NC STATE UNIVERSITY

Undergraduate Mathematics Newsletter

Issue 1, Spring 2015

http://www.math.ncsu.edu/undergrad/

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Editor: Trisha Clinkscales

MoSAIC

Mathematics of Science, Art, Industry, Culture

NC STATE UNIVERSITY

The festival of Math & Art is coming to NC State!

Come experience the beauty of mathematics and discover the rich interactions taking place in the interdisciplinary area between mathematics and many other cultural domains, such as the visual arts, architecture, sculpture, origami, dance, music, etc.

The MoSAIC festival includes:

- interactive workshops (balloon twisting, sculpture group assembly, dance composition with algebra)
- mini-lectures
- a mathematical art exhibit
- short films, and
- an area for informal exchange

The events are designed to be easily accessible to all audiences: grades 6-12, teachers, college students, faculty, and general public.

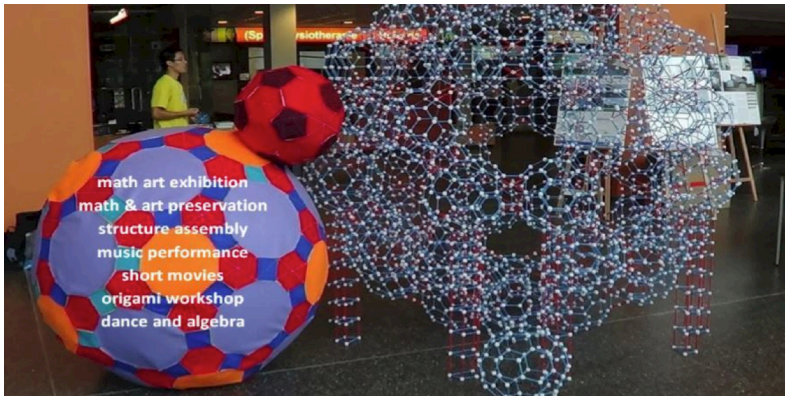
The festival is free and open to the general public!

Host: College of Science & College of Education

Venue: NC State University | SAS Hall

Dates: Friday, March 27, 2015, 10:00 am – 7:30 pm
Saturday, March 28, 2015, 10:00 am – 4:30 pm

- Complete schedule: http://www.mosaicmathart.org/events/ncsu/
- Registration is encourage: http://go.ncsu.edu/mosaic
- Link to Google Maps and Parking Information for Visitors



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Mathematics Courses – Spring 2015

NOTE TO ALL MATH MAJORS:

IF YOU PLAN TO TAKE MA 225 - FOUNDATIONS OF ADVANCED MATHEMATICS FOR THE SPRING SEMESTER ARE **STRONGLY ENCOURAGED** TO ENROLL IN ONE OF THE FOLLOWING SECTIONS:

MA 225.001	MWF	9:10 – 10:00	SAS 1220	Dr. Cooper
MA 225.004	MWF	11:20 – 12:10	SAS 1220	Dr. Fenn

THE CLASSES BELOW MAY BE USED AS ADVANCED MATH ELECTIVES

MA 351. Introduction to Discrete Math Models	10:15 – 11:30 TH	TBA
MA 401. Applied Differential Equations II	11:45 – 1:00 TH	Chertock
	11:45 – 1:00 TH	Norris
	12:25 – 1:15 MWF	Bociu
	1:30 – 2:20 MWF	Haider
MA 408. Foundations of Euclidean Geometry	3:00 – 4:15 TH	Kogan
MA(ST) 412. Long-Term Actuarial Models	3:00 – 4:15 TH	Scroggs
MA(ST) 421. Introduction to Probability	11:20 – 12:10 MWF	Silverstein
MA 426. Mathematical Analysis II	9:10 – 10:00 MWF	Martin
MA/CSC 427. Introduction to Numerical Analysis I	11:20 – 12:10 MWF	Chu
MA 430. Mathematical Models in the Physical Sciences	11:45 – 1:00 TH	Fulp
MA 437. Applications of Algebra	8:30 – 9:45 TH	Sullivant
MA 440. Game Theory	10:15 – 11:30 TH	Schecter
MA 450. Methods of Applied Mathematics I	1:30 – 2:45 TH	Shearer

The following **graduate courses** are offered in the spring and may also be used as advanced math electives:
MA 501, MA 504/OR 505, MA 513, MA 515, MA 518, MA 520, MA 521, MA 522, MA 523, MA 524, MA 526, MA 531/OR MA 532, MA 534, MA(ST) 546, MA 551, MA(BMA) 573, MA(CSC) 580, and MA 584.

