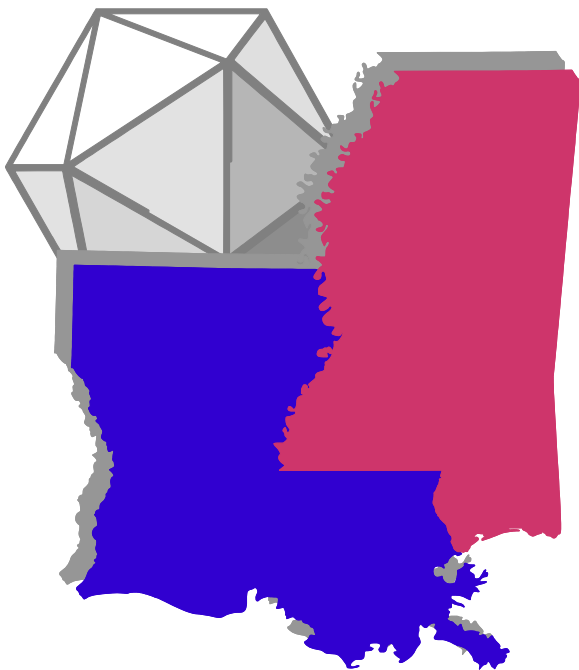


# The Mathematical Association of America

## Louisiana/Mississippi Section



93<sup>rd</sup> Annual Meeting  
hosted by LSU Shreveport  
Shreveport, Louisiana  
February 25 – 27, 2016



## **WIFI access**

Network: LSUS wireless

Username: library

Password: nml120407

LSUS is an eduroam campus

## **Institutional Partners**

Jackson State University

Louisiana School for Math, Science, and the Arts

Louisiana State University Baton Rouge

Louisiana State University Shreveport

Loyola University

McNeese State University

Mississippi College

The University of Mississippi

Northwestern State University

Southeastern Louisiana University

University of Louisiana Lafayette

University of Southern Mississippi

Institutional Partners' Membership Fees help fund student activities.

Thank you for your support!

## Plenary Address

### **Does Your Vote Count?**

Deanna Haunsperger, Carleton College

Friday, February 26<sup>th</sup>, 1:15 p.m. – 2:15 p.m.

University Center Theatre

Are you frustrated that your candidate never wins? Does it seem like your vote doesn't count? Maybe it doesn't. Or at least not as much as the voting method with which you choose to tally the votes. Together we'll take a glimpse into the important, interesting, paradoxical world of the mathematics behind tallying elections.

## 7<sup>th</sup> Annual R.D. Anderson Lecture

### **Geometric Gems**

Michael Starbird, University of Texas

Friday, February 26<sup>th</sup>, 5:15 p.m. – 6:15 p.m.

University Center Theatre

Plain plane (and solid) geometry contains some of the most beautiful proofs ever—some dating from ancient times and some created by living mathematicians. This talk will include some of my favorites such as the Dandelin Sphere argument that a plane intersects a cone in an ellipse; a method for computing areas under curves such as the tractrix developed by a living mathematician, Momikan Mnatsakanian; and many more. Geometry provides many treats!

## Outstanding Teacher Address

### **The Trouble with Teaching Awards: A Case in Point**

Rick Mabry, Louisiana State University Shreveport

Saturday, February 27<sup>th</sup>, 10:30 a.m. – 11:30 a.m.

University Center Theater

We consider this old problem: How should we choose recipients of a teaching award? (For the sake of argument, we assume that the problem is not vacuous. Namely, we stipulate as an Axiom of Choice the affirmative answer to the more fundamental question: Should we choose recipients of a teaching award?) The solution to the problem will be given only after the audience is subjected to a large number of mostly irrelevant and irreverent observations and reminiscences. These will serve as examples and evidence to support the primary claim.

