

Integral News

LETTER FROM THE DEPARTMENT CHAIR



It's been a long -- but also an exciting -- semester. We hosted the Texas Undergraduate Mathematics Conference with over a hundred undergraduate students. Numerous Sam undergrads presented math talks during this conference and mingled with other students from all over Texas. Colin Adams, as an invited speaker, presented "Blown Away: What Knot to do When Sailing". A panel of mathematicians answered questions about the numerous job opportunities in industry.

Our weekly colloquium series included talks by professors from all over the US, along with some international talks. One of the most exciting talk was by Myron Smoorenburg and Gene Robinson speaking on the use of small unmanned airplanes in search and rescue operations. (They flew their small craft high above the football stadium and took photographs of their audience from high above us. We could watch the pictures from a small computer in a nearby pickup truck!) Their applications of "model airplanes" to Search & Rescue is typical of areas where applications of mathematics and statistics can improve technology and even, possibly, save lives.

The Second Workshop on Constructive Function Theory included mathematicians from the Ukraine, Maryland, Georgia and...Texas. Professors Alford, Babenko, Garcia-Puente and Wang were Sam Houston speakers at this workshop.

Soon we will be recruiting students to work on longterm undergraduate research; other students will have opportunities to work on a research grant in wavelets or receive NSF scholarships. And we always need students to help with math tutoring.

Mathematics is a valuable field, requiring careful logic and creative reasoning. It is both an exciting field and a profession with lots of employment opportunities. So enjoy your classes and do well on those final exams!

And have a white Christmas. Oops - that's right, I'm in Texas. No snow. Still, have a fun and safe holiday season!

--Ken Smith

Mathematics and Statistics Department Happenings

- **5 December** - Study afternoon sponsored by RLMS and the SHSU Student Chapter of the MAA begins at 3:30 pm in LDB 418
- **6 December** - Last day of classes
- **7 December** - Final Exam Study Day
- **10 - 13 December** - Final Exams
- **15 December** - Commencement
- **16 January** - Spring semester classes begin.

PWLS SPEAKER DR. BARBARA SHIPMAN - A STUDENT'S PERSPECTIVE

By Amanda Seitz

Dr. Barbara Shipman of the University of Texas at Arlington visited campus on Monday, September 24, 2007, to share her research with the students and faculty at Sam Houston State University. Dr. Shipman's talk, which was entitled "Manifolds, differential Equations, Honeybee dances, and Physics – Some Unexpected Connections," was the second fall installment of the Piney Woods Lecture Series in Mathematics.

Dr. Shipman began her talk with a brief history of how she came to be a mathematics major as an undergraduate, and how "beautiful" it was the very day she did. She then explained how honeybees perform a "waggle dance" to direct the other honeybees to sources of honey. She continued talking about the use of differential equations and the possible applications of physics in her research. And for the finale, she presented the manifolds which she had found in her research, and pointed out the similarities between these manifolds and the honeybee dance patterns.

About 60 students and faculty attended Dr. Shipman's talk. There was also a reception afterwards, and several students were invited to have dinner with Dr. Shipman later that evening, where they could ask questions about her research and the experiences of being a mathematician.

I personally enjoyed Dr. Shipman's lecture. It was great to hear her discuss her research with such enthusiasm, and it was fun to see how she connected manifolds to

I was able to talk to Dr. Shipman later that evening at dinner, where she explained the solution to a common analysis problem. Overall, it was a wonderful experience.

Amanda Seitz is a junior mathematics major, statistics minor. Amanda has presented talks at the 2007 Meeting of the Texas Section of the MAA and Math Fest 2007. She is currently working on an undergraduate research program with Dr. Rebecca Garcia on Dr. Garcia's CURM grant.

