Program of Activities
For the Fall Meeting of the

Mathematical Association of America

Ohio Section

Fall, 2013
Cleveland State University
Cleveland, Ohio
October 4-5, 2013

MAA Ohio Section

Program

Friday, October 4

11:30-12:00	Nominating Committee	MC 102
12:00-4:00	Registration	MC Atrium
12:00-1:00	Committee Meetings:	
	CENTENNIAL COMMITTEE	MC 103
	CONCUR (Curriculum)	MC 104
	CONSACT (Section Activities)	MC 102
	CONSTUM	MC 312
	CONTEAL (Teacher Education & Licensure)	MC 101
1:00-4:00	Vendor & Book Exhibits	MC Atrium
1:15-1:30	Welcome and Announcements	MC Auditorium
1:30-2:30	Invited Address: **"Sports Ranking – March Madness to Twitter"** Tim Chartier	MC Auditorium
2:30-2:55	Break	MC Atrium
2:55-3:00	Centennial Minute – Thomas Hern	MC Auditorium
3:00-4:00	Invited Address: **"Some Non-Standard Sports Applications of Mathematics and Statistics"** Richard Cleary	MC Auditorium
4:10-6:05	**Contributed Paper Sessions**	MC 101 and 103
4:10-6:05	Executive Committee Meeting	MC 102
6:05-6:30	Social Time	MC Atrium
6:30-7:45	Banquet	Fenn Tower Ballroom (3rd floor)
7:55-9:00	After dinner talk: **"Mime-matics"** Tim Chartier	

Saturday, October 5

8:00-10:00	Registration	MC Atrium
8:00-10:00	Book Vendors and Exhibits	MC Atrium
8:00-8:50	Coffee and Pastries	MC Atrium
8:05-8:40	Committee on Local Arrangements	MC 102
8:50-9:00	Welcome and Announcements	MC Auditorium
9:00-10:00	Invited Address: **"Statistics: A Time for Celebration and Change"** Brad Hartlaub	MC Auditorium
10:00-10:20	Break	MC Atrium
10:25-11:40	**Contributed Paper Session**	MC 101 and 103
11:50-12:50	Distinguished Teaching Award Presentation: **"Using Game Theory to Teach Critical Thinking Skills and Quantitative Literacy"** Harold Putt	MC Auditorium
12:50-1:00	Closing Remarks	MC Auditorium

Abstracts of Invited Addresses

Friday

Speaker: Tim Chartier, Davidson College
Title: Sports Ranking – March Madness to Twitter
Abstract: In the past decade ranking methods have been used for a variety of applications from the web to ecological systems to sports teams. This talk will discuss the Massey and Colley methods, which are two of the six computer ranking methods factored into NCAA College Football's BCS rankings that are used to determine which teams are invited to play in which bowl games. Both methods compute a ranking by solving a linear system of equations and can be applied to a large variety of sports. In this talk, we will introduce the integration of nonuniform weighting for these methods. Further, we will explore challenges in using PageRank, the very successful method of Google for ranking webpages. We will discuss how such methods can produce brackets for the Division I NCAA Men's Basketball Tournament also known as March Madness. Finally, we will discuss recent work that adapts sports ranking methods to social networks such as Twitter.

Speaker: Rick Cleary, Babson College
Title: Some Non-Standard Sports Applications of Mathematics and Statistics
Abstract: Thanks to the popularity of books like "Moneyball" by Michael Lewis, there has been a great increase in public awareness that statistical analysis has become a vital and accepted tool in sports applications. We present some examples in which other branches of mathematics can be used to consider sports related questions. We will investigate several of these less well-known applications. Specific instances include: using probability to model rare events and streaks in sports; some graph theory and operations research to consider a scheduling question; an optimization problem involving a basketball pool; and even some elementary topology related to the rules of several sports.

