

# MATHEMATICS NEWSLETTER

NEWS FOR THE UNDERGRADUATE

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Editor, Bisa Meek  
[www.math.ncsu.edu/undergrad](http://www.math.ncsu.edu/undergrad)

Fall 2004  
Volume X, Issue 1

## ... Meet De Shane Spears

De Shane is a senior in the Applied Math Degree Program from Dunn, North Carolina. He is also pursuing a Minor in Accounting. De Shane is laid back, but tries to stay busy with his studies and work. When not busy he is relaxing and trying to recuperate.

As a high school student, De Shane's strength was in Mathematics. De Shane's first choice was Mechanical Engineering, but was admitted to Applied Math. He considered switching to Engineering after completing the necessary courses, but decided he wanted to finish in Math. Mathematics was not what he expected. He did not realize high-level mathematics was so abstract. Some of the 'simple' concepts required great effort to understand and extra studying. De Shane has enjoyed learning the theorems, axioms, postulates, etc. that are the basis of the high school math he enjoyed - understanding why and how mathematical concepts work.

*"Mathematics has forced me into a new way of thinking."*

Outside of mathematics, De Shane is a member of the Society of Undergraduate Mathematics (SUM Club), observed presentations at a MAA/SIAM event held at Clemson, and participated in the ICM Competition. Though considering graduate school, he is going to take a break from the reading and studying to do some personal research. De Shane hopes the personal research will help him make a more informed decision about his course of graduate study.

De Shane encourages freshmen to take their core classes as early as possible, and take advantage of the many summer research and internship opportunities. Get to know your professors, especially through their office hours. There is plenty of tutoring available when courses become difficult.

## Inside this issue

- Accolades 2**
- Course Advertisements 3**
- Departmental News 4**
- News & Accolades continued 5**
- New Masters Program 6**

## Mathematics Electives

*These classes may be used as Advanced Math Elec. (GRP 002).*

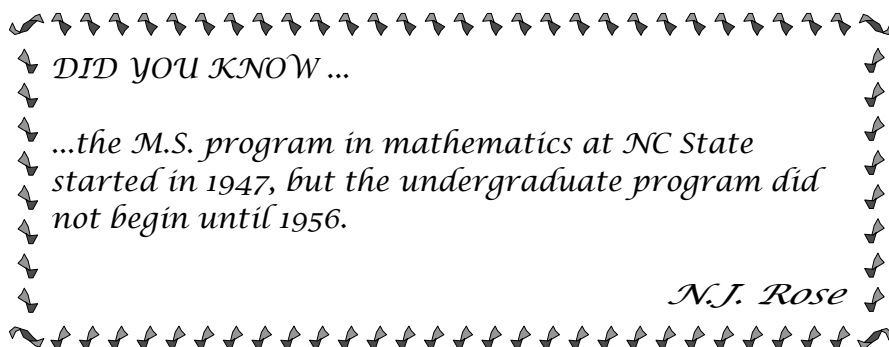
### SPRING 2005

- \* MA 325 Intro. to Appl. Math.
- MA/LOG 335 Symbolic Logic
- MA 341 Appl. Diff. Equations I
- MA 401 Appl. Diff. Equations II
- MA 405 Intro. to Linear Algebra and Matrices
- MA 408 Found. of Euclidean Geometry
- MA 410 Theory of Numbers
- \* MA 413 Short-Term Actuarial Models
- MA/CSC 416 Intro. to Combinatorics
- MA 421 Intro. to Probability
- MA 426 Mathematical Analysis II
- \* MA/CSC 428 Intro. to Numerical Analysis II
- \* MA 432 Mathematical Models in Life and Soc.Sci.
- MA 433 History of Math.
- MA 437 Appls. of Algebra
- MA 493M Major Paper in Math. Supplement
- MA 501 Adv. Math. for Engineers and Scientists I
- MA 502 Adv. Math. for Engineers and Scientists II
- MA/OR 505 Linear Programming
- MA 512 Adv. Calculus II
- MA 513 Intro. To Complex Variables
- MA 520 Linear Algebra
- MA 521 Abstract Algebra I
- MA 537 Nonlinear Dynamics and Chaos
- \* MA 544 Comp. Experiments In Mathematical Prob.
- MA 547 Financial Math.
- MA 555 Intro. to Manifold Theory
- \* MA/BMA 574 Mathematical & Exper. Mod. of Phys. Processes II
- MA/CSC 580 Numerical Analysis I
- MA/CSC 583 Intro. to Parallel Computing
- MA 587 Num. Sol. of Partial Diff. Eqs.--Finite Element Methods