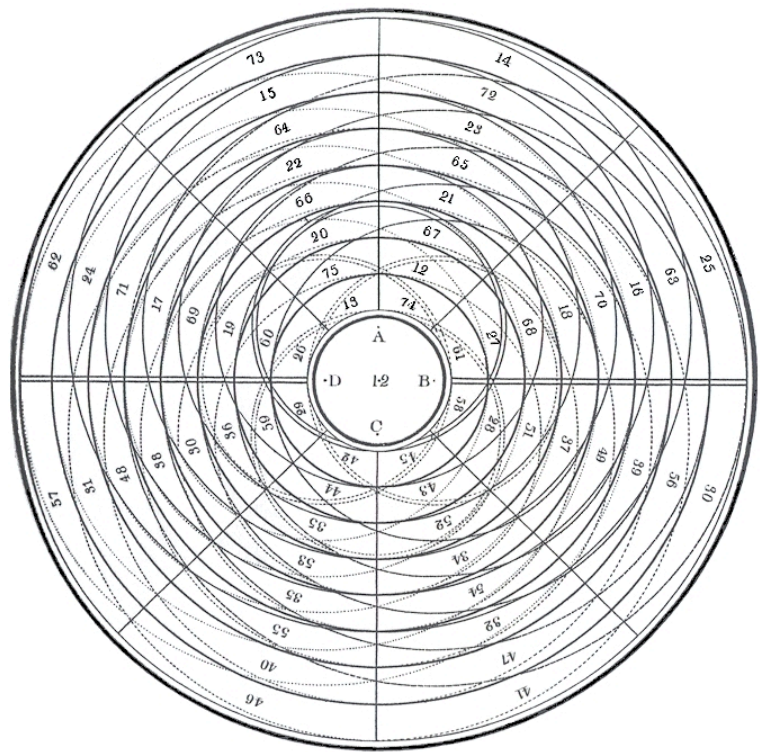


honeybee dance patterns.

SHSU STUDENTS EMBARK UPON CURM RESEARCH

By Rebecca Garcia

The Center for Undergraduate Research in Mathematics (CURM) at Brigham Young University (BYU) is a program funded by BYU and the National Science Foundation (NSF) to promote undergraduate research in mathematics throughout the United States. CURM awards mini-grants each year to professors at various institutions which would assist them in training professors to be mentors for undergraduate research, in assisting the undergraduate participants financially so as to be able to devote more time to the research project, in providing travel funds for the research group to the Spring Mathematics Conference at BYU, and in offering general support to the satellite research group on issues related to undergraduate research. In March 2007, our own Dr. Rebecca Garcia was one of the fifteen professors selected out of a pool of approximately eighty applicants to receive the mini-grant. She is working with Stefanie Meyer, Stacey Sanders, and Amanda Seitz on an undergraduate research project in algebraic combinatorics.



<http://www.pasles.org/circle.html>

The project is on applying the computational tools of commutative algebra to enumerating and constructing Franklin magic circles. A Franklin magic circle is very similar to the well-known magic square. A magic circle is an arrangement of numbers in a circular grid where the sum of the numbers around a ring is the same as the sum of the numbers along a radius. A Franklin magic circle is a magic circle which satisfies additional (and rather complex) properties. The first appearance of a Franklin magic circle was given by our founding father Benjamin Franklin in 1752 in a private letter. The first part of our project was to define a magic circle and to give a working definition of a Franklin magic circle. To date, there is no such definition. The next step is to use the tools of computational commutative algebra to find the building blocks of a Franklin magic circle, known as the minimal Hilbert basis. These basis elements will provide an easy way of constructing any Franklin magic circle. Finally, we will use various techniques found in Dr. Maya Ahmed's 2004 doctoral dissertation to unravel the mystery of counting the number of Franklin magic circles with a given magic sum, which involves learning some theory behind Hilbert series and polynomial algebra and the use of two computer algebra systems, 4t2 and Singular.

PROBLEM OF THE MONTH



What is the longest bowling alley that can be put in a 30 foot by 50 foot rectangle (assume the bowling alley is exactly 5 feet wide)?

