Talks (9:45-11:45) and contests (from 11:05-11:20):

<table>
<thead>
<tr>
<th>Time</th>
<th>Room 134</th>
<th>Room 135</th>
<th>Room 138</th>
<th>Room 139</th>
<th>Room 113</th>
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<tbody>
<tr>
<td>09:45-10:00</td>
<td>Anne Quinn</td>
<td>Megan Trinh/Mike Bellissimo Zbikowski’s Divisibility Criterion and The Trinh-Bellissimo Theorem</td>
<td>John Hoggard Finding Pi In Buffon’s Stack Of Needles</td>
<td>Melanie Baker Playing 24</td>
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<td>Korey Kilburn</td>
<td>Angie Toth An Untetrahedralizable Polyhedron</td>
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<td>Michelle McCarney Bungee Barbie Jump</td>
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<td>Rick White What is the Real Value of Pi?</td>
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<td>Ty Rotko The Basic Physics of Tackling</td>
<td>Korey Kilburn How to Optimize Your Prom Date</td>
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Activities (9:30-11:45am) and contests (9:30-11:20am):

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Room 113- math library (by the bridge)</td>
<td>Making the first 100+ digits of Pi; applet that uses inscribed and circumscribed polygons to approximate Pi (9:45-11am)</td>
</tr>
<tr>
<td>Room 129- CS project room</td>
<td>Oculus Rift</td>
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<tr>
<td>Room 130- MRC</td>
<td>Digits of Pi Contest (all morning—9:30-11:20am)</td>
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<tr>
<td>Room 132- testing room</td>
<td>Buffon’s Needle</td>
</tr>
<tr>
<td>Room 136-teaching lab</td>
<td>Paper folding, Pi Trivia contest (all morning 9:30-11:20am)</td>
</tr>
<tr>
<td>Room 137—CS lab</td>
<td>games</td>
</tr>
<tr>
<td>Stairway</td>
<td>Bungee Barbie – activity and contest (all morning 9:30-11:20am)</td>
</tr>
<tr>
<td>Hallway- station 1</td>
<td>Quarto and Tsurro</td>
</tr>
<tr>
<td>Hallway- station 2 – by testing room</td>
<td>Towers of Hanoi – activity and contest (all morning 9:30-11:20am)</td>
</tr>
<tr>
<td>Hallway -station 3 – by TC lounge</td>
<td>Station 3 Zeus on the Loose (math related card game)</td>
</tr>
<tr>
<td>Hallway- station 4 by 138</td>
<td>Station 4 Yahtzee with 4 sided die</td>
</tr>
<tr>
<td>Hallway- station 5- by 139</td>
<td>Station 5 Love Letter (Deduction based card game)</td>
</tr>
<tr>
<td>Overflow—downstairs</td>
<td>Games in conference rooms 027 and 014</td>
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Abstracts of talks

9:45-10:00

Ross 134: Anne Quinn: Mathematical Strategies for Winning at the Game of SET

The game of SET® is a fast paced game where three cards make a “SET” if, for each attribute, the values on the cards are either all the same or all different. Each card can be identified by four attributes, each of which has three values: number (1, 2, 3), color (red, green, purple), symbol (diamond, oval, squiggle), and shading (open, striped, solid). A sample of a “SET” is seen below.

Many mathematical topics will be discussed (such as combinatorics, expected value, divisibility, modular arithmetic, and mathematical proof) as we search for the best strategies for winning. Details of this study are available on the research page at www.setgame.com.

Ross 135: Megan Trinh/Mike Bellissimo: Zbikowski’s Divisibility Criterion and The Trinh-Bellissimo Theorem

Zbikowski’s divisibility criterion presents a quick and easy way to check the divisibility of one integer by another integer. By doing algebraic manipulations of simple formulas we can acquire a method of divisibility that is easier than that of long division, or Pascal’s divisibility tests. We will explore the four different cases for numbers ending in a 1, 3, 7, or 9 and determine their divisibility. We will also develop the criterion for specific numbers using modulo congruence. We researched into base 8 modulo congruence and developed an interesting lemma that led to creating the Trinh-Bellissimo Theorem.

Ross 138: John Hoggard: Finding Pi in Buffon’s Stack of Needles

An eighteenth century naturalist claimed he estimated pi by throwing loaves of bread, but the problem is usually described using needles. We'll use something less sharp than needles (but sharper than bread) to conduct our own experiment, and consider some computer simulations. Along the way, we'll brush against topics ranging from trigonometry to calculus, and end up wondering, "What does 'random' really mean, anyway?"

Or--numerous activities in the other rooms: Ross 129, 130, 132, 136, 137,…

10:05-10:20

Ross 134: Korey Kilburn: How to Optimize Your Prom Date

In this talk, we will assume that there are two equally sized groups of people who are all single and eligible dates for the upcoming prom. To create the couples, each person in group 1 will be matched with a person in group 2. May this matching be accomplished such that no pair of individuals would prefer to swap dates? We will determine if it is possible that a person from group 1 and a person from group 2 would prefer to be dates with each other, rather than their original date. If no pair wants mutually to "trade up", the matching scheme would be called stable. We will discuss how to form a stable matching scheme and furthermore discuss the optimality and applications of such a matching scheme.

