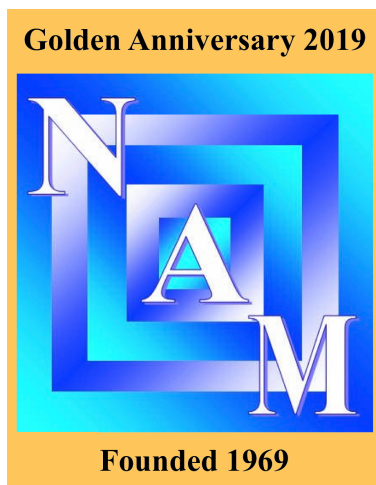


National Association of Mathematicians, Inc.

## Regional Faculty Conference on Research and Teaching Excellence

March 24-25, 2017

Morehouse College  
Atlanta, Georgia



<http://nam-math.org/fcrte.html>

# Regional Faculty Conference on Research and Teaching Excellence (FCRTE)

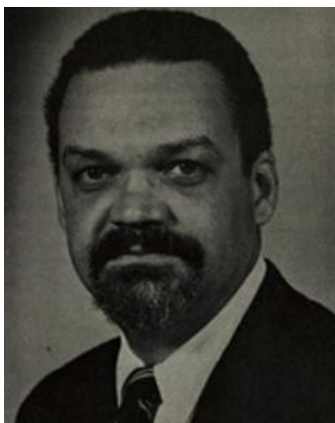
The National Association of Mathematicians (NAM) is a non-profit professional organization in the mathematical sciences with membership open to all persons interested in the mission and purpose of NAM which are (1) promoting excellence in the mathematical sciences and (2) promoting the mathematical development of all underrepresented minorities. NAM was founded in 1969; in 2019, we will celebrate our 50th anniversary.

NAM has five meetings every year: the Computational Sciences Institute in the Early Summer Fall; the MAA MathFest in the Late Summer; the NAM MathFest in the Fall; the Joint Mathematics Meetings in the Winter; and the Regional Faculty Conference on Research and Teaching Excellence (FCRTE) in the Spring. The Faculty Conference on Research and Teaching Excellence (FCRTE) is a two-day meeting, typically Friday and Saturday in the Spring, which rotates around the country based on NAM's regional structure. The conference is geared for faculty from Historically Black Colleges and Universities (HBCUs). The conference consists of five components:

- A Short Course in Computational Science  
This is a two-hour course to be held on Friday as the conference begins.
- The Albert Turner Bharucha-Reid Lecture  
This is an hour-long talk which proceeds the Friday banquet.
- Recognition Banquet  
This dinner takes place Friday evening.
- Contributed Talks  
Eight faculty speakers may present on topics of their choice. Each faculty speaker has 25 minutes to present with 5 minutes of questions and answers. The talks will be held on Saturday.
- Regional Panel Discussion  
A discussion to focus on issues relevant to the region in which the conference is held. The conference will close out on Saturday with this discussion.

More information can be found at the website <http://nam-math.org/fcrte.html>.

## Albert Turner Bharucha-Reid Lecture



The Albert Turner Bharucha-Reid Lecture series was inaugurated in 1994 during NAM's year-long "Twenty Fifth Year Observance." It is named in honor of Albert Turner Bharucha-Reid, an internationally recognized mathematician on random polynomials. The inaugural lecture was given by Professor Tepper Gill of Howard University who had written his Ph.D. dissertation under the direction of Professor Bharucha-Reid. The Lecture is to be given annually at the Faculty Conference on Research and Teaching Excellence. A partial list of past Bharucha-Reid Lectures can be found at the website

<http://nam-math.org/bharucha-reid-lecture.html>

# Schedule

<b>Friday, March 24</b>	
1:00 PM - 5:00 PM Dansby 200	On-Site Registration
1:30 PM - 1:45 PM Ramada Plaza	Shuttle Leaves Ramada Plaza for Morehouse
2:00 PM - 2:30 PM Dansby 200	<b>Conference Welcome and Introductions</b> Edray Herber Goins, President of NAM Tuwaner Hudson Lamar, NAM Region A Representative Duane Cooper, Department Chair of Mathematics at Morehouse Michael Hodge, Associate Provost for Research, Scholarship, and Creative Production at Morehouse
<b>AFTERNOON SESSION</b>	<b>Moderator: Jose Lugo (College of Coastal Georgia)</b>
2:30 PM - 3:30 PM Dansby 200	<i>Prof. Claude B. Dansby:</i> <i>A Legendary Professor of Mathematics at Morehouse College</i> Johnny L. Houston (Elizabeth City State University)
3:30 PM - 4:30 PM Dansby 200	<i>Age Perceptions, Knowledge, and Preventive Behaviors Regarding Cervical Cancer: Analysis from the 2005 Health Information National Trends Survey (HINTS)</i> Samuel Dolo (Savannah State University)
4:30 PM - 5:00 PM	Beverage Break
5:00 PM - 6:00 PM Dansby 200	<b>Albert Turner Bharucha-Reid Lecture</b> <i>Modeling the Dynamics of the Human Sleep/Wake Cycle</i> Shelby Nicole Wilson (Morehouse College)
6:30 PM - 6:45 PM Dansby	Shuttle Returns to Ramada Plaza
7:00 PM - 9:00 PM Ramada Plaza	<b>Recognition Banquet</b> Special Presentation by Sylvia Bozeman (Spelman College) and Johnny Houston (Elizabeth City State University), NAM Golden Anniversary Committee Co-Chairs