# Section NExT Workshop

Friday, February 26<sup>th</sup>, 8:30 a.m. – 11:30 a.m.  
University Center, Webster Room

- 8:30 a.m. **Welcome**  
Jana Talley, Jackson State University, Section NExT Coordinator
- Introductions**  
Christine Gordon, McNeese State University, Section NExT Committee
- Opportunities for Computing with Big Data**  
Carmen Wright, Jackson State University, Section NExT Committee
- 9:00 a.m. **Building a Successful Academic Profile**  
Donald Cole, University of Mississippi, Assistant Provost & Assistant to Chancellor for Multicultural Affairs
- 9:30 a.m. Break
- 9:40 a.m. Question and Answer Activities
- 9:50 a.m. **Infusing Technology into Undergraduate Research and Learning Activities**  
Tchavdar Marinov, Southern University of New Orleans
- 10:30 a.m. Break
- 10:40 a.m. Question and Answer Activities
- 10:50 a.m. **Extending Undergraduate Research into Mentoring Activities: A Robotics Summer Camp**  
Mostafa Elaasar, Southern University of New Orleans
- 11:30 a.m. **Closing Remarks**

**Student Luncheon**  
**Two Heads Are Better Than None:**  
**Or, Me and the Fibonacci**  
Steve Kennedy, Carleton College  
Friday, February 26<sup>th</sup>, 11:15 a.m. – 12:45 p.m.  
University Center Ballroom

As a graduate student trying to solve a problem in dynamical systems, I stumbled on a seemingly miraculous formula involving the Fibonacci numbers. Five years later, while working on a probability problem, the same miraculous formula popped up. This time I went looking for the explanation of the miracle and, eventually, found it in combinatorics. I'll explain the problems I was trying to solve, the miraculous formula that appears, and the wonderful explanation of the miracle. As a bonus, I'll point to a problem or two that naturally arise from that explanation, the answers to which are still not known.

**Student Presentations**  
Friday, February 26<sup>th</sup>, 2:30 p.m. – 4:50 p.m.  
University Center, Caddo-Bossier Room

2:30 p.m.

**Requirements to Insure the Evolution of Altruistic Genes in E. Coli**  
Rainey Lyons, Undergraduate, University of Louisiana at Lafayette

Altruistic cells in organisms are programmed to terminate themselves if they are a threat to the colony. We convert a system of differential equations to a first order cubic differential equation and solve numerically. We find requirements for the fecundity and mortality function that allow evolution or extinction of the altruistic gene.

2:50 p.m.

**Applications of the Sierpiński Triangle to Music Composition**  
Samuel Dent, Undergraduate, University of Southern Mississippi

The present paper builds on the idea of composing music via fractals, specifically the Sierpiński Triangle and Sierpiński Pedal Triangle. One such method is a geometric composition system with the configuration of the Sierpiński Pedal Triangle that generates a three-note pattern and distributes it throughout various levels of the music.

3:10 p.m.

**Homotopy Idempotents and the Free Group**  
Linda Hexter, Undergraduate, Loyola University New Orleans

This article studies Nielsen fixed point theory for homotopy idempotents defined on a bouquet of circles, the space whose fundamental group is the free group on two generators. The result is that the Nielsen number of these maps is always  $\leq 1$ , providing a direct proof of the Bass Conjecture.

3:30 p.m.

## **Regions of Stability of the BZ Reaction**

Steven Dabelow, Undergraduate, McNeese State University

The Belousov-Zhabotinsky (BZ) reaction is an example of a chaotic system. The Brusselator and the Oregonator, models of the BZ reaction, describe the system's behavior. In this talk, we will perform Routh Stability Analysis on these two models so that we can find where the system is stable.

3:50 p.m.

## **The Sum of Orthogonal Matrices in $M_N(\mathbb{Z}_2)$**

Avin Sunuwar, Undergraduate, Southeastern Louisiana University

$A \in M_N(\mathbb{Z}_2)$  can be written as a sum of orthogonal matrices if and only if the row sums and the column sums of  $A$  have the same parity. We show that for  $n = 2, 3, 4$ , if  $A \in M_N(\mathbb{Z}_2)$  can be written as a sum of orthogonal matrices, then at most  $n$  orthogonal matrices are needed.