Need Access to the Math Undergraduate Lounge? If you are a new or continuing Math Major who has not already requested access to the Undergraduate Lounge, you need to see Di Bucklad in SAS Hall 2108.

COURSE HIGHLIGHTS

MA 331/493: Differential Equations for the Life Sciences

Instructor: Dr. Banks & Dr. Tran

Lecture details: 1:30-2:45, TH, SAS 1220

This course seeks to provide students with an understanding of how mathematics and life sciences can stimulate and enrich each other. In particular, all methods discussed (either analytical or graphical or computational) will be motivated with examples from the biological sciences (such as growth models, kinetics and compartmental models, SIR and other epidemic models, mixing models, cell proliferation, biological switches and clocks, predator-prey) and include first order equations, separable equations, second order systems, vector and matrix systems, linear algebra, eigenvectors, eigenvalues, graphical and qualitative (phase-plane) methods, inverse problems techniques in biology, and numerical techniques. Computational modeling will be carried out using SimBiology, a MATLAB toolbox based graphical user interface, which automates and simplifies the process of modeling biological systems.

The course will provide a solid foundation for more advanced studies of mathematics beyond calculus. After successfully completing MA 331/493, students will be able to

- Give examples of well-known mathematical models of biological systems.
- Formulate and analyze models involving ordinary differential equations.
- Numerically simulate a given ordinary differential equation model using SimBiology.
- Explain how mathematical approaches have informed biological understanding.
- Read and interpret articles in life sciences that use ordinary differential equations to model biological applications.

MA 591: Introduction to Differential Topology

Prerequisites: MA 426 and MA 405 (or 305)

Instructor: Dr. Irina Kogan | http://www.math.ncsu.edu/~iakogan

Let us start with a pop quiz:

Question 1: Is it always possible to bisect any oddly shaped turkey and cheese sandwich with a single cut fairly? (Fairly means that each part contains the same amount of bread, cheese and turkey, measured by volume).

Question 2. Is it true that at this moment of time there are two antipodal points on the Earth with exact same temperature and atmospheric pressure?

The answer to both questions is yes and it follows from a beautiful topological theorem, named after mathematicians Borsuk and Ulam. The theorem states that every continuous function from an n-dimensional sphere to Euclidean n-space maps some pair of antipodal points to the same point. If this sounds interesting and you enjoyed Mathematical Analysis in Several Variables and Linear Algebra courses, come to learn Differential Topology. We will mostly follow "Differential Topology" book by Guillemin and Pollack.

News from the Math Honors Program

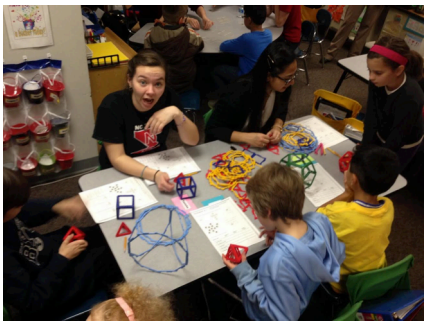
Director: Dr. Sandra Paur

Website: http://www.math.ncsu.edu/honors

Patrick Gallagher and Dustin Leininger graduated in December 2014 and nine students are on track to complete the Math Honors Program in May or over the summer. Alex Hazeltine is doing the Budapest Semesters in Mathematics this semester. New students joining the Math Honors Program since last fall include Yvonne Chazal, Kyle Frid, Taylor Garnowski, Kevin Kristensen, Derek Makous, Gautam Nagaraj, Michael Rose, Diya Sashidhar, Jean-Claude Shore and Matthew Simpson. Thirty-two 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 14 NSF Fellowships and four DoD Fellowships for graduate school as well as six Goldwater Scholarships and three 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 REU Program (Research Experience for Undergraduates). More than 30 students have completed a study abroad program focusing on mathematics, either at the Budapest Semesters in Mathematics or the Math in Moscow Program.