Ross 135: Angie Toth: An Untetrahedralizable Polyhedron

Triangulation of polyhedrons in the plane is a fundamental operation in discrete geometry, but triangulation does not generalize smoothly to tetrahedralization in three-dimension. In this talk, we demonstrate a Schönhardt Polyhedron and explore the properties that make it’s tetrahedralization impossible.
Ross 138: John Hoggard: Finding Pi in Buffon’s Stack of Needles

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Or-- numerous activities in the other rooms: Ross 113, 129, 130, 132, 136, 137,…

10:25-10:40

Ross 134: Dan Bennett: The Horrid, Awful, Devastating End of the world from the Towers of Hanoi and Why this Big Problem is not such a Big Problem.

In a mystic temple in the distant east there is a large room with 3 posts and 64 golden disks. Priests spend their lives moving these disks according to a strict set of rules, hoping to complete the puzzle and, according to an ancient legend, bring on the END OF THE WORLD! In this talk we will explore the puzzle, develop a method for completing the movements, and predict the end of the world.

Ross 135: Michelle McCarney: Bungee Barbie Jump

Cord length is very important in a bungee jump—too short, and the jumper doesn’t get much of a thrill; too long, and ouch! We will discuss finding a mathematical model for a bungee jump that uses a Barbie doll and rubber bands. The students will then use this model to determine the number of rubber bands needed to safety perform the Barbie bungee jump from the second floor of Ross Hall.

Ross 138: Brad Wolfe: An Introduction to Projective Geometry

Historical methods of perspective in renaissance art are provided as an introduction to central projection and motivation for the projective plane. Then the axioms of the projective plane are then used to prove models of $\mathbb{RP}^2$, along with an example of a finite projective plane and to introduce the concepts of duality and perspectivity.

Or-- numerous activities in the other rooms: Ross 113, 129, 130, 132, 136, 137,…

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Ross 138: Rick White: What is the Real Value of Pi?

The numerical value of pi will be calculated using various distance functions, with some surprising results.

Or-- numerous activities in the other rooms: Ross 113, 129, 130, 132, 136, 137,…

11:05-11:20

Ross 134: Larry Downey: What's wrong with this Picture?

The development of powerful image editing software has created the need to detect forgeries within digital images. Digital Image Forensics is a discipline (mostly mathematical) in which algorithms are created and used to expose forgeries which are not visible to the human eye. We will briefly discuss some of the mathematics involved and in real time attempt to detect alterations to images using state of the art software which started as an undergraduate research project.


This talk will introduce a probabilistic fault containment algorithm which utilizes the techniques of self-stabilization to solve specific instances of the fault recovery problem. Along with a formal introduction to the algorithm and the self-stabilization paradigm, we will present an implementation scheme in C++ and discuss several observations of the empirical performance of the algorithm on various system configurations and fault-counts. The goal of this talk is to determine which, if any, graph-theoretic structures favor a probabilistic approach to fault containment. We will be specifically interested in investigating the relative performance of the fault containment algorithm on lists, trees, and various network structures including ring, and mesh topologies.

Ross 138: Rick White: What is the Real Value of Pi?

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-Or numerous activities—or 24 contest in Ross 139; Set and Rubiks contests in Ross 113

11:25-11:40

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Ross 135: Ty Rotko: The Basic Physics of Tackling

Tackling occurs in many sports and when kids are playing around. This talk will go into detail covering: a body's center of gravity, the base of a standing person in area, and the force behind a tackle given some assumptions. There are several kinds of math that are put into this talk, including: Calculus, Numerical methods, and physics. The conclusion will inform us on the amount of force applied to the person being tackled's head. While a tackle may seem pretty basic, there is a lot of math that goes into it.

Ross 138: Korey Kilburn: How to Optimize Your Prom Date

In this talk, we will assume that there are two equally sized groups of people who are all single and eligible dates for the upcoming prom. To create the couples, each person in group 1 will be matched with a person in group 2. May this matching be accomplished such that no pair of individuals would prefer to swap dates? We will determine if it is possible that a
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Secrets of Mental Math, with **Dr. Arthur Benjamin**  
Monday, March 16, 2015, at 1pm and 7pm  
Cole Auditorium, Edinboro University  

![Image](image.png)  

Editor of the MAA Math Horizons magazine (2004-2008)...

One of Princeton Review's "America's Best 300 Professors"...

As seen by millions at TED.com...

Reader's Digest calls him "America's Best Math Whiz"...

Arthur Benjamin, Harvey Mudd College Professor of Mathematics and professional magician, will amaze and entertain as he demonstrates (and explains) his fast-paced feats of mind: how to mentally add and multiply numbers faster than a calculator, memorize 100 digits of pi, figure out the day of the week of any date in history, and more.

Dr. Benjamin has performed his mixture of math and magic for audiences all over the world. He's appeared on the Colbert Report, Today Show, and National Public Radio, and been profiled in the New York Times, Los Angeles Times, USA Today, Scientific American, People and Wired magazines.