4:10 p.m.

## **Conformal Mapping**

Jacob Higgins, Graduate, McNeese State University

Conformal mapping is a technique developed in complex analysis that has many applications in engineering. Creating conformal maps under specific conditions is of particular interest to mathematicians and engineers. This discussion will build upon elements of complex analysis to explore properties of conformal maps and construct such maps between domains.

4:30 p.m.

## **Do Dogs Know Calculus?**

Wendy Kussmann, Graduate, McNeese State University

Data was collected and analyzed to see if Tim Pinning's dog, Elvis, takes the optimal path to his ball every time. Does Elvis need calculus to find the optimal path to his ball? Does Elvis use related rates to get to his ball instead of calculus? We will find out!

## **Faculty Presentations: Session A**

Friday, February 26<sup>th</sup>, 2:30 p.m. – 5 p.m.

University Center, Webster Room

2:30 p.m.

## **Density of a Normal Subgroup of the Invertibles in Certain Multiplier Algebras**

Tracy Robin, University of Louisiana Lafayette

We investigate the normal subgroup structure of the general linear group of certain unital  $C^*$ -algebras. Let  $A$  be a unital  $C^*$ -algebra and let  $G \subseteq GL(A)$  be a noncentral normal subgroup. Then  $G$  contains a noncentral positive element. We study the strict topology closure of  $G$  under certain conditions.

2:55 p.m.

## **The Generalized and Symmetric Spaces in $SL_2(\mathbb{F}_q)$ and $GL_2(\mathbb{F}_q)$**

Carmen Wright, Jackson State University

We will discuss the generalized symmetric spaces for  $SL_2(\mathbb{F}_q)$  and  $GL_2(\mathbb{F}_q)$ . Specifically we will characterize the structure of these spaces and prove that when the characteristic of  $\mathbb{F}_q$  is not equal to two the extended generalized symmetric space is equal to the generalized symmetric space for  $SL_2(\mathbb{F}_q)$  and nearly equal for  $GL_2(\mathbb{F}_q)$ .

3:20 p.m.

## **Matching Backbone Colorings of $k$ -trees**

John Estes, Belhaven University

The integer  $BBC_2(G,H)$  is the smallest for which there exists a 2-backbone coloring, a coloring  $f$  with  $|f(u)-f(v)| \geq 2$ , for  $uv \in E(H)$ ,  $H$  a spanning subgraph of  $G$ . We show  $BBC_2(G,M) \leq k+1 + \text{floor}((k+2)/3)$  for  $k$ -trees and  $BBC_2(G,M) \leq k+1 + \text{floor}((k+1)/2)$  for  $k$ -degenerate graphs with matching  $M$ .

3:45 p.m.

## **Developing A Graph Theory Programming Language**

Nicholas Richardson, Northwestern State University

Searching through a number of graphs for a property becomes a repetitive process that is well suited for an automated program. However, most programming languages require extra code to develop that handles graph operations. A Graph Theory Programming Language will handle graph operations while simplifying the programming process involving graphs.

4:10 p.m.

## **HPLMEM to Approximate Invariant Densities**

Tulsi Upadhyay, The University of Southern Mississippi

We present a homogeneous piecewise linear maximum entropy method (HPLMEM) to approximate invariant densities of the Frobenius-Perron operator and estimate errors between the exact and approximated invariant densities of the operator related to some nonsingular transformations. We compare numerical results of this method with some existence results.

4:35 p.m.

## **An Iterative Double Description Method for Integer Constraint Problems**

John Perry, The University of Southern Mississippi

We compare the Double Description Method to the traditional simplex + cutting plane approach for Integer Programming for cases when you just want one, feasible solution in the interior of the solution code (no optimization). In such cases, DDM proves attractive, and is easily modified to iterative problems.