Speaker: Tim Chartier, Davidson College
Title: Mime-matics
Abstract: In Mime-matics Tim Chartier explores mathematical ideas through the art of mime. Whether creating an illusion of an invisible wall, wearing a mask covered with geometric shapes or pulling on an invisible rope, Dr. Chartier delves into mathematical concepts such as estimation, tiling, and infinity. Through Mime-matics, audiences encounter math through the entertaining style of a performing artist who has performed in local, national and international settings.

Saturday

Speaker: Brad Hartlaub, Kenyon College
Title: Statistics: A Time for Celebration and Change
Abstract: During this international year of statistics, it is exciting to take a look at the impact of recent developments. We will briefly explore some applications of statistical models. Billy Beane changed the role of general managers in Major League Baseball with statistical methods that are described in Moneyball. Nate Silver demonstrated incredible success predicting the winners of U.S. elections. In addition to these popular applications, we will examine the changing landscape in statistical education. Considerable progress has been made, but much more work and professional development is needed. Progress on the NSF LOCUS grant will be highlighted.

Speaker: Harold Putt, Ohio Northern University
Title: Using Game Theory to Teach Critical Thinking Skills and Quantitative Literacy
Abstract: This talk concerns the course TREX 1001: Conflict and Cooperation a transitions experience (TREX) course at Ohio Northern University developed around the topic of game theory. In addition to the design and development of this particular course, we will discuss the concept of TREX courses and the role they play in the general education curriculum at ONU. Finally, we will describe several interesting applications of game theory that the speaker encountered during the course development process.

Brief Biographies of Invited Speakers

Tim Chartier, Davidson College

Tim Chartier is an Associate Professor of Mathematics at Davidson College. He is a recipient of a national teaching award from the MAA. As a researcher, Tim has worked with both Lawrence Livermore and Los Alamos National Laboratories on the development and analysis of computational methods targeted to increase efficiency and robustness of numerical simulation on the lab's supercomputers, which are among the fastest in the world. Tim's research with the labs was recognized with an Alfred P. Sloan Research Fellowship. He coauthored Numerical Methods: Design, Analysis, and Computer Implementation of Algorithms with Anne Greenbaum.

Tim serves on the Editorial Board for Math Horizons. He chairs the Advisory Council for the Museum of Mathematics, which opened in 2012 and is the first museum of mathematics in the United States.

As an artist, Tim has trained at Le Centre du Silence mime school and Dell'Arte School of International Physical Theater. He also studied in master classes with Marcel Marceau.

Rick Cleary, Babson College

Rick Cleary is Professor and Chair in the Division of Mathematics and Science at Babson College in Wellesley, MA. He has previously taught at Cornell University (where he earned his PhD), Bentley University, Harvard University and Saint Michael's College in Vermont. Rick has also served six years as Associate Treasurer of MAA. He enjoys working on applied problems in mathematics and statistics, and has recent jointly authored papers with colleagues on diverse topics including failure times for hip replacements, fraud detection in accounting, assessment of creativity in marketing, and various questions in modeling sports outcomes. Professor Cleary's recreational interests are largely sports related. Running, golf, coaching his sons in baseball and rooting for the Red Sox are among his favorite activities.

Brad Hartlaub, Kenyon College

Brad Hartlaub joined the Kenyon faculty in 1990. He is a nonparametric statistician, and his research deals with rank-based tests for detecting interaction. He has published research articles on count or rank based statistical methods in the Journal of Nonparametric Statistics, The Canadian Journal of Statistics, and Environmental and Ecological Statistics. He has served as the Chief Reader of the AP Statistics Program and is an active member of the American Statistical Association's Section on Statistical Education. Brad was selected as a Fellow of the American Statistical Association in 2006. He has served the College as Chair of the Mathematics Department, Chair of the Division of Natural Sciences, and has recently agreed to serve a three-year term as Associate Provost. He has received research grants to support his work with undergraduate students from the Andrew W. Mellon Foundation, the Council on Undergraduate Research and the National Science Foundation.