The first undergraduate student to submit a correct solution to Dr. Jensen in 410 LDB will win a free pizza! (sponsored by SHSU student chapter of the MAA)

PWLS - DR. KATHERINE SOCHA

Dr. Katherine Socha of St. Mary's College of Maryland visited SHSU on October 24, 2007 to present the final edition of the Fall 2007 Piney Woods Lecture Series. Dr. Socha presented a talk entitled *Moving in Circles*. This talk allowed Dr. Socha to discuss the connections between various mathematical topics and circles (her favorite geometric shape).

She shared a "new" proof of the Pythagorean Theorem which relied heavily on knowing the area of circles. This proof was one of the most recent proofs of the



Pythagorean theorem!

After her talk, students and faculty joined Dr. Socha for a reception sponsored by the Department of Mathematics and Statistics.

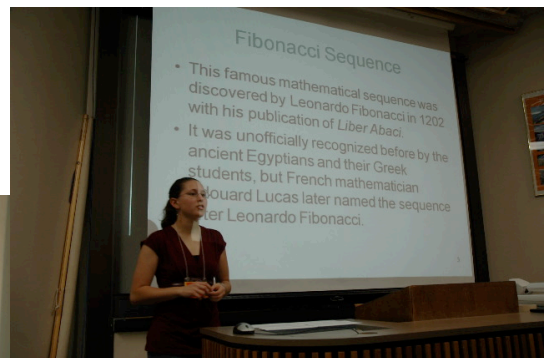
The Piney Woods Lecture Series will continue in the Spring. For more information, see http://www.shsu.edu/~mth_jaj/pwls.



DO YOU HAVE AN ARTICLE TO CONTRIBUTE TO THE NEWSLETTER?

If you have an article or a topic for an article which should be in the next edition of the *Integral News*, let Dr. Jensen (410 LDB or jensen@shsu.edu) know. Also remember to nominate your favorite geek for Math Nerd of the Month!

IMAGES FROM THE TUMC - 3 NOVEMBER 2007



TUMC - A STUDENT'S PERSPECTIVE

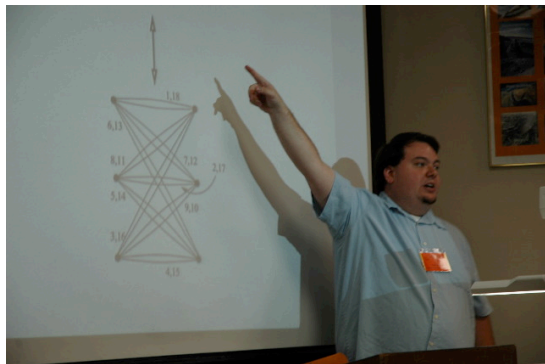
By Philip Bradley

I thought the conference was extremely well organized, and everything was way better than I had expected it to be. I found there to be ample opportunity to learn from a wide variety of topics. Personally, I went to see the following talks: The Three Models of Hyperbolic Geometry, Morse Theory From a Combinational Point of View, Minimal Surface Symmetries, and Learning to Divide during the first section of student talks. It was hard to take a lot of notes because of how fast the talks were, but I felt like it was a good introduction to topics which I had never heard of before. I learned that a non-degenerate critical point is where $f'' = 0$, and that in a partial derivative you treat a variable as if it's a constant.

