

# M\*A\*T\*H COLLOQUIUM

Wednesdays 4p.m. Darwin 103

THE MATHEMATICS DEPARTMENT OF SONOMA STATE UNIVERSITY PRESENTS A SERIES OF INFORMAL TALKS OPEN TO THE PUBLIC

“Mathematics is the process of turning coffee into theorems” –Paul Erdős

- Sep 6 **DESCARTES TANGENT LINES.** BILL BARNIER, SONOMA STATE UNIVERSITY  
A tangent line that intersects a given curve exactly once (only at the point of tangency) is called a Descartes Tangent Line. Question: For  $n$  a positive integer, can you find a curve that admits exactly  $n$  Descartes Tangent Lines? This talk will be very graphical and should be accessible to any student who has had experience with graphs of functions. [☺ Pizza after talk ☺]
- Sep 13 **COOKIES, CARS AND STATISTICAL PROCESS CONTROL.** Susan Herring, Sonoma State University  
If you have ever gotten home from shopping to find the item you purchased was defective then this talk will be of interest to you. Find out the difference between quality control, quality assurance and statistical process control. Applications of statistical process control will be discussed in fields as diverse as manufacturing, teaching and baking cookies.
- Sep 20 **GEOMETER'S SKETCHPAD<sup>®</sup> IS YOUR FRIEND.** Sam Brannen, Sonoma State University  
The speaker will display the power and beauty of Geometer's Sketchpad<sup>®</sup> through a series of demonstrations, including the constructions of fractals and tessellations.
- Sep 27 **MATHEMATICAL MYSTERIES OF SUDOKU.** Rick Luttmann, Sonoma State University  
The speaker will discuss the origins of Sudoku, techniques of solution for both people and computers, how to create puzzles, and some interesting quantitative questions (some answered, some still open) such as how many puzzles are there, how many completed grids are there, and what is the minimum number of clues that will determine a unique solution. [☺ Pizza after talk ☺]
- Oct 4 **MATH IN THE MOVIES.** Jeff Clark, Santa Rosa Junior College  
Have you ever sat down and watched a movie, heard or seen some mathematics spoken or demonstrated and wondered if it was said or done correctly? In this talk you will be shown clips from movies such as Contact, U571 and Castaway and see if Hollywood got it right.
- Oct 11 **CHEMICAL SYNAPSES AND CELL COMMUNICATION - THE HODGKIN-HUXLEY APPROACH.** Sunil Tiwari, Sonoma State University  
The speaker will discuss a Nobel prize winning experiment by Hodgkin and Huxley in medicine (1963) and will give a mathematical explanation of cell-to-cell communication involving chemical synapses. Synapses are circuits in which the neurons of the central nervous system interconnect. They are thus crucial to the biological computations that underlie perception and thought.
- Oct 18 **THE STATISTICS OF STUDENT SUCCESS.** Cora Neal, Sonoma State University  
Learn about the field of Institutional Research as we look at decisions all universities have to make and the problems they face. Several statistical techniques will be used to investigate a data set involving Native Alaskan students at the University of Alaska Anchorage.
- Oct 25 **KNOWING MATHEMATICS AND TEACHING MATHEMATICS.** Rick Marks, Sonoma State University  
A teacher of mathematics calls upon a specialized knowledge of mathematics that is different from the mathematical knowledge of a layperson, a teacher of other content areas, and even a mathematician. This pedagogical content knowledge has ties to epistemology, learning theory, educational policies and standards, research, and teacher preparation. We will explore this idea from a variety of perspectives, both theoretical and practical.
- Nov 1 **TEACHING HIGH SCHOOL MATH – REWARDS & PERILS.** Yolanda Woods, Emily Savinar-Nogue, & Sean Gregory, Napa High School  
Three teachers from Napa High will discuss the difficulties and joys of their chosen vocation and how their schooling and experience have contributed to what they know about the science and art of teaching mathematics. Issues such as No Child Left Behind and the emphasis on high stakes achievement tests, quality teaching and the search for “highly qualified” teachers, along with teacher shortage will also be discussed. [☺ Pizza after talk ☺]
- Nov 8 **LAWS OF SINES AND COSINES AS TAUGHT BY BARTHOLEMAUS PITICUS (1561-1613).** Clement Falbo, Professor Emeritus, Sonoma State University  
In 1595, Bartholemaus Piticus wrote a popular Trigonometry text that went through six editions, over a period of 35 years. We will reconstruct his proofs for the laws of sines and cosines from fragments of his 1612 edition. The derivations are interesting applications of “circle geometry.” We will use these laws to prove a theorem invented in 2005.
- Nov 15 **MATHEMATICAL ECOLOGY AND LANGUAGE COMPETITION.** Ben Ford, Sonoma State University  
Your country's native language (Irish, French, . . .) is threatened by competition from another language (likely English!). If preserving the local language is important, what options do you have? Which of them are most likely to be effective? How much time do you have before the language is effectively dead? We'll look at tools from mathematical ecology that have been adapted to help explore these and other questions from the social sciences.
- Nov 22 **THANKSGIVING RECESS**
- Nov 29 **MATHEMATICAL MODELS FOR MUSICAL SOUND.** Rick Kavinoky, Santa Rosa Junior College  
The wave equation (a differential equation) in one and two dimensions determines the modes of vibration of musical instruments, for example strings (one dimension) and drumheads (two dimensions). Fourier series help to analyze, compress, and reconstruct the sound.
- Dec 6 **THE KAUFFMAN-HARARY CONJECTURE FOR TURK'S HEAD BRAIDS.** Nick Dowdall, Sonoma State University  
The Kauffman-Harary Conjecture (KHC) is an open conjecture in knot theory concerning “Colorability Of Alternating Knots.” This talk will outline a proof that the KHC holds over all Turk's Head Knots. This talk will be accessible for all undergraduate students. [☺ Pizza after talk ☺]



## MATHEMATICS DEPARTMENT

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TO CELEBRATE MOVING BACK INTO DARWIN HALL, ALL PRESENTATIONS WILL BE GIVEN BY PEOPLE WITH TIES TO THE SONOMA STATE DEPARTMENT OF MATHEMATICS.

Talks may change: Please confirm with the Mathematics Office before a specific talk