Harold Putt, Ohio Northern University

Harold Putt earned his BS degree in secondary education and mathematics at Clarion University and his MA and PhD degrees in mathematics at Bowling Green State University. After finishing his PhD, Harold taught for one year at the East Liverpool Campus of Kent State University and then for five years at the University of Akron. He left Akron to join the faculty in the Department of Mathematics and Statistics at Ohio Northern University in 1983 and has been there ever since.

Harold has been involved in the activities of the Ohio Section of the MAA for more than 35 years. Over the years he has served on CONTEAL, CONSACT, CONCUR, the Executive Committee, the Program Committee, the Nominating Committee, and the Teaching Award Committee. He was President of the section during the 2002-2003 academic year.

Receiving the 2012 Ohio Section Teaching Award was a great honor for Harold as he credits much of his success as a teacher to the mentoring he has received from many longtime colleagues and friends from the Ohio Section.

Contributed Paper Sessions

*denotes undergraduate student

Friday, October 4
4:25—6:20

Time	**Session A** Room MC 101 Session Chair: John Tynan	**Session B** Room MC 103 Session Chair: erica Whitaker
4:10-4:25	***Juggling with Bounded Heights*** *Abstract 1* Jon Stadler Capital University	***Ming Antu and the Catalan Numbers*** *Abstract 2* Weiping Li Walsh University
4:30–4:45	***Understanding Honeybee Nest-site Selection Through Models*** Abstract 3 Partha Srinivasan Cleveland State University	***Quasi-exponential Growth and Decay*** Abstract 4 David Burton Franciscan University of Steubenville
4:50-5:05	***A Galilean Inequality for the Free Damped Motion*** Abstract 5 Aurel Stan The Ohio State University - Marion	***Numerical Smoothness*** Abstract 6 Adamou Fode Bowling Green State University
5:10-5:25	***An Implicit Boundary Integral Method*** *Abstract 7* Catherine Kublik University of Dayton	***Writing in the History of Mathematics Course*** *Abstract 8* *James FitzSimmons* *Wilmington College*
5:30-5:45	***Who Gets the Best Room?*** Abstract 9 M.B. Rao University of Cincinnati	***Results Inspired by the Weierstrass Theorem*** Abstract 10 Swarup Ghosh Bowling Green State University

5:50-6:05	***P.I.'s for Garch Processes*** *Abstract 11* Maduka Rupasinghe Ashland University	***School Mathematics 19th Century America?*** *Abstact 12* Barbara Margolius Cleveland State University
6:10-6:25	***Pairwise versus Mutual Independence*** *Abstract 13* John Coleman Franciscan University of Steubenville	***A Non-geometric Switch Toggling Problem*** *Abstract 14* Megan Duke* Muskingum College

Contributed Paper Sessions

*denotes undergraduate student

Saturday, October 5
10:25-11:40

Time	**Session A** Room MC 101 Session Chair: Matt McMullen	**Session B** Room MC 103 Session Chair: Matt Menzel
10:25-10:40	***Sum Cographs*** Abstract 15 Robert Haas	***Online Tutoring and Student Retention*** *Abstract 16* Giorgi Shonia Ohio University - Lancaster
10:45–11:00	***Validation of the Cognitive Complexity of Word Problems involving the Application of Quadratic Equations*** Abstract 17 Jerry Obiekwe The University of Akron	***My Experiences With the Flipped Classroom*** *Abstract 18* Jim Anderson University of Toledo
11:05-11:20	***Multiple Views of Graphs in GeoGebra*** Abstract 19 Barbara D'Ambrosia John Carroll University	***One-Room Schoolhouse (ORS)*** *Abstract 20* Anna Davis Ohio Dominican University
11:25-11:40	***The Battle of Trafalgar: A Mathematical Analysis*** *Abstract 21* Douglas D. Seaman	***Assessing the Validity of Student Evaluation Instrument using Mathematics Faculty Data*** *Abstract 22* Jerry Obiekwe The University of Akron

Abstracts of Contributed Papers

Friday 4:10-4:25

Juggling with Bounded Heights

Jon Stadler
Capital University

Abstract 1: Certain types of juggling patterns can be represented using lists of nonnegative integers. These integers are called the heights of the sequence. We will give an introduction to the mathematics of juggling sequences and will count sequences in which the heights are bounded above by some fixed integer.