## **Faculty Presentations: Session B**

Friday, February 26<sup>th</sup>, 2:30 p.m. – 5 p.m.

University Center, Desoto Room

2:30 p.m.

### **Readiness Assurance Process (RAP)**

Liza Cope, Delta State University

This talk will focus on the nuts and bolts of the RAP process that I use at the beginning of each instructional unit in the classes that I teach. We will discuss the potential benefits of the RAP process as well as lessons that I have learned during the three years that I have been using the RAP process. Participants will be provided with the resources necessary to begin using the RAP process in their classes.

2:55 p.m.

### **Strengthening Teacher Education with Mathematics and Science Scholars**

Patricia Beaulieu, University of Louisiana at Lafayette

STEMS<sup>2</sup> (Strengthening Teacher Education with Mathematics & Science Scholars), an NSF Noyce Scholarship project, represents a collaboration among UL Lafayette's Colleges of Education and Sciences and two local school districts. This presentation provides details of writing and implementing the grant that institutions interested in similar funding may find useful.

3:20 p.m.

### **Success Rates and Homework Completion in Intermediate Algebra**

Susan M. Ficken, Mississippi University for Women

Data from several semesters of Intermediate Algebra revealed a significant drop in completion rates in students who failed to submit even 5% of the homework. Greater quantities of undone homework correlated with an extremely steep drop. I will present this data and discuss some of the interventions we are trying.



3:45 p.m.

## **Using Clickers to Gauge Understanding**

Christy Sue Langley, University of Louisiana at Lafayette

This talk will give a glimpse into my Mathematics for Finance class; in which I use the University adopted clicker system to gauge understanding of key topics. I will share the ease of integration for both student and instructor.

4:10 p.m.

## **Characterizing the Rises and Falls in Wide-spread School Mathematics Reform**

Lecretia A. Buckley & Jana Talley, Jackson State University

This presentation provides an overview of wide-spread reform movements in school mathematics beginning with *new math* and ending with the *Common Core State Standards for Mathematics*. Several reoccurring themes are identified and used as the context for garnering insights about teaching and school mathematics reform.

4:35p.m

## **Math Survivor and More**

Agnes M. Carino, Mississippi University for Women

This talk describes the experiences of returning to the teaching profession after over a decade of staying at home. Also, the speaker will share lessons and inspiration learned from being a Project NEXt fellow (2014-15) in facing the challenges of being a “junior” faculty inside and outside the classroom.

## **Faculty Presentations: Session C**

Saturday, February 27<sup>th</sup>,

9:00 a.m. – 10:15 a.m.

University Center, Caddo-Bossier Room

9:00 a.m.

## **Accessing the Impact of Environmental Disasters on Population Dynamics using Stochastic Matrix Models**

Ross A. Chiquet, University of Louisiana Lafayette

We develop matrix population models which account for demographic stochasticity. We investigate how reduction in the survival rates affects the sperm whale population. Then, we investigate the long term effect of a catastrophic event on the population of sperm whales in the Gulf of Mexico using different functions to model recovery.

9:25 a.m.

## **The Method of Approximate Fundamental Solutions for Elliptic PDE Problems**

Haiyan Tian, The University of Southern Mississippi

We use the method of approximate fundamental solutions for solving second and fourth order elliptic partial differential equations. The method is applicable to a general elliptic differential operator for which closed form fundamental solutions are unknown. Numerical examples are given to show the effectiveness of the method.

9:50 p.m.

## **Estimation of Diffusion Rate and Biased Movement Parameters with Mean Occupancy Time**

Xiuquan Wang, Tougaloo College

The movement of Insects inhabiting a spatial environment are not completely random but toward a more favorable location. We added an advection term to a basic diffusion model to describe local biased dispersal of species. The biased movement parameters and diffusion rate are estimated based on mean occupancy time.

## **Faculty Presentations: Session D**

Saturday, February 27<sup>th</sup>,

9:00 a.m. – 10:15 a.m.

