Emmy Noether Day –05/15/19

Room 016

Music is math. Sounds good? Speaker: *Dr. Giorgio Bornia*: Music is the place where sounds meet feelings. We play music because we feel. We listen to music because we feel. And guess what? Mathematics - apparently such a cold discipline - takes part in this emotional process. We will explore the world of music through mathematics. In this journey, a good old companion will lead us: the guitar.

Room 109

Parallel lines never meet, or do they? Speaker: *Dr. Lars Christensen*: We learn in geometry class that parallel lines never meet, but every time we let our eyes follow a straight stretch of highway all the way to the horizon, we doubt it. Of course mathematics has a way to make sense of what we see. In projective geometry, two parallel lines do meet in a point infinitely far away! And, actually, a line and a parabola always have two intersection points, provided that one looks carefully and counts properly.

Room 111

Next Up! Speaker: *Dr. Raegan Higgins*: This will be a hands-on introduction to difference equations. We will introduce a variety of basic sequences and see how to establish recursive relationships.

Room 112

Carthage, Oxhide, and Mathematics. Speaker: *Dr. Hung Tran*: We talk about the legendary foundation of Carthage by Queen Dido, based on a piece of oxhide and some clever mathematics. It is an example of a broader theme of optimization problems which have several practical applications. There will be soap bubbles, architecture, and fun.

Room 010

"The city of Lubbock is running away!" *Dr. Dimitri Volchenkov*: Cities are among the largest and most complex artificial networks created by human beings. At the same time the city is the ever biggest communication editor that determines not only our present social and economic well-being but for those generations to come, as providing an interface for our everyday mutual interactions. The speed and scale of urban growth require urgent global actions to help cities prepare for growth and to avoid them of being the future epicenters of poverty and human suffering. Recently, we have accomplished a study on urban dynamics of Lubbock. Due to structural factors of early urban development, our city runs south-west at a speed of about 200 yards per year that determines not only our present social and economic well-being but for those generations to come. The Texas Tech University is anchored in its historical campus and cannot follow the city running away. Situated on the boundary of urban areas going downhill, the University should search for a partnership with the Lubbock City Council and state government for a major downtown expansion of its campus in the neighborhoods falling into disrepair and decrepitude.

Room 114

How fast can you react? Speaker: ***Dr. Min Wang***: During the workshop, we will find several student volunteers to collect their reaction time data using online tools and then present the basic idea of statistics to how to display and analyze the data and make comparisons among different data sets. This activity will help students gain some insights about applications of statistics in daily life.

Room 113

Project Lazarus: Speaker: ***Dr. Brock Williams:*** This session will be a hands-on introduction to LAZARUS, the *Lab for the Analysis of Zombie Activity and Research into Undead Simulations*. We'll discuss the math we use to model zombie outbreaks. We'll visit the lab's GPU cluster so you can see how a supercomputer is constructed. Finally, we'll describe the outreach mission of the lab and do some hands-on experimentation with our web resources.

Workshops for Teachers (room 115) 10-10:45 and 11-11:45 am

An Invitation to Projective Geometry. Speaker: ***Dr. David Weinberg*****:** By introducing a new system of coordinates, a new world of geometry is revealed. The projective line, the projective plane, and points at infinity will be explained. We will see why there are no parallel lines in projective geometry (they intersect at infinity). Time permitting, we will see the great unifying power of projective geometry by studying conic sections in the projective world.

Is there a perfect exam question? Speaker: ***Dr. Jerry Dwyer*****:** This talk explores issues of assessment in mathematics. Is it possible to design an exam question that tests deep conceptual knowledge of a topic? Are exams the best way of testing students' content knowledge? Is there any merit in multiple choice tests? Should teachers be graded on their students' test scores?