Ming Antu and the Caralan Numbers

Weiping Li
Walsh University

Abstract 2: The Catalan numbers form a sequence of natural numbers that occur in various counting problems. The first of this type is Euler's solution on the number of triangulations of a polygon. Recent study shows that Ming Antu, a Chinese mathematician of Mongolian nationality in 18th century, was actually the first one to use the Catalan numbers. In the talk, we will review how he discovered the Catalan numbers through his geometric models and used them in his power series expansions.

Friday 4:30–4:45

Understanding Honeybee Nest-site Selection Though Models

Partha Srinivasan
Cleveland State University

Abstract 3: The process by which honeybees choose a new nesting site is, rather remarkably, a democratic one. We describe this phenomenon and present mathematical models which emulate this process. If the scouting bees are only able to find a single site, the viability of this site is based on its quality. In this case, we show the analogy between our model and epidemic models, and also present a few analytical results in this case. When the swarm has multiple sites to choose from, there are some interesting dynamics that depend on the quality of these sites, as well as their discovery times. We present some numerical results in the case when they have two

sites to choose from. This work is in collaboration with Andrew Nevai (University of Central Florida) and Kevin Passino (OSU). The models are largely based on the experimental work conducted by Tom Seeley.

Quasi-exponential Growth and Decay

David Burton
Franciscan University of Steubenville

Abstract 4: A well-known property of exponential decay is a half-life that is independent of initial amount. A closely related property is that half-life remains invariant over time. Similar remarks hold for exponential growth and doubling time. It is sometimes incautiously asserted or implied that these properties are in fact characteristic of exponential decay and growth. I will show various examples of what I call quasi-exponential functions. These are non-exponential functions with invariant half-life or doubling time (or more generally invariant *r*-life for a fixed value of *r*). Characterizations and properties of such functions will be explored along with some possible applications.

Friday 4:50–5:05

A Galilean Inequality for the Free Damped Motion

Aurel Stan
The Ohio State University - Marion

Abstract 5: We will show first how the hyperbolic functions can be used to present the three cases: overdamped, critically damped, and underdamped, of the free damped motion, in a unitary way. Then we will present a Galilean inequality for the free damped motion. We end the talk with an interpretation of this Galilean inequality.

Numerical Smoothness and its Applications to Error Analysis for RKDG on the Scalar Nonlinear Conservation Laws

Adamou Fode
Bowling Green State University

Abstract 6: Numerical Smoothness is a new concept in the literature of Differential Equations, and it means the smoothness of numerical solutions. Although, the idea of numerical smoothness is not a popular concept in the literature, it is a necessary concept as an early indicator of numerical instability. In this talk, we will show the importance of smoothness indicators and their contribution in the error analysis of a smooth solution to hyperbolic problems.

Friday 5:10–5:25

A New Boundary Integral Algorithm for Implicit Interfaces

Catherine Kublik
University of Dayton

Abstract 7: We present a new implicit interface boundary integral method for solving Poisson's equation. The technique is based on averaging a family of parameterizations of an integral equation defined on the boundary of the domain, where the integrations are carried out in the level set framework using an appropriate Jacobian. By the coarea formula, the algorithm can operate in the Euclidean space. I will present numerical results in two and three dimensions. This is joint work with Nick Tanushev and Richard Tsai.

History of Mathematics as a Writing-Across-the-Curriculum Course

James FitzSimmons
Wilmington College

Abstract 8: Wilmington College has recently implemented a writing-across-the-curriculum requirement for all majors. Each major was tasked with having at least one upper-division course in which a significant amount of writing was required. Our mathematics department decided that the History of Mathematics course would be the ideal course for this. I agreed to take on the design of this remodeled course and to teach it for its first run. The course went so well during its first run that I am continuing to teach it until someone wrests it away from me! This talk will discuss the positives and negatives (many more of the former than of the latter) as well as the workings of this new, writing-focused History of Mathematics course. Come and here about Wilmington College's experiences and ask questions pertaining to your own institution.