University Center, Webster Room

9:00 a.m.

## **Intermediate Value Theorem, Mean Value Theorem, and Rolle's Theorem via Mathematical Animations**

Tilak de Alwis, Southeastern Louisiana University

In a traditional calculus class, we cover the topics such as Intermediate Value Theorem (IVT), the Mean Value Theorem (MVT), and Rolle's Theorem using static diagrams and calculations. In this talk we will show how to use modern computer algebra systems such as *Mathematica* to enhance the traditional instruction methods using mathematical animations. Such dynamic environments help students to gain further insights into seemingly abstract theorems.

9:25 a.m.

## **On a Rectangular Hyperbola and Two Conjugate Sheaves of Circles: 2nd Order Curves on a Football Field**

M. Longla, University of Mississippi

Yu. V. Pavlyuchenko, Peoples' Friendship University of Russia

Our talk illustrates in a rather peculiar example of Dewey's problem-based learning. On

the example of a soccer game, we take a student from the concept of analytical geometry, beyond the standard course and encourage the students to a deeper study of the interesting and nontrivial topic of geometry as sheaves of circles.

9:50 a.m.

### **The Mathematics of Perspective Drawing**

David Gurney, Southeastern Louisiana University

Usually artists use straight edges aligned to vanishing points, along with other tools, to create perspective drawings. This talk looks at some of the mathematics – including geometric sequences, inverse functions, and equation solving – underlying the artistic process.

## **Faculty Presentations: Session E**

Saturday, February 27<sup>th</sup>,

9:00 a.m. – 10:15 a.m.

University Center, Caddo-Bossier Room

9:00 a.m.

### **Mobile Devices as a Means to Promote Mathematical Discourse**

Jana Talley & Lecretia A. Buckley, Jackson State University

This study employs exploratory research methods to determine the usefulness of mobile devices in promoting mathematical dialogue in undergraduate classrooms. An instructor interview, classroom observations, and student surveys were analyzed to identify instructional practices that facilitate successful implementation of mobile devices as components of student response systems.

9:25 a.m.

### **"Digital Natives" Do Digital Math**

Lenny Ornas, McNeese State University

While millennial students have been brought up with computers, smart phones, and omnipresent internet access their whole lives, their abilities using these tools to do mathematics has been dubious, at best. In this talk, we discuss a new course we are implementing at McNeese State to address these shortcomings.

9:50 a.m.

### **Projects in Elementary Statistics**

Melissa Myers and Julie Roy, University of Louisiana at Lafayette

We will present projects that can be used in Elementary Statistics classes and discuss how the purpose is more than just an assignment. We will share our experiences and discuss the excitement, enjoyment, and engagement the students experience while discussing, designing and carrying out projects.

