The Fifth Adventures in Mathematics

– Mathematics and Arts

FUN ACTIVITIES • FRIDAY, FEBRUARY 17, 2017 • 8:20 AM – 3:00 PM

Adventures in Mathematics (AIM), a finalist of the 2015Tech Titans Award (http://www.techtitans.org/)-the Future University, is an annual event organized by the Department of Mathematics at Texas A&M University Commerce for high school math teachers and their students. They will be involved in hands-on activities in math, listen to talks on math careers, watch planetarium shows, tour campus, and experience a lunch in the student cafeteria. The purpose of AIM is to increase students' interests in learning Mathematics and offer teachers examples, methods and stories, which can be used in classrooms. High school teachers may receive a certificate of Continuing Professional Development Units upon request. A registration fee of $3 per participant (including teachers) is required that covers all activities, refreshments and lunch. High schools are responsible for their transportations to Commerce, TX.

For AIM, we also organize the Northeast Texas Algebra Competition (NTAC) at the level of algebra II. High school students led by their teachers are eligible to participate. In addition to individual awards, team awards will be given to the top three teams. A team score is determined by the sum of the top four scores of each team. At the end of AIM, competition awards and door prizes will be presented. Winners will receive a gift card of $25 donated by L-3 Communications, and one of the following prizes.

- **First Place: A TI-84, a scholarship of $1,000**
- **Second Place: A scholarship of $800**
- **Third, Fourth, Fifth Place: A scholarship of $500**
- **10 Honorable mentions**

  (*To receive the scholarship, a student must attend Texas A&M University Commerce as a fulltime math major.*)

To help us prepare sufficient food and parking permits, please RSVP by Monday, February 6, 2017. Contact Dr. Tingxiu Wang (tingxiu.wang@tamuc.edu, or 903-886-5958) for questions.

Where:	**Sam Rayburn Student Center** **Texas A&M University Commerce** **Commerce, TX 75429**
8:20am - 8:50am:	**Registration**
8:50am - 10:00am:	**Northeast Texas Algebra Competition, breakout sessions, 3D-Printing, planetarium, Campus tour**
10:00am – 11:10am:	**Welcome and Keynote: Origami in Mathematics, Science, and Education by Dr. Lang**
11:10am- 2:15pm:	**Lunch, breakout sessions, 3D-printing, planetarium show, campus tour**
2:15pm – 2:45pm:	**Competition awards and door prizes (graphing calculators and other gifts)** **(winners need to be present for door prizes)**

DESCRIPTION OF ACTIVITIES

NORTHEAST TEXAS ALGEBRA COMPETITION (NTAC), 8:50 AM – 10:00 AM

The Northeast Texas Algebra Competition (NTAC) is at the level of algebra II. Each school can have up to 10 students participating in NTAC with two alternates. The alternates may participate if there are extra clickers available. There will be 60 questions and students will have 20 seconds for each question. No pencils, paper or calculators are allowed during the competition. A student will work these questions in his/her head and submit answers with a "clicker."

Keynote Speaker: Dr. Robert J. Lang

From Flapping Birds to Space Telescopes: the Art and Science of Origami
http://www.langorigami.com/

The last decade of this past century has been witness to a revolution in the development and application of mathematical techniques to *origami*, the centuries-old Japanese art of paper-folding. The techniques used in mathematical origami design range from the abstruse to the highly approachable. In this talk, Dr. Lang will describe how geometric concepts led to the solution of a broad class of origami folding problems – specifically, the problem of efficiently folding a shape with an arbitrary number and arrangement of flaps, and along the way, enabled origami designs of mind-blowing complexity and realism, some of which you'll see, too. As often happens in mathematics, theory originally developed for its own sake has led to some surprising practical applications. The algorithms and theorems of origami design have shed light on long-standing mathematical questions and have solved practical engineering problems. Dr. Lang will discuss examples of how origami has enabled safer airbags, Brobdingnagian space telescopes, and more.