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.

SUM Club --- Society for Undergraduate Mathematics



In January, SUM Club attended the Washington Elementary School Math and Science night. Club members were stationed at different tables with different math related games. As students came through our room, we were able to play games and subtly teach the elementary students small portions of larger math concepts.

The games included drawing 4 lines to connect 9 dots on a 3x3 grid, moving a piece along playing cards (ace, 2, 3,& 4) to demonstrate Markov chains, creating Platonic solids and different variations from shapes, removing certain toothpicks from unique layouts to achieve a goal, and choosing 1, 2, or 3 pieces at a time from a pile of 21 pieces to have your opponent choose the last piece. Club members included (from left to right) David Zavala, Neal Hairston, Sorena Dadgar, Yvonne Chazal, Ben Pierson, Shane Finkel, Amanda Williams, Prem Shah, and Ana Lancaster.

Undergraduate Research Speed Data-ing!

NEW Registration Deadline: March 31!

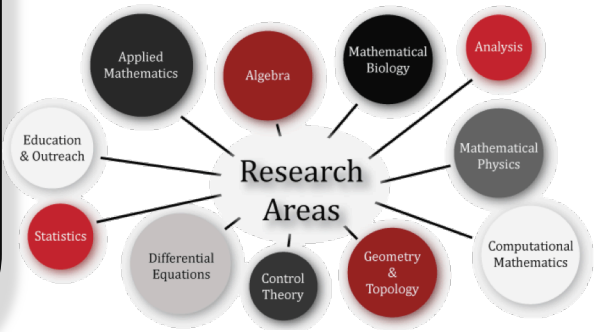
Date: Monday, April 6, 2015, 4:30-6:45pm

Location: Duke Energy Hall in Hunt Library

Registration is a must – even if you have already registered you must register again with the new registration date.

REGISTRATION REQUIRED

http://go.ncsu.edu/speed_data_ing



Financial Mathematics Information Session

Thursday, March 26, 4pm – 5pm

SAS 4201

- Quantitative analysis has brought efficiency and rigor to financial markets and to the investment process and is becoming increasingly important in regulatory concerns.
- Quantitative Finance concerns itself with the valuation of assets and financial instruments as well as the allocation of resources.
- NC State's 18-month Financial Mathematics Masters is known for rigorous training in the core areas of probability, statistics, modeling, investment theory, stochastic processes, and economics.

If your passion is to be in quantitative finance, follow that passion to NC State, where we provide you with the academic understanding and professional services you need to succeed!

financial.math.ncsu.edu

Financial Mathematics@ncsu.edu

Mathematics Colloquium

Frank Morgan, PhD Princeton

Title: Optimal Tilings

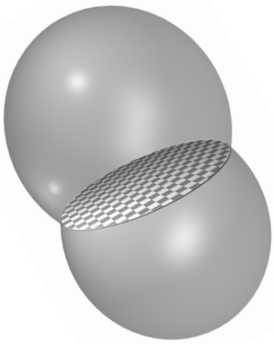
Monday, April 13, 2015 at 4:00 PM

SAS 1102

Tea at 3:30 PM in SAS 4104

Abstract: Regular hexagons provide the most efficient, least-perimeter, unit-area tiling of the plane, as was finally proved by Hales in 2000. Is there a best tiling by pentagons? What about higher dimensions? The presentation will include new results, some by undergraduates, and open questions.

Fourth Annual Kwangil Koh Lecture on Mathematics in Our Time



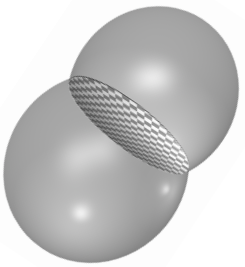
Frank Morgan, PhD Princeton

Title: Soap Bubbles and Mathematics

Tuesday, April 14, 2015 at 4:30 pm

SAS 2203

Reception at 4:00 PM in SAS Atrium



Abstract: Professor Morgan will address how soap bubbles continue to confound and amaze mathematicians - they are a serious topic in mathematics and one with lots of applications. Interestingly, some recent mathematical breakthroughs in this area have actually come from students. The lecture will include demonstrations, explanations, and a little guessing contest with prizes. Fifth-graders and above welcome.

