Eastern Pennsylvania and Delaware Section of the
Mathematical Association of America

Student Contributed Paper Session Abstracts

Millersville Unviersity

October 27, 2012

Student Speakers

Undergraduate Session I-A
Matisse

David Dimino, Mit Patel, University of the Sciences
Title: Pigeonhole Principle and its Implications
Time: Session I-A Matisse 1:30pm
Abstract: *Our talk will consist of an overview of the Pigeonhole Principle, in which we will give real life situations that yield unexpectedly profound results given its relative simplicity. Our discussion will also cover various implications the Pigeonhole Principle has for computer science. Examples of these implications include hash algorithms as well as compression algorithms.*

Tony Shi, Hweejung Kim, University of the Sciences
Title: Circle Packing
Time: Session I-A Matisse 1:45pm
Abstract: *Circle packing is an arrangement of circles in a plane such that no two circles overlap and each circle is mutually tangent with at least one other circle. In our presentation we are going to discuss the origin of circle packing, its optimal arrangement, and some applications.*

Jennifer McGuckin, Alex Ruiz-Cortez, University of the Sciences
Title: Crystal Topography
Time: Session I-A Matisse 2:00pm
Abstract: *Crystal Topography is the the detailed mapping or charting of the features of a crystal lattice. We will be discussing the history of crystal topography and the application of discrete math to the mapping of crystal lattices.*

Michelle Ho, Sthuthi Kanakavalli, University of the Sciences
Title: Application of Pascal Style Pseudocodes
Time: Session I-A Matisse 2:15pm
Abstract: *In this talk we will define pseudocodes. We will start by giving a little background on pseudocodes and how it is beneficial for the community. Then, we will move on to discussing the applications of pseudocodes.*

Undergraduate Session I-B
Audubon

Ashley Minnich, Jennifer Laov, University of the Sciences
Title: Microlives
Time: Session I-B Audubon 1:30pm
Abstract: *We will be discussing the history of Microlives, the mathematical belief that "one microlife is 30 minutes of your life expectancy." Your lifestyle and eating habits will affect your life and how long you will live. So, choosing your lifestyle will help you live longer. The presentation will discuss the origin of microlives, how it is calculated, and the practical application it has in our lives.*

Chelsea Leber, Millersville University
Title: A Brief History on Women in Mathematics and Their Contributions
Time: Session I-B Audubon 1:45pm
Abstract: *This presentation will highlight the important works of documented, and not so heavily documented, female mathematicians. This presentation will put into chronological order the critical works and research done by women in various mathematical fields. Emphasis will be put on connections between mathematical ideas and discoveries, along with the women who had a huge influence in the mathematical community. Not only are female mathematicians an important part of the past, but their a crucial element to the mathematical discoveries in future.*

Amy Strosser, Maria Marinelli, Mount Saint Mary's University
Title: The Middle Levels Problem
Time: Session I-B Audubon 2:00pm
Abstract: *In this talk, we will provide an introduction to the Middle Levels Problem, which is based on finding Hamiltonian cycles in the middle two levels of the Boolean lattice. We will summarize our research findings and analysis of the problem using Graph Theory, as well as the algorithm we formulated to find all solutions to the base case of the problem by hand.*

Siddharth Dahiya, Penn State Harrisburg
Title: Mapping Through the Elements
Time: Session I-B Audubon 2:15pm
Abstract: *We have begun developing software to interactively display the dependency structure of the propositions in Euclids The Elements. We will describe the goals of our project and, time permitting, give a demonstration of its use. This talk is a continuation of a talk we gave at the spring 2012 meeting of the Moravian Career Conference. At that time we had an idea and we had done some preliminary work to decide if the project was feasible. We spent this summer developing our software and we have made extensive progress.*

Undergraduate Session II-A
Matisse

Eric Koch, Kutztown University
Title: Secure Voting with Cryptography
Time: Session II-A Matisse 3:00pm
Abstract: *We will discuss a robust online voting scheme which guarantees that voters only vote once, and that they vote anonymously. We will also discuss how the idea of cryptosystems, blind signatures, zero-knowledge proofs, and threshold schemes maintain security and allow for voter verification. The main cryptosystem analyzed will be the Paillier cryptosystem, which allows one to perform arithmetic on encrypted data, a property essential for this application.*

Bryan Karlovitz, West Chester University
Title: Feasibility For Linear Matrix Inequalities
Time: Session II-A Matisse 3:14pm
Abstract: *We present an algorithm for finding a feasible point to a system of linear matrix inequalities.*

Anthony Mastriania, Millersville University
Title: Resolution Graphs and Splice Diagrams for Certain Surface Singularities
Time: Session II-A Matisse 3:28pm
Abstract: *In this work, we explore surface singularities in the form $z^n = f(x, y)$. First, we discuss ways of computing the resolution graph of the plane curve singularity defined by $f(x, y) = 0$. Using this graph in conjunction with an algorithm, we determine the resolution graph of the surface singularity defined by $z^n = f(x, y)$. We specifically focus on $n = 2$, proving a theorem on the structure of the resolution graph in this case. Once we have the resolution graph, we compute an associated combinatorial object called the splice diagram. Some of our examples support a recent conjecture of Neumann.*

Graduate Session II-B
Matisse

Brian Kronenthal, University of Delaware

Title: A strategy for constructing new generalized quadrangles

Time: Session II-A Matisse 3:42pm

Abstract: *Generalized quadrangles are incidence structures that have applications to areas of mathematics such as algebra, extremal combinatorics, geometry, and coding theory. Let $GQ(q)$ denote a generalized quadrangle of order q. When q is an odd prime power, only two $GQ(q)$ are known to exist. Furthermore, their point-line incidence graphs are isomorphic. This means that there is essentially only one known $GQ(q)$, and so finding another would be of great interest. In this talk, we will discuss a strategy for using algebraically defined bipartite graphs to construct new generalized quadrangles over finite fields of odd order. In addition, we will discuss a related problem over the complex numbers. This talk will serve as a gentle introduction, and will be accessible to all.*