evolve as the club grows. That is why I'm asking students in the club right now what they would like to see the club be involved in. So far there has been talk about trivia nights between other logic-based clubs like physics, statistics, and chemistry where questions would be based on both clubs' majors. The club is also planning on hosting a number of movie nights featuring free pizza and a movie voted on during club meetings, one of which is the movie *The Matrix*. The club is also open to any suggestions members, old and new, might have whether they be fundraisers or events.

UNDERGRADUATE PROGRAM

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