<b>Saturday, March 25</b>	
8:00 AM - 12:00 PM Dansby 200	On-Site Registration
8:00 AM - 8:15 AM Ramada Plaza	Shuttle Leaves Ramada Plaza for Morehouse
8:00 AM - 9:00 AM Dansby 200	<b>Continental Breakfast</b> Catered by Q-Time Restaurant
<b>MORNING SESSION</b>	<b>Moderator: Edray Herber Goins (Purdue University)</b>
9:00 AM - 10:00 AM Dansby 200	<i>SAGBI bases and a Topology on Initial Algebras</i> Mohammed Tesemma (Spelman College)
10:00 AM - 11:00 AM Dansby 200	<i>Evolution Equation of Epitaxially Strained Thin Solid Films</i> Wondimu Tekalign (Savannah State University)
11:00 AM - 12:00 PM Dansby 200	<i>Funding Opportunities at the National Science Foundation</i> Tasha Inniss (National Science Foundation)
12:00 PM - 1:00 PM Dansby 200	<b>Box Lunch and Regional Business Meeting</b> Tuwaner Lamar (NAM Regional A Member), Presiding Lunch catered by Jason's Deli
<b>AFTERNOON SESSION</b>	<b>Moderator: LaTriece Tanksley (Savannah State University)</b>
1:00 PM - 2:00 PM Dansby 200	<i>Creating Population Variety in Simulating Sampling Distributions</i> Gerald Agbegha (Georgia Gwinnett College)
2:00 PM - 3:00 PM Dansby 200	<i>A study of the Topology of Magnetic Helicity and its Application to the Spheromak</i> Ronald Williams (Florida A&M University) Roselyn Williams (Florida A&M University)
3:00 PM - 3:30 PM	Beverage Break
3:30 PM - 5:00 PM Dansby 200	<b>Regional Panel Discussion</b> <i>Best Practices for Maintaining a Research Program at an HBCU</i> Torina Lewis (Clark Atlanta University) Mohammed Tesemma (Spelman College) Ulrica Wilson (Morehouse College) Moderator: Duane Cooper (Morehouse College)
5:00 PM - 5:15 PM Dansby 200	Closing Session/Wrap-up Adjournment
5:30 PM - 5:45 PM Dansby	Shuttle Returns to Ramada Plaza

# Attendees

Name	Affiliation	E-Mail
Gerald Agbegha	Georgia Gwinnett College	gagbegha@ggc.edu
Fred Bowers	Spelman College	fbowers@spelman.edu
Robert Bozeman	Morehouse College	rbozeman2@bellsouth.net
Sylvia Bozeman	Spelman College	sbozeman2@bellsouth.net
Curtis Clark	Morehouse College	curtis.clark@morehouse.edu
Duane Cooper	Morehouse College	Duane.Cooper@morehouse.edu
Samuel Dolo	Savannah State University	dolos@savannahstate.edu
Edray Herber Goins	Purdue University	egoins@purdue.edu
Johnny L. Houston	Elizabeth City State University	jlhouston602@gmail.com
Tasha Inniss	National Science Foundation	tinniss@nsf.gov
Tuwaner Lamar	Morehouse College	tlamar@morehouse.edu
Torina D. Lewis	Clark Atlanta University	tlewis@cau.edu
Jose Lugo	College of Coastal Georgia	jllsjlls@gmail.com
Chuang Peng	Morehouse College	chuang.peng@morehouse.edu
Mohammed Tesemma	Spelman College	mtesemma@spelman.edu
Wondimu Tekalign	Savannah State University	tekalignw@savannahstate.edu
LaTrice Tanksley	Savannah State University	tanksleyl@savannahstate.edu
Raymond Williams, Sr.	Mississippi Valley State University	rw2@mvsu.edu
Ronald Williams	Florida A&M University	Roselyn.Williams@famou.edu
Roselyn Williams	Florida A&M University	Roselyn.Williams@famou.edu
Shelby Wilson	Morehouse College	shelby.wilson@morehouse.edu
Ulrica Wilson	Morehouse College	uwilson@morehouse.edu

# Abstracts

1. Gerald Agbegha (Georgia Gwinnett College)

*Creating Population Variety in Simulating Sampling Distributions*

Saturday, 1:00 PM - 2:00 PM

An understanding of statistics and their sampling distributions is a prerequisite for understanding statistical inference. For a student with basic knowledge about independent and identically distributed (iid) random variables, basic results concerning the mean and standard deviation of a statistic are easy to obtain. However, understanding and proving the results such as the central limit theorem is hard even for students who have advanced knowledge of probability. The next best thing is to put the student through exploratory exercises using simulation as the propellant. The role of simulation in helping students understand abstract or difficult concepts in statistics has been addressed in the literature. By using simulation, we hope to help the student have a deeper understanding of these results through inductive generalization. A key requirement of inductive generalization is to show that results hold true for a wide variety of situations; in this case a variety of distributions (populations). In this presentation, the concept of a fanout distribution is used to achieve such variety. Students use a “Fanout” excel program to study sampling distributions and are able to learn some phenomena related to sampling distribution and changes in sample size.