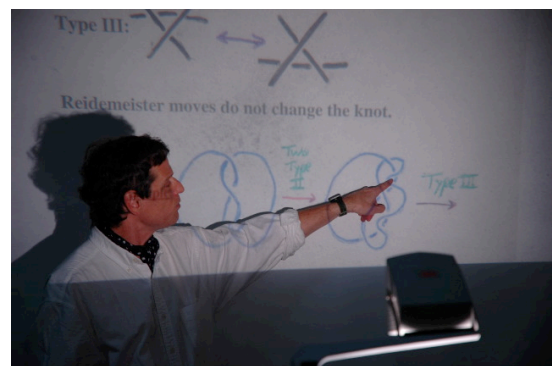
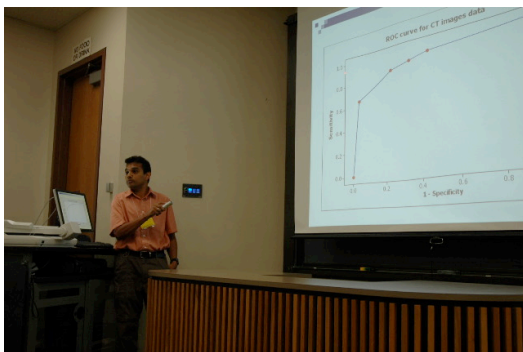
I loved the first Keynote speaker, his presentation really helped me to understand the basics on knot theory (such as the tri-coloration, and the trivial knots, also the modular thing).

Lunch (catered by Farmhouse) was amazing!!! I had seconds of the poppyseed chicken, and would have had more, but I was so full!

In the second set of student talks, I went to: Billiard Mathematics, the KdV Equation (which was extremely eye-opening), Mathematics Behind Basic Enhancements of Digital Images, How Long is the Coast of Britian (I love fractals, so this one was especially good and the student giving the talk is in my CS class too!), and See the Constellation: Mathematical Connections. This last talk was my favorite, because he was funny, and the talk connected mathematics to everything we could think of.



The panel discussion at the end was the thing that really helped me decide that i wanted to stay as a math major. It was extremely helpful to hear from people in the real world who have different backgrounds and different jobs with a mathematics degree.



NEWS FROM THE MATHEMATICS PROGRAM

By Dr. Jacqueline Jensen

On September 22nd, the Ruth Lane Mathematics Society participated in the American Heart Walk on the SHSU campus. This is the sixth consecutive year that RLMS has participated in this important event. This year, they had 9 walkers and raised \$1050 for the American Heart Association!

On September 24th, Dr. Barbara Shipman of the University of Texas - Arlington came to campus to present "Manifolds, Differential Equations, Honeybee Dances, and Physics - Some Unexpected Connections" as the second speaker this year in the Piney Woods Lecture Series. Approximately 60 students attended her lecture, and about 30 student attended a reception after her talk. Dr. Shipman then had dinner with 10 female undergraduates, where they discussed mathematics, graduate school, and careers.

On October 24th, Dr. Katherine Socha from St. Mary's College of Maryland presented the third and final fall edition of the Piney Woods Lecture Series. Dr. Socha spoke about "Moving in Circles," her favorite geometric shape. Approximately 70 faculty and students attended her talk, which was followed by a reception in her honor. That evening, Dr. Socha had dinner with eight undergraduate women.

These Piney Woods Lecture Series events are sponsored by the Mathematical Association of America and the Tensor Foundation. The receptions are funded by the College of Arts & Sciences at SHSU. The Piney Woods Lecture Series will continue in the spring 2008 semester with at least three more speakers. See http://www.shsu.edu/~mth_jaj/pwls for more information.

SHSU hosted the Third Annual Texas Undergraduate Mathematics Conference (TUMC) November 2-3 2007. This year's conference was bigger and better than ever with more than 130 faculty and students pre-registered for the event, and thirty speakers presenting contributed talks. This year's conference featured an invited address by Dr. Colin Adams of Williams College. Dr. Adams presented "Blown Away: What Knot to Do When Sailing." This talk was attended by all TUMC attendees and a number of other students. Another highlight was the keynote address by Dr. Richard Tapia of Rice University entitled "Promoting Students' Appreciation For Math Through Applications to Very Cool Activities." This talk followed a welcome to campus by department chair Dr. Ken Smith and Dean of the College of Arts and Sciences Jaimie Hebert. Another highlight of the conference was the panel discussion, featuring Brad Ramirez of Segal Company, Barbara Jordan of Sewell, Netherland, & Associates, Jennifer McCloud-Mann of the University of Texas at Tyler, and Lesley Wilson of Fairfield Industries. More details about the conference, including conference photos are available online at http://www.shsu.edu/~mth_jaj/tumc.