Robert J. Lang is recognized as one of the foremost origami artists in the world as well as a pioneer in computational origami and the development of formal design algorithms for folding. With a Ph.D. in Applied Physics from Caltech, he has, during the course of work at NASA/Jet Propulsion Laboratory, Spectra Diode Laboratories, JDS Uniphase and as an independent consultant, authored or co-authored over 100 papers and 50 patents in lasers and optoelectronics as well as authoring, co-authoring, or editing of 25 refereed papers, 16 books, and a CD-ROM on origami. He is a full-time artist and consultant on origami and its applications to engineering problems but keeps his toes in the world of lasers and served as the Editor-in-Chief of the *IEEE Journal of Quantum Electronics* from 2007–2010. He received Caltech's highest honor, the Distinguished Alumni Award, in 2009 and was elected a Fellow of the American Mathematical Society in 2013.

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The following activities will be held at the same time for 50 minutes and then repeated.

Activity I: Sculpting Mathematical Patterns in Creative and Magical Ways by Adam Bowden and Rebecca Steward
Description: These mystical math demonstrations paint a picture of magic. However, math connections will be drawn between what appears to be a mystery and the mathematical patterns that exist.

Activity II: *i*Art by Dr. Mehmet Celik
Abstract: A mathematical concept need not exist in reality; it is an idea, a model of reality. As Polish-American philosopher Alfred Korzybski put it "the map is not the territory". The Imaginary unit, *i* is one of the two solutions of $x^2 + 1 = 0$. Do you think imaginary numbers are *"impossible"?* This presentation will show how useful and important the imaginary numbers are.

Activity III: Topologists, Geometers and Surgeons (TGS) by Dr. Ye-Lin Ou
Description: What is Topology? What is Geometry? What is the difference between the two groups of mathematicians who study these subjects? Dr. Ye-Lin Ou will give you some answers through some performances and some conversations among topologists, geometers and surgeons.

Activity IV: The World of Fractals by Donna Holt
Description: Join us in fractivities associated with interesting aspects of fractal geometry. We will construct physical and virtual fractals, and investigate the underlying mathematics and overarching beauty of fractals and their applications.

Activity V: Student forum led by Dr. Pani Seneviratne
Description: university students will have a forum about campus life, extracurricular activities, math clubs, Greek life, undergraduate research and career options.

Activity VI: Math Club Activities by Arianna Lira, Meghan Regodon, Michael Ross, and Chelsey Williams
Description: Math Club members will present creative, interactive and alive math fun activities. Participants will have the opportunity to witness and to experience for themselves the creative aspects of mathematics. Those activities offer a glimpse of the fascination and delight a mathematician experience in thinking about mathematics.

Activity VII: 3D-Printing by Perry Moler
Description: In a computer lab, students will learn about 3D-printing, and then select a graph to print. Seating is limited, and admission tickets are required.

Activity VIII: Campus Tour
Description: Touring the campus of Texas A&M University-Commerce can take hours. However, during this 50-minute tour, students will be guided through the central part of the campus and visit the departments of Biology, Chemistry, Engineering and Technology, and Physics, including the labs.

Activity IX: Planetarium Show, Asteroid: Mission Extreme

Description: Asteroid: Mission Extreme takes audiences on an epic journey to discover the possibilities that asteroids present for space travel. Using stunning visuals and state-of-the-art computer graphics, the film presents the fascinating idea, based on real science, that asteroids could be used as stepping stones to other worlds, veritable "way stations" in space enabling us to cross the entire solar system. As with any venture in outer space, the challenges involved with making this idea a reality are enormous; however, a mission this extreme could ultimately lead us to learn how to protect our planet and how to successfully inhabit other worlds. Explore what it would take for astronauts to reach an asteroid and then tame it for our use, as well as how such an extraordinary adventure could benefit humankind, in Asteroid: Mission Extreme. Seating is limited and admission tickets are required.