2. Samuel Dolo (Savannah State University)

*Age Perceptions, Knowledge, and Preventive Behaviors Regarding Cervical Cancer:*

*Analysis from the 2005 Health Information National Trends Survey (HINTS)*

Friday, 3:30 PM - 4:30 PM

Cervical cancer is considered to be the third most common type of cancer in women, and the second largest cause of deaths in women. Its toll is greatest in population that lack screening programs to detect precursor lesions (Roden, 2006). Almost all cervical cancer is caused by HPV (Human Papillomavirus), a common virus that is spread through sexual intercourse. It is widely believed among experts that most women who are diagnosed with cervical cancer today have not had regular pap smears or they have not followed up on abnormal Pap smear results. But the question is how knowledgeable are women regarding this deadly disease which is curable when detected early. To examine the current state of cervical cancer perceptions and prevention knowledge among U.S. adults, we analyzed data from the 2005 Health Information National Trends Survey (HINTS), which in a series of open-ended question, asked respondents to cite all the strategies for preventing cancer of which they were aware. The results indicate that women ages 50 - 64 were the most opinionated regarding the characteristics of cervical cancer.

3. Johnny L. Houston (Elizabeth City State University)

*Prof. Claude B. Dansby: A Legendary Professor of Mathematics at Morehouse College*

Friday, 2:30 PM - 3:30 PM

The influence and impact of Prof. Claude B. Dansby on the mathematical sciences community in the Atlanta University Center and Beyond.

4. Tasha Inniss (National Science Foundation)

*Funding Opportunities at the National Science Foundation*

Saturday, 11:00 AM - 12:00 PM

In this session information will be provided about the various programs and funding opportunities in the Directorate for Education and Human Resources at the National Science Foundation. Time permitting, strategies for developing competitive proposals will also be presented.

5. Wondimu Tekalign (Savannah State University)

*Evolution Equation of Epitaxially Strained Thin Solid Films*

Saturday, 10:00 AM - 11:00 AM

We consider a continuum model for the evolution of an epitaxially-strained dislocation-free thin solid film on a deformable substrate in the absence of vapor deposition. By using a thin film approximation we derived a nonlinear evolution equation. We examined the nonlinear evolution equation and found that there is a critical film thickness below which every film thickness is stable and a critical wave number above which every film thickness is stable. We developed a numerical method for the evolution of strained solid films under the thin film approximation. The numerical method was used to characterize the family of equilibrium shapes in terms of the film thickness and the spatial periodicity for both two-dimensional (island ridge) and three-dimensional (quantum dot) morphologies.

6. Mohammed Tesemma (Spelman College)

*SAGBI bases and a Topology on Initial Algebras*

Saturday, 9:00 AM - 10:00 AM

In this talk I will introduce the concept of SAGBI bases: A special set of generators for subalgebra of polynomial/Laurent polynomial rings. I will state some results in relation to invariant theory. Finally I will conclude with the summer REU that I supervised at Clemson University in 2013 about a topological space on initial algebras.

7. Ronald Williams (Florida A&M University)

Roselyn Williams (Florida A&M University)

*A study of the Topology of Magnetic Helicity and its Application to the Spheromak*

Saturday, 2:00 PM - 3:00 PM

The purpose of our study is to develop the mathematical theory to describe and analyze the behavior of a spheromak plasma. This is a collaborative effort with the Spheromak Turbulent Physics Experiment (STPX) located at Florida A&M University. We present the results of the study of the topology of magnetic helicity in order to develop mathematical models to describe the helicity, reconnection and confinement of the magnetic fields of the spheromak plasma. We investigate the structures of the homotopy groups of the tori, knots, braids, and their relation to twisting, knotting, braiding and tangle of the magnetic fields.

8. Shelby Wilson (Morehouse College)

Albert Turner Bharucha-Reid Lecture: *Modeling the Dynamics of the Human Sleep/Wake Cycle*

Friday, 5:00 PM - 6:00 PM

Sleep is a behavioral state in which we spend nearly one third of our lives. This biological phenomenon clearly serves an important role in the lives of most species. While much effort has been put forth in understanding the nature of sleep, many aspects of sleep are still not well understood. Here, we present a Morris-Lecar type, ODE model of human sleep-wake regulation with thermoregulation and temperature effects. Simulations of this model show features previously presented in experimental data such as elongation of duration and number of REM bouts across the night as well as the appearance of awakenings due to deviations in body temperature from thermoneutrality. The model highlights how temperature effects interact with sleep history to effect sleep regulation. We will discuss the dynamics associated with the model as well as how the model could be used as a foundation for experimental simulations pertaining to jet lag, sleep deprivation, and temperature effects on sleep.