What are you doing this summer? – Betsy Alexieff

Take a class or two?

- When making a decision about taking summer classes, there are lots of options.
- Consult your advisor for appropriate course selection, course load and to find out which option is best suited for your plan of study.
- The Maymester intensive 3-week session offers interesting GEP topics May 11th-May 29th.
- Courses can be taken on campus at NC State, online through NC State Distance Education, at a community college (not limited to the NC Community College System) or at another four-year institution.

Maymester Offerings and Information: http://emas.ncsu.edu/summer/courses/

General Information NC State Summer School Information: http://emas.ncsu.edu/summer/

Summer School Course Catalog: http://www.ncsu.edu/registrar/courses/index.html

NC State Distance Education Courses: http://distance.ncsu.edu/courses/first-summer/

Cooperating Raleigh Colleges: http://www.ncsu.edu/registration/inter-institutional/crc/index.html

Course Equivalencies at a North Carolina Community College: *(Math courses within the major are seldom accepted as transfer credit from community colleges.)

http://admissions.ncsu.edu/apply/admission-review/transfer-admission-review-process/#transfercredits

Other Educational Institution Courses Equivalencies: https://www.acs.ncsu.edu/scripts/ugadmiss/trnsfcrs.pl

Financial Aid Availability

- Financial Aid is available for summer sessions. Please consult the Office of Scholarships and Financial Aid for details: http://financialaid.ncsu.edu/contact-us/

Study Abroad *(Deadline has been extended until March 18th)

- Visit another country and make progress toward your degree.
- Study Abroad experiences have time sensitive deadlines that are quickly approaching.
- If interested in this opportunity, please act now!

Study Abroad Summer Programs: http://studyabroad.ncsu.edu/

Secure an Internship

- Contact The Career Development Center for assistance with a resume and the internship search process.
- Consult with faculty members about internship networking options and leads.
- Research companies, organizations and make an inquiry about possible internship opportunities.

Career Development Center: http://careers.ncsu.edu/

Personal Development Opportunities

- If taking classes, study abroad, pursue an internship are not an option, a standard job will promote workforce skills and enhance the resume.
- Become involved with service in your local community and volunteer your talents a few hours a week.
- Observe a professional in your area of interest.
- Identify and become acquainted with a person in your area of interest who can serve as a Mentor.
- Research Experience for Undergraduates (REUs) with faculty at NC State*(Deadline extended!) If unable to participate this year, begin planning for next summer!

REU Information: https://www.math.ncsu.edu/REU/

ADVISING CENTER

North Carolina State University presents
A Festival of Math & Art

SCHEDULE OF EVENTS

FRIDAY, March 27, 2015

10:00 – 12:00 pm: Art exhibition & Show and Tell with MoSAIC speakers

4:00 – 5:00 pm: Reception

5:00 pm: Welcome remarks & George Hart – Introduction: MoSAIC Festival Project

5:10 pm: Ingrid Daubechies – Lecture – "Math Helping Art Conservation"

5:40 pm: George Hart – Lecture – "From Mathematics to Sculpture"

6:10 pm: Bruce Torrence – Lecture – "Mathematics Meets Photography"

6:40 pm: Radmila Sazdanovic – Lecture – "The Mathematics of Diagrams"

7:10 pm: Bridges Movie Festival

SATURDAY, March 28, 2015

10:00: Anatoly Larkin – "Music: Attack of the Sine Waves (On the Inner Ear)"

11:00 am – 12:30 pm: Parallel interactive workshops

George Hart – Workshop – "Group Sculpture Assembly"

Eve and Bruce Torrence – Workshop – "Fun with Iterative Balloon-twisting"

Ashley White – Workshop – "Applications of Algebra in Dance Composition"

2:00 – 3:30 pm: Parallel interactive workshops

George Hart – Workshop – "Group Sculpture Assembly"

Eve and Bruce Torrence – Workshop – "Fun with Iterative Balloon-twisting"

Ashley White – Workshop – "Applications of Algebra in Dance Composition"

3:30 – 4:30 pm: Panel Discussion

Volunteers are needed!

Contact Dr. Duca at anduca@ncsu.edu

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