NEWS FROM THE MATHEMATICS EDUCATION PROGRAM

By Dr. Mary Swarthout.

The mathematics education group has been focused on making plans for a preconference event to be held prior to the annual *Conference On The Teaching Of Mathematics 6 – 12* on February 1–2, 2008. The meeting, to begin on Thursday evening, January 31st and continue through Friday, February 1, will bring together mathematics education faculty from institutions of higher education to discuss issues regarding mathematics education research under the banner of MERIT [Mathematics Education Research in Texas]. This inaugural event is being supported by the Department of Mathematics and Statistics, the Daniel H. Reeves Center for Mathematics Education and the Office of Graduate Studies and is intended to be the first of a series of annual conferences that mark Sam Houston State University as a major center for mathematics education in the state of Texas. The MERIT conference will create an opportunity for dialogue among state mathematics educators interested in addressing current research issues and in collaboration on future research projects in Texas.

The major speakers on the program for the annual *Conference On The Teaching Of Mathematics 6 – 12* to be held on February 1–2, 2008 have been set. Dr. Cathy Seeley, past president of the National Council of Teachers of Mathematics and a Senior Research Consultant for the Dana Center, Austin, Texas, will be presenting a talk for the opening session of the conference on Friday afternoon. Dr. Paul Kennedy from Colorado State University will be speaking at the closing session on Saturday afternoon. Interested in being a speaker? Contact Dr. Max Coleman for speaker form and conference registration information.

The National Council of Teachers of Mathematics [NCTM] will be holding a regional conference in Houston on November 29 and 30, 2007. Drs. Cory, Jasper, Jones and Swarthout will all be speaking as a part of the program. In addition, about 30 undergraduate students will be attending the conference and have become new student members of NCTM. Dr. Jones has done a great job in recruiting and encouraging this professional experience for SHSU students.

Dr. Zientek and Distinguished Professor Bruce Thompson's article, "Applying the Bootstrap to the Multivariate Case: Bootstrap Component/Factor Analysis", was published in the journal *Behavior Research Methods*.

Drs. Jones and Swarthout presented a colloquium talk to the department on November 14. They shared some of the research process for a current project investigating preservice teachers understanding of function. This work continues during the Fall 2007 semester and further results will be shared at a national meeting during February 2008.

Dr. Linda Zientek, chair, and Dr. Bill Jasper have been active as a part of the Texas Partners in P-16 Mathematics working group that is addressing issues related to the transition from high school to college mathematics. This group, organized by the Higher Education Coordinating Board and including members from the Dana Center, a variety of two- and four-year colleges and universities, and school districts will continue to focus on college readiness for students in Texas.

NEWS FROM THE STATISTICS PROGRAM

By Dr. Cecil Hallum.

This year marks the 12th anniversary of the Program in Statistics and it is exciting to report that the 2007 August commencement marked the graduation of the 54th graduate student to complete the M.S. degree in Mathematical Statistics. The map in Dr. Hallum's office depicts the geographical location of 39 of these 54 graduates (one map pin per graduate – the other 15 pins will be there eventually). “Word of mouth” from our previous graduates is proving to be an especially effective means for attracting new graduate students into the Program in Statistics. The minor program is continuing to grow as well; the current cohort of students seeking the minor is our largest.

Since the last newsletter, Dr. Stephen Scariano of Loyola University in New Orleans came to campus for a two day visit; he is doing separate research efforts with Drs. Holt and Bandulasiri. He also gave a colloquium related to “statistical process and quality control”. He will be back on campus on November 16, 2008 to continue these research activities.