# Biographies

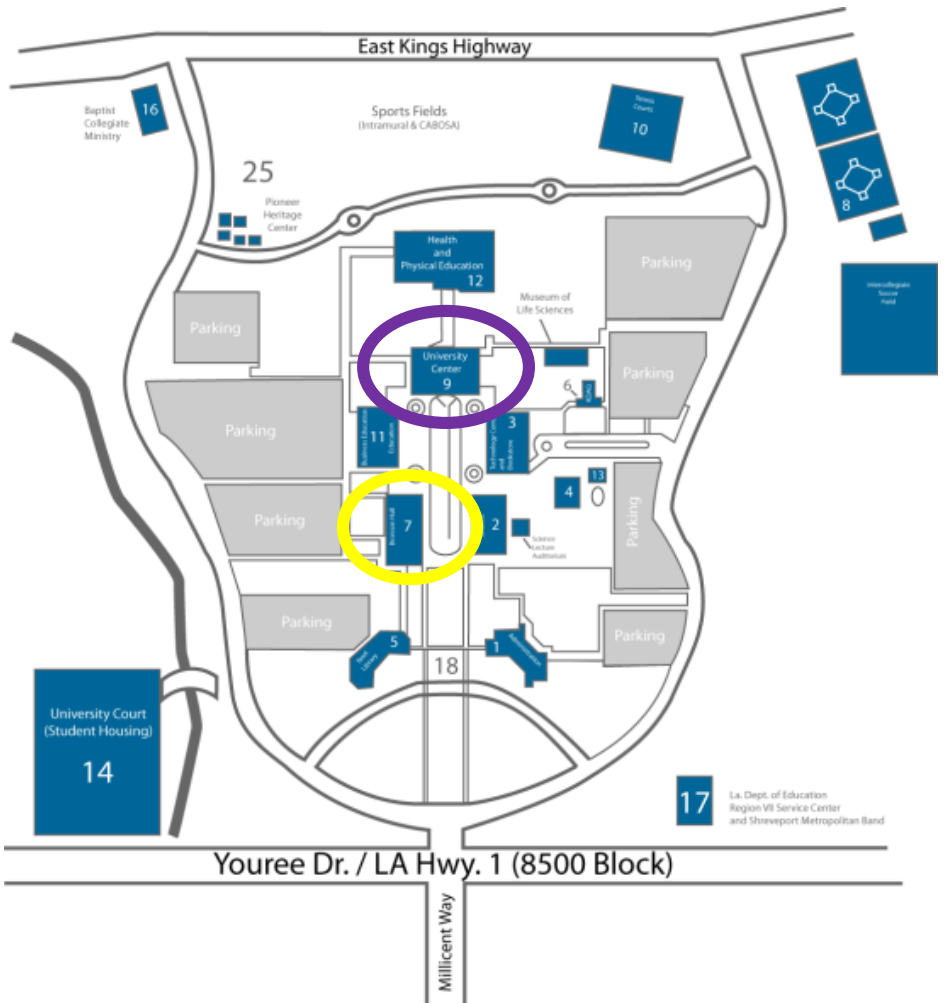
**Dr. Deanna Haunsperger** is a Professor of Mathematics at Carleton College in Minnesota. Since her own undergraduate days at a small liberal arts college in Iowa, Deanna has been interested in increasing the number of students who pursue advanced degrees in mathematics. That passion has guided her as a former co-editor for Math Horizons (the Mathematical Association of America's magazine for undergraduates) and as co-founder and co-director of Carleton's Summer Mathematics Program for Women (a successful, intensive four-week summer program to encourage talented undergraduate women to pursue advanced degrees in the mathematical sciences). She has chaired the MAA's Strategic Planning Committee on Students and the Council on Outreach. Currently Deanna is President-Elect of the MAA. Deanna is married to fellow mathematician Steve Kennedy, and together they have two grown children.

**Steve Kennedy** is a Professor of Mathematics at Carleton College and Senior Acquisitions Editor for MAA Press. He earned a PhD from Northwestern University and a BS from Boston University. In addition to Carleton, he has taught at Loyola (Chicago) University, the University of Delaware, and Saint Olaf College. He was co-Editor (with Deanna Haunsperger) of Math Horizons from 1999-2003. He has published two books with MAA Press: *The Edge of the Universe* and *A Century of Advancing Mathematics*. He co-founded and has co-directed (again with Deanna Haunsperger) since 1994 the Carleton Summer Mathematics Program for Women which, as of this writing, enjoys more than 85 alumnae with earned PhDs.

**Rick Mabry** is freshly retired after twenty-six years of posing as a math professor at LSU Shreveport. His duties included teaching courses representing most of the subjects in the undergraduate math curriculum, about which he posed as knowledgeable. In a parallel life, and with a comparable amount of noise, Mabry also posed as the drummer in local bands of various styles. These included country music, blue grass, Cajun, and for his longest stint, big band jazz. But in truth, he was strictly rock and roll. In 2010 he suddenly found himself as the holder of an endowed professorship, again ill-equipped to play the part. Nevertheless, he tried to use the role to drum up business for his math department. He was successful to this extent: at the time of his departure in 2015, a number of mathematics majors still remained. Professor Mabry's mathematical legacy also includes some very shady research, and he is reported to have discovered the perfect way to slice a pizza.

