



Fall 2023

NEWSLETTER

New Additions to the College of Science

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Every modern challenge facing human society involves mathematics and the sciences. Rising to meet those challenges requires chemists, biologists, physicists, engineers, and mathematicians to unite their disciplines. New technologies are making it easier than ever for these researchers to work together. The Integrative Science Initiative (ISI) will transform teaching, research, and discovery in the STEM fields at NC State by employing the latest technology, solving significant societal challenges, and training a new generation of interdisciplinary scientists. At the heart of this initiative is the new \$180 million Integrative Science Building (ISB), which will provide vital STEM teaching and research space that will catalyze transforming the sciences. At its center will be three initial research thematic areas to collaboratively study, synthesize, and screen molecules and molecular pathways in the context of human and animal disease. Interdisciplinary research and teaching across these themes will embrace cutting-edge technologies in shared spaces and core facilities provided by the ISI. Construction of the ISB started this summer and is slated to be finished in 2026.

Newsletter Contacts

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New Additions to the College of Science



A new building isn't the only addition to NC State. Dr. Lewis Owen has recently been appointed as the dean of the College of Sciences. Before his appointment, Dr. Owen served four years as a professor and head of the college's Department of Marine, Earth, and Atmospheric Sciences. During that time, he was on the development committee for the College of Sciences strategic plan and culture charter and was engaged in numerous initiatives to help nurture a diverse, equitable, and inclusive culture that values the experiences and perspectives of all. Owen's research and teaching focus on understanding the nature and dynamics of Quaternary paleoenvironmental change and landscape evolution, environmental geology, and natural hazards along active plate margins.

He has also undertaken innovative teaching, including study abroad experiences in the Himalayas, the Galapagos, and Bonaire. Owen received his Bachelor of Science with honors in geology from the Imperial College London, and his Ph.D. in geology and geography from the University of Leicester in the UK.

Source: <https://provost.ncsu.edu/university-interdisciplinary-programs/isb/>
<https://sciences.ncsu.edu/about/staff/meet-the-dean/>

Department Happenings

Monday, Oct. 16th, 7-8pm (SAS 2202) - SUM Club Meeting: Shopping Cart Day

Friday, Oct. 20th, 3-5pm (SAS 4201) - AWE Artificial Intelligence & Generative AI Workshop

Join Amazon Web Services(AWS) on October 20th for a comprehensive overview of artificial intelligence (AI) and its immense potential. Through high-level demos and captivating examples, explore the transformative applications of AI. Discover how AI can enhance current processes and unlock new opportunities. This in-person event is being led by Amazon Women in Engineering (AWE). AWE champions and advocates for women and gender-diverse people in technical roles through safe spaces, empathetic discussion, and education.

For questions about this workshop, please contact Prof. Mette Olufsen (msolufse@ncsu.edu) or Prof. Mansoor Haider (mahaider@ncsu.edu).

Monday, Oct. 30th, 7-8pm (SAS 2202) - SUM Club Meeting: Movie Night and Halloween Celebration

Monday, Nov. 13th, 7-8pm (SAS 2202) - SUM Club Meeting: Mathematical Insights Night

Monday, Nov. 27th, 7-8pm (SAS 2202) - SUM Club Meeting: End of Semester Celebration

April 4th-14th, 2024 (Titmus Theatre) - University Theatre Show: Ada and the Engine Mathematician Ada Byron Lovelace, daughter of the infamous Lord Byron, believes in the boundless potential of the “analytical engines” invented by her friend Charles Babbage. Constrained by the social rules of her day, Ada is determined to make her mark. Through love, friendship, and poetic dreams of the future, Ada creates a vision of the world where art and information converge to transform everything at the beginning of the British Industrial Revolution.

In April 2024, the NC State University Theatre will perform Ada and the Engine at Titmus Theatre. For more information about the show, visit <https://theatre.arts.ncsu.edu/events-calendar/ada-and-the-engine/>

SUM Club

The Society for Undergraduate Mathematics (SUM Club) is a student organization for students passionate about mathematics. We connect math undergrads and provide students with academic and professional development, leadership, and service opportunities. This is accomplished through social and outreach activities