Friday 5:30-5:45

Who Gets the Best Room?

M.B. Rao
University of Cincinnati

Abstract 9: An apartment has four rooms with differing degrees of desirability. The total rent is $4000. How to distribute the rent across the rooms? Who gets the best room? Who gets the second best room? And so on. A solution is presented which answers both the questions in one stroke. A stochastic version of the solution is also presented utilizing Dirichlet Distribution.

Results Inspired by the Weierstrass Approximation Theorem

Swarup Ghosh
Bowling Green State University

Abstract 10: In 1885, Karl Weierstrass proved that on a closed bounded interval of real line, every real-valued continuous function can be approximated by polynomials; this result is known as the Weierstrass approximation theorem. Since then this theorem has inspired a series of results. Some of those results will be discussed in this talk.

Friday 5:50 – 6:05

Bootstrap Based Prediction Intervals for Garch Processes

Maduka Rupasinghe
Ashland University

Abstract 11: The sieve bootstrap, which obtains residuals for re-sampling by fitting finite order autoregressive models to time series, can be utilized to obtain prediction intervals as well as approximate distribution of statistics of interest. While this re-sampling method has been used to obtain prediction intervals for ARMA processes, it has not been adopted to obtain prediction intervals for time series with heteroscedastic errors. In this talk, its application for obtaining prediction intervals for GARCH processes is considered. The simulation results indicate that the prediction intervals based on the sieve bootstrap have good finite sample properties under normal and exponential errors.

What was School Mathematics Instruction Like in 19th Century America?

Barbara Marglius
Cleveland State University

Abstract 12: In this talk, we look at what it was like to be a schoolteacher teaching mathematics in the 1800s, and what some of the mathematics taught might include. The 19th century was a period of transition from a copybook or cyphering book tradition to a textbook tradition. Early in the century, students and teachers probably did not have access to a published textbook. Late in the century, they probably did. This was also the time period in which transition began from a one-room schoolhouse approach to a grade-based approach.

Friday 6:10-6:25

Pairwise versus Mutual Independence

John Coleman
Franciscan University of Steubenville

Abstract 13: A student is given the assignment of finding three mutually independent events in an n-element uniform probability space. The student attempts to solve this problem by repeatedly choosing three events at random and testing them for independence. However, the student commits the beginner's blunder of only testing for pairwise independence. Eventually, the student succeeds in finding three events which are pairwise independent, and submits these to the professor. What is the chance that the student lucks out and the events are in fact mutually independent? We investigate this question and show that it depends heavily on the number n. No luck is required if n is either prime or the product of two distinct primes. On the other hand, the student is in deep trouble if n is the square of a prime.

A Non-geometric Switch Toggling Problem

Megan Duke*
Muskingum College

Abstract 14: Switch toggling games such as Lights Out and the σ^+-game are widely studied in mathematics and have been applied to model a variety of situations such as genetic networks and cellular automata. This paper introduces a class of toggling games where at each iteration a fixed number of switches is chosen to be toggled where the only switches changed are the switches chosen to be toggled. The switches all operate independently of each other and do not depend on the proximity or the position relative to any other switch. This paper classifies the conditions necessary and the steps taken to transition from all switches in the on state to all switches in the off state. Further results include the conditions required of the parity between the number of switches in the system and the fixed number of switches toggled at each step in order to transition from a given initial state to a specified terminal state.

Saturday 10:25-10:40

Sum Cographs

Robert Haas

Abstract 15: A cograph is a combinatorial structure consisting of points, each pair of which are linked by a colored line. This talk will describe cographs obtained from algebra by taking elements from an abelian group (e.g. integers) for points and lines, with each line the sum of its endpoints. Configurations necessary or forbidden will be explored, in particular those associated with group torsion.