During March, 2008, SAS Institute of Cary, North Carolina has selected the SHSU Program in Statistics for profiling and reporting in their Student Newsletter which is distributed globally. Elizabeth Ceranowski, Student Programs Manager at SAS Institute, and possibly other SAS representatives, will be on campus either the week prior to or the week following the 2008 SAS Global Forum which is being held in San Antonio during the week of March 16-19, 2008. The Global Forum is the yearly international conference (held last year in Orlando, Florida). SAS, the acronym for “Statistical Analysis System”, is one of the most comprehensive statistics packages in the world and one used extensively in the Program in Statistics at SHSU. The profiling effort by SAS Institute will consist of documenting considerable information about the Program along with the interviewing of undergraduate students that have chosen statistics as their minor, the interviewing of graduate students pursuing the M.S. in Statistics and the interviewing of faculty as well.

As a part of the Departmental colloquium series, we were especially pleased to host the November 5, 2008 visit and presentation by RP Flight Systems (RPFS) of Wimberley, Texas. RPFS provides a valuable service to EquuSearch, which is known world-wide for their efforts in the field of Search and Rescue/Recovery in searching for missing bodies. When someone goes missing anywhere in the world, Texas EquuSearch often-times gets the call to assist. And when Texas EquuSearch needs airborne locating tools, they employ the RPFS Unmanned Airborne Vehicular (UAV) aircraft. Gene Robinson (President of RPFS) and Myron Smoorenberg (Chief Test Pilot) gave an especially interesting presentation that provided details of several successful RPFS missions. At the end of the formal presentation, attendees adjourned to soccer field 3 to witness an actual flight of the UAV drone. This visit also was the initiation of a research dialogue with RPFS in support of identifying and carrying out research efforts to aid in the detection of objects (e.g., missing persons) from the use of digital photography. Seth Demel is the third graduate student in the Department (Jason Minter and Huixing He did so initially) to do research directly related to the type of search and recovery missions of interest to RPFS; Seth is currently completing a literature survey of statistical means and methods for doing “object detection” as a part of his thesis.

Along other lines, Dr. Hallum was recently contacted by Professor Randall Rieger of West Chester University in West Chester, Pennsylvania to be a candidate to review the statistics program on their campus. He explained that they are starting an external review process and they are looking to us for insight since their program is very similar to ours. How this progresses waits to be seen but, hopefully, there is something for us to gain from such an experience as well – we will soon see. GO BEARKATS – get SASsy!!

WHO IS....DR. LINDA ZIENTEK?

By Robin Kubn

Dr. Linda Zientek was born and raised in Brenham, Texas, where she grew up on a dairy farm. Her favorite hobby is doing counted cross-stitch and her favorite vacation spot is Destin Beach in Florida. She has three children whose ages are 19, 20, and 22. Her 19 year old daughter is attending Blinn College but is planning to come to Sam Houston State University in the near future. Dr. Zientek also has a Maltese puppy named Precious and three cats that her daughter saved from an abandoned building.



Dr. Zientek received a Bachelor of Science and a Masters of Science in mathematics from SHSU and received her Ph.D. in Curriculum and Instruction from Texas A&M University. Dr. Zientek taught at Blinn College until this fall. She accepted a position at Sam Houston State because she went to school here and liked the environment and the school itself. She also felt that working at SHSU would give her an opportunity to conduct research about teacher quality, particularly focusing on mathematics and science teachers, while teaching at the same time. She chose to teach mathematics because she liked the subject and believes it is important for students to understand mathematics. She feels that teaching mathematics gives her the opportunity to help students in this area.

JUST FOR FUN**Problem 1**

Consider the number 12355699. If we write each of the digits in this number on separate slips of paper, put them in a bowl, and draw three of the numbers at random, without replacement, what is the probability that the sum of the numbers drawn will be even?

Problem 2

A regular tetrahedron has edges 36 units in length. What is the altitude of the tetrahedron?

Problem 3

Consider numbers written in base b , where b is between 2 and 9, inclusive. Clearly indicate how you can tell quickly whether the number b is odd or even. Justify your claim.