**Michael Starbird** is a Professor at The University of Texas at Austin. His teaching has been recognized with many awards including the MAA's Haimo Award. He has produced DVD courses in the Great Courses Series on calculus, statistics, probability, geometry, and the joy of thinking, and a MOOC entitled Effective Thinking Through Mathematics. His books include Inquiry Based Learning textbooks and, with co-author Edward Burger, *The Heart of Mathematics: An invitation to effective thinking* and *The 5 Elements of Effective Thinking*.

# Map



## Event Locations:

- 7. Bronson Hall (circled in gold)
- 9. University Center (circled in purple)
- 12. HPE Gym

The following businesses have supported our meeting.  
We ask you to support them while you are in town.



**7141 Youree Drive**  
**Open**  
**10:30 am - 9 pm**  
**Thursday**  
**10:30 am - 10 pm**  
**Friday and**  
**Saturday**



**7241 Youree**  
**Drive**  
**Open Thursday**  
**10 am - 11 pm**  
**Open Friday**  
**10 am - 1 am**



**8510 Youree Drive**  
**Open 11 am - 9 pm**

**The following publisher has supported our meeting. We ask you to support them by visiting the exhibits.**



Contact: Kate Gallagher  
[kgallagher@hawkeslearning.com](mailto:kgallagher@hawkeslearning.com)  
1-800-426-9538

**HAWKES**  
L E A R N I N G

**The LSU Athletics Department invites you to attend Friday's basketball games in the HPE building. Women at 5:30 and Men at 7:30. Just show your badge for free admission.**

**Go Pilots!**

# Schedule of Events

## Thursday, February 25<sup>th</sup>

Registration	5 p.m. – 7 p.m.	Bronson Hall Lobby
Integration Bee	6:30 p.m. – 9 p.m.	Bronson Hall, Room 101
Video and Pizza	7:30 p.m. – 8 p.m.	Bronson Hall, Room 101

## Friday, February 26<sup>th</sup>

### All activities in the University Center

Registration	8 a.m. – 4 p.m.	Second Floor Lobby
Team Competition	8:30 a.m. – 11 a.m.	Ballroom
Section NExT	8:30 a.m. – 11:30 a.m.	Webster Room
Exhibits	9 a.m. – 5 p.m.	Red River Room
Student Luncheon	11:15 a.m. – 12:45 p.m.	Ballroom
Plenary Address	1 p.m. – 2:15 p.m.	Theatre, first floor
Student Papers	2:30 p.m. – 4:50 p.m.	Caddo-Bossier Room
Contributed Papers A	2:30 p.m. – 5 p.m.	Webster Room
Contributed Papers B	2:30 p.m. – 5 p.m.	Desoto Room
R.D. Anderson Lecture	5:15 p.m. – 6:15 p.m.	Theatre, first floor
Anderson Banquet	6:30 p.m. – 8:30 p.m.	Ballroom
LSUS Basketball games	5:30 and 7:30 free admission	HPE gym

## Saturday, February 27<sup>th</sup>

### All activities in the University Center

Registration	8 a.m. – 10 a.m.	Second Floor Lobby
MAA Liaison Breakfast	8 a.m. – 9 a.m.	Red River Room
Exhibits	9 a.m. – 11 a.m.	Red River Room
Contributed Papers C	9 a.m. – 10:15 a.m.	Webster Room
Contributed Papers D	9 a.m. – 10:15 a.m.	Desoto Room
Contributed Papers E	9 a.m. – 10:15 a.m.	Caddo-Bossier Room
Outstanding Teacher Address	10:30 a.m. – 11:30 a.m.	Theatre
Business Meeting	11:45 a.m. – 12:45 p.m.	Theatre
Executive Committee	1 p.m. – 2 p.m.	Pilots Room