Online Tutoring and Student Retention

Giorgi Shonia
Ohio University - Lancaster

Abstract 16: Ohio University has started offering online tutoring services to student in selected classes. Present report analyses impact on student retention and academic performance. We compare 24/7 online tutoring to traditional face-to-face alternative and explore various delivery choices, their advantages and sinergies with other instructional technologies.

Saturday 10:45-11:00

Validation of the Cognitive Complexity of World Problems Involving the Applications of Quadratic Equations

Jerry Obiekwe
The University of Akron

Abstract 17: Solving word problems particularly those involving quadratic parameters, for the most part, are challenging for many students. The literature in cognitive psychology has suggested certain steps that are needed for solving word problems. Additionally, each of those steps is associated with certain knowledge requirement. The literature also suggested that the failure to correctly solve a word problem could be attributed to lack of the knowledge requirement of any of the cognitive steps. This study will attempt to validate those cognitive steps via Linear Logistic Test Modeling (LLTM) using quadratic word problems. The results and its implications to teaching and learning word problems will be discussed.

My Experiences with the Flipped Classroom

Jim Anderson
University of Toledo

Abstract 18: In the Fall 2012 and Spring 2013 semesters, I used the reverse (flipped) classroom method of instruction for my MATH-1330 (Trigonometry) classes. I will discuss what happen in these classes and show some of the material used for these classes.

Saturday 11:05 –11:20

Multiple Views of Graphs in GeoGebra

Barbara D'Ambrosia
John Carroll University

Abstract 19: Using the free software GeoGebra, it is easy to create linked graphing windows. In just minutes, you can create worksheets that allow your students to explore topics that involve separate but related graphs. For example, you can drag a point around the unit circle in one pane while simultaneously drawing the corresponding sine and cosine curves in another. Other applications of the second graphics window include the ability to see both a local and global view of a curve simultaneously, and the relationship between the Cartesian and polar graphs of a function. I will demonstrate the creation of some such worksheets in GeoGebra.

One-Room Schoolhouse (ORS) for the Twenty First Century

Anna Davis
Ohio Dominican University

Abstract 20: Is your college struggling to offer upper-level mathematics courses due to low enrollment? The Mathematics Department at Ohio Dominican University is pioneering a One-Room Schoolhouse (ORS) model for our upper-level mathematics courses. The ORS setting utilizes the flipped classroom approach to allow a single instructor to conduct multiple courses in the same classroom at the same time. This allows a small liberal arts college to offer a great variety of specialized, low-enrollment courses on-demand, at no additional cost.

Saturday 11:25 – 11:40

The Battle of Trafalgar: A Mathematical Analysis

Douglas D. Seaman

Abstract 21: In 1805 at the Battle of Trafalgar a more powerful fleet met a lesser fleet. By employing "new mathematics" (calculus) a "new" battle plan was used. This talk covers estimated loses with both plans (in addition to deriving the firepower law).

Assessing the Validity of Student Evaluation Instrument using Mathematics Faculty Data

Jerry Obiekew
The University of Akron

Abstract 22: Student course evaluation is a prevalent exercise that takes place at the end of the semester in American colleges and universities. Students are asked to evaluate their experiences in each course and the outcomes are related to teaching effectiveness, which in turn are used in making decisions regarding reappointment, tenure and promotion, initial hires and merit raises. Although, there are rigorous studies out there that concluded that student evaluation indices can be used interchangeably as teaching competence, but there are also a handful of academicians who are conflicted on whether the instrument measures student satisfaction or quality of teaching. One thing for certain most people agree on is that the results can be used to improve instructional strategies and hence teaching effectiveness. This study examined the psychometric quality of student evaluation instrument using mathematics faculty data.

Save these Dates!

The spring meeting of the Ohio Section will be held at the University of Toledo on **April 4-5, 2014**.

MathFest will be in Portland, OR, **August 7-9, 2014**.