MA 493M may not be used as advanced math elective

*\*These classes may be used for the math modeling requirement for AMA majors (GRP 004).*

*Class times are listed at  
[www.math.ncsu.edu/Courses/Sprg05.txt](http://www.math.ncsu.edu/Courses/Sprg05.txt)*



## Spring 2004 Graduates

### MATHEMATICS

Shon Donald-Shaheen Albert  
 Dylan Ascolese  
 Jilleah Gayle Boroughs  
 Meredith Leigh Boyd  
 \*Timothy Hobart Bushnell  
 Mark Jonathan Darby  
 Josh Dustin Douglas  
 \*Steven Michael Farrar  
 Jennifer Marie Guthrie  
 Hassan Shannon Hair  
 Kane Hamer  
 Keysha Michele Mayfield  
 Daniel Ray McCaskill  
 Paul Alexander Offen  
 Susan Elaine Replogle  
 \*Alexander Aaron Schlegel  
 Elizabeth Marie Smith  
 \*Nicholas Meyer Vance  
 Dorothy Amanda Wellons  
 William Jamison Winspear

### APPLIED MATHEMATICS

\*Jason Ryan Blevins  
 Heather Camille Cherry  
 Karen Elizabeth Donaghy  
 Matthew Williams Hamilton  
 Denise Faye Hammock  
 \*Mark Christopher Harris  
 Joshua Robert Hines  
 Erik Rollin Johnson  
 Jessica Suzanne King  
 \*KeTrena Suzanne Langhurst  
 Jennifer Karen Lawhorn  
 Joshua David Markwordt  
 \*Stephanie Shannon Morgan  
 \*Timothy David Mowrer  
 \*Vishal Manaklal Patel  
 Nikia Stanley  
 Mark Donald Sutton  
 Austin Severn Waters  
 Franklyn Jonas Wilson, III  
 Kevin Matthew Windham

\* completed Math Honors program

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### Spring 2004 SENIOR AWARDS

The College Senior Awards recognizes outstanding graduating seniors in three categories: Scholarly Achievement, Research, and Leadership. The following students were nominated by the Math department.

#### *Scholarly Achievement Winner*

Nicholas Meyer Vance

#### *Research Nominee*

Steven Michael Farrar

#### *Leadership Winner*

Alexander Aaron Schlegel

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## Scholarship Awardees

Departmental Scholarships are awarded several times throughout the year and are based on academic accomplishment as measured by grade point average, adequate progress towards a degree in mathematics, and difficulty of the courses taken, and sometimes financial need. Forms are available at [www.math.ncsu.edu/undergrad/scholarships](http://www.math.ncsu.edu/undergrad/scholarships).

*We would like to recognize math majors who have received scholarships this academic year.*

#### **Anderson Scholarship:**

David Roberson

#### **Mumford Scholarship:**

Robert Darwin

#### **Aspnes Scholarship: (none math)**

Mary Snipes, Kristen Spence, Allison Mc Carn

#### **Park Scholarship:**

Andrea Hernandez, De Shane Spears

#### **Banks Scholarship:**

David Roberson

#### **Petrea Scholarship:**

Jessica Page, David Robinson

#### **Dr. Bullock Scholarship:**

Jeffery Gaither

#### **Duke Energy Scholarship:**

Daniel Sikes

#### **Mrs. Bullock Scholarship:**

Joshua Clemons

#### **Park Scholars:**

Meghan McIntyre, Donald Warren, Albert Blackmon, Katherine Phillips, Nicholas Vance, Lucas Bilbro, Justin Brockman, Danielle Speller

#### **John T. Caldwell Scholarship:**

Jonathan Mc Daniel, Jessica Wagstaff

#### **Cell Scholarship:**

Richelle Hollingshead

#### **Caldwell Fellows:**

Jonathan Mc Daniel

#### **Chaney Scholarship:**

Rachel Chaves

#### **Chancellor's Leadership:**

Anthony Dixon, Shawanna Norman, Lynn Harris, Nikki James, Turhan Carroll, Eamonn Tweedy

#### **Goudes Merit Scholarshisp:**

David Roberson

## Course Advertisements

### MA 325: Introduction to Applied Mathematics

Prereq: MA 231 or MA 242  
Instructor: R. White

Introduces students with multivariable calculus to five different areas of applied mathematics. These areas will be five three-week modules, which lead to higher level courses in the application areas. Topics will vary, and examples of modules are heat and mass transfer, biology and population, probability and finance, acoustic and vibration models, mathematics of visualization, cryptography as well as others.

### MA 537: Nonlinear Dynamics and Chaos

Prereq: MA 341 and MA 405  
Instructor: J. Selgrade

In the past 25 years there has been an explosion of interest in nonlinear behavior, chaos, and fractals in the physical and biological sciences. Chaotic behavior has been observed in disciplines as diverse as meteorology, medicine, and economics. These phenomena may be introduced at an elementary level because often they are described by nonlinear difference equations which are discrete dynamical systems and are analyzed by studying iteration of functions. The course will introduce appropriate mathematical concepts, e.g., equilibrium, stability, bifurcation, and fractals. Software will be available so that students can perform computer experiments and discover for themselves the fascinating behavior of nonlinear dynamical systems.

### MA 544: Comp. Experiments in Mathematical Probability

Pre-requisite: MA 421  
Instructor: J. Silverstein

This class will explore the benefits of using computers to gain insight into mathematical behavior. Examples will be chosen from topics in probability theory which are not typically covered in other courses or which do not have a complete mathematical treatment at this time.



### MA 587 Course Description: Numerical Solution of PDEs, Finite Element Methods

Pre-req: A reasonable background in linear algebra, numerical analysis, and partial differential equations.  
Instructor: Z. Li

The finite element method is one of very important numerical methods for solving partial differential equations in science and engineering. In this introductory course, we will start with theoretical foundations and algorithm implementations for one-dimensional problems so that we can learn the essential tools that carry over to higher dimensions. The discussion of two-dimensional problems, some common used finite element spaces, error analysis, and other related topics including some applications of the finite element method will then be followed. Efforts will also be made on the issues of implementation and related software. Using the data from the Matlab mesh generation, the students will be able to implement finite element method using their favorite computer languages.

### MA 591B: Calc. & Diff. Eq. for Life Sci. Modeling – II

Pre-req: Calculus, Diff.Eq.  
Instructor: M. Olufsen

Emphasis will be to bring together students from mathematical and biological sciences to discuss the art of mathematical modeling. Students from biological sciences are expected to bring a problem that can be analyzed using mathematics, while mathematics students are expected to use their mathematical knowledge to help solve the proposed problems. During the course we will discuss a number of techniques for modeling including compartment models, Lotka Volterra's predator prey models, and more advanced models predicting behavior of physiological systems. We will spend a significant amount of time discussing how modeling comes about, designs, assumptions, and parameters. A significant component of this course will be to work on projects to solve or analyze problems related student research interests.

### MA 591X: Introduction to the Calculus of Variations

Pre-requisite: Ordinary diff.eq. and multivariable  
Instructor: X. Lin

Calculus of Variations deals with problems in physics, engineering and applied mathematics that are governed by maximum or minimum principles. It can be viewed as a generalization of finding extremal problems in calculus. One classical problem is the "Brachistochrone": a curve connecting two spatial points along which a particle can slide down in the shortest time. This is an introductory course accessible to advanced undergraduate and beginning graduate students.

### MA 798G: Theory for systems of conservation laws, Numerics for systems, and Applications

Pre-req: Advanced Calculus, Fortran, C/C++ or MATLAB.  
Instructor: P. Gremaud/H. Jenssen

Conservation laws play a central role in many applications: fluid flow, solid mechanics, electromagnetism, combustion, traffic flow etc. The class of equations constitute a field of pure and applied PDEs that has recently witnessed spectacular advances w.r.t. both theory and computations. This second part of MA 797-798 can be followed independently and will cover systems of equations and applications. Undergraduates are welcome to attend.

*Course Advertisements (Continued from page 3)***MA116: Intro. to Scientific Programming (Math)**

Pre-req: MA 141, and either PMS 100 or E 115

Instructor: J. Scroggs

Matlab is an excellent simulation/prototyping tool. This course is especially well-suited for students interested in numerical analysis, computational/applied mathematics, and other related (engineering) fields. Many courses in numerical analysis (e.g. MA 402, MA 427, and MA 428) use Matlab.

**MA 493M: Major Paper in Mathematics supplement**

Instructor: J. Scroggs

Designed for students satisfying one of their MAJOR PAPER degree requirements by taking a Math class that is not pre-approved (e.g. MA 432). Writing is mentored by the MA 493m instructor, while mathematical content is mentored by the companion course's instructor (e.g. For MA 432).

**2003 William Lowell Putnam Mathematical Competition**

**Owen Baker**, an NCSU student ranked 117<sup>th</sup> out of a group of 3615 contestants from 479 institutions including 18 students from NC State that took part in the competition. The only other NC Institution to compete, Duke, had four students place in the top 200. Students interested in competitions are encouraged to take MA 444. For more information on competitions and MA 444, please email Dr. Xiao-Biao Lin at [xblin@math.ncsu.edu](mailto:xblin@math.ncsu.edu) or visit [www.math.vt.edu/events/](http://www.math.vt.edu/events/).

## Student News

**Franklin Goldsmith** (2003) was awarded the NSF and DoD Fellowship and will be a first-year Ph.D. student in chemical engineering at MIT. He spent last year in Freiburg, Germany on a Fulbright grant for mathematics working at the Fraunhofer Institute for Solar Energy Systems and studying at the University of Freiburg.

**KeTrena Langhurst** (Class of 2004) was awarded the 2004 Gertrude Cox Award for Women in Graduate Statistics Programs.

**John May** (Graduate Student) won the ISSAC 2004 Distinguished Student Award for his paper "Approximate Factorization of Multivariate Polynomials via Differential Equations". The award is presented by the Assoc. for Computing Machinery, Special Interest Group on Symbolic and Algebraic Manipulation (SIGSAM).

**Undergraduate Research** This September, mathematics students participated in a new interdisciplinary workshop series held by the College of Charleston and UNC. The Southeastern Atlantic Mathematical Sciences workshop (SEAMS) aka. Cha-Cha Days presents research in applied mathematical sciences. Masters, PhDs, and Post-docs present research and undergraduates present research posters.

**Daniela Valdez-Jasso** was one of the undergraduates presenting her research. The "Modeling Pressure-Area Relation for Blood Flow in Arteries" poster is available for viewing outside Harrelson 255. You can email Daniela at [dvaldez@unity.ncsu.edu](mailto:dvaldez@unity.ncsu.edu).

**Charles Rogers** completed a Summer Research project with **Mark Darby**. The "Model Fitting and Parameter Estimation Applied to Norovirus" poster is available for viewing outside HA 255. You can email Charles at [crogers@unity.ncsu.edu](mailto:crogers@unity.ncsu.edu).

*"To be a scholar of mathematics you must be born with talent, insight, concentration, taste, luck, drive and the ability to visualize and guess."*  
-Paul R. Halmos

## Faculty Announcements

**Faculty announcements:** **Dr. Larry Norris** has been awarded the 2004 LeRoy and Elva Martin Teaching Award. **Dr. Hoon Hong** and **Dr. Kailash Misra** named outstanding teachers for 2003-2004, and are now members of the Academy of Outstanding Teachers. **Dr. Min Kang** just became a member of the Sigma Xi ([www.sigmaxi.org](http://www.sigmaxi.org)) scientific research society.

## Math Honors News

Eleven students completed the Math Honors Program in the Spring and Summer. Of these, KeTrena Langhurst is pursuing a Ph.D. in Statistics at NCSU, Alex Schlegel is studying for a masters in secondary education at Arizona State and Nick Vance is in the BS/MS program at NCSU. Jason Blevins is attending graduate school at Duke in economics, Timothy Bushnell, Steven Farrar, Timothy Mowrer are planning on graduate school. Mark Harris is working on his Ph. D. in physics at Cornell. Stephanie Morgan is in medical school at UNC. Vishal Patel is in the 5 year BS/MS program at NCSU and plans to go to grad school. Kenneth Running is working on a master's degree in aeronautical engineering at University of Maryland.

Timothy Mowrer received honorable mention for an NSF Fellowship. Previously Franklin Goldsmith received an NSF and DoD Fellowship and David Johnson received a Gates Fellowship. Justin Brockman and Brian Pike attended the Budapest Semesters in Mathematics in Spring 2004 and Will Davis is currently attending the Budapest Semesters. Mariya Bessonov is completing the MASS (Mathematics Advanced Study Semesters) Program at Penn State this fall. She, along with Justin Brockman, finished an REU at Cornell last summer and Brian Pike at Florida State. Six students, Vishal Patel, Josh Clemons, Mark Harris, Tim Bushnell, Nick Vance and Austin Waters presented results of their research to math faculty and students last spring. We expect several students to be presenting results of their research this semester. Times and places will be announced.

New students joining the Math Honors Program include: John Chester, Eric Kalendra, Subha Kollaru, Brandyn Lee, Chris Lunsford, Douglas Marks, Anthony Parise, Ben Perryman, Daniel Sikes, and Jason Yellick. Students interested in more information about the program should contact Dr. Paur at [sopaur@math.ncsu.edu](mailto:sopaur@math.ncsu.edu) or visit <http://www.math.ncsu.edu/honors>.

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## Pi Mu Epsilon

### Spring 2004 Initiates

Shon D Albert .....	<i>Mathematics</i>	Andrew Joseph Mallner .....	<i>Nuclear Engineering</i>
Michael Seth Bereman .....	<i>Chemistry</i>	Douglas David Marks .....	<i>Physics</i>
Mariya Yevgenyevna Bessonov .....	<i>Mathematics</i>	Jonathan Ray Mc Daniel .....	<i>Applied Mathematics</i>
Lucas Savage Bilbro .....	<i>Physics</i>	John St George O'Dowd .....	<i>Applied Mathematics</i>
Justin Samuel Brockman .....	<i>Physics</i>	Mohanraj Prabhugoud .....	<i>Mechanical Engineering</i>
Jenny Elizabeth Cameron .....	<i>Mathematics Education</i>	Jennifer Lou Price .....	<i>Aerospace Engineering</i>
John Joseph Chester Jr .....	<i>Mathematics</i>	David Robert Robinson .....	<i>Statistics</i>
Robert William Darwin .....	<i>Mathematics</i>	Abouzeid M Shalaby .....	<i>Physics</i>
James William Davis .....	<i>Mathematics</i>	De Shane Lee Spears .....	<i>Applied Mathematics</i>
Didier Fritz Deshommes .....	<i>Computer Science</i>	John Robey Stanley .....	<i>Physics</i>
Joel Isaac Robeson Gomez .....	<i>Chemistry</i>	Cameron Wayne Swofford .....	<i>Applied Mathematics</i>
John Tolliver Henderson .....	<i>Mathematics Education</i>	Maya Chenille Thompson .....	<i>Applied Mathematics</i>
Andrea C Hernandez .....	<i>Mathematics</i>	Catherine Elaine Tripp .....	<i>Chemical Engineering</i>
Adrian Kay Hutchinson .....	<i>Physics</i>	Eamonn Patrick Tweedy .....	<i>Physics</i>
Qunlei Jiang .....	<i>Computational Mathematics</i>	Bradley La Mont Webster .....	<i>Economics</i>
Subha Rani Kolluru .....	<i>Mathematics</i>	Rebecca Smith Wills .....	<i>Mathematics</i>
Margaret Corrinne Linak .....	<i>Chemical Engineering</i>	Philip Michael Woodward .....	<i>Mechanical Engineering</i>

### Phi Beta Kappa

Math Majors initiated Spring 2004:

Robert W. Darwin  
Margaret C. Linak

Jonathan R. McDaniel  
Daniel E. Sikes

***Congratulations!***

*"Defendit numerus:  
There is safety in numbers."*

*-anonymous*

## NEW—Masters of Financial Mathematics

**Overview** The Masters of Financial Mathematics program at North Carolina State University is a four-semester interdisciplinary graduate program integrating Agricultural and Resource Economics, Economics, Industrial Engineering, Mathematics, and Statistics courses. The program consists of six core courses and four elective courses as well as a semester-long research project or internship. The coursework is designed to provide students with a strong mathematical background, statistical and computational tools, and a comprehensive description of financial markets.

- ✓ **Internships** Our students have located internships with Citizen's Bank (Manchester, NH), Progress Energy (Raleigh, NC), SAS (Cary, NC), and Wachovia (Charlotte, NC).
- ✓ **Job Placement** Our graduates have found exciting, challenging work at Branch Banking and Trust (Winston-Salem, NC) and Progress Energy (Raleigh, NC).

**For More Information** Our website can be found at [www.math.ncsu.edu/finmath](http://www.math.ncsu.edu/finmath). Feel free to email [jmjones4@math.ncsu.edu](mailto:jmjones4@math.ncsu.edu) with questions.

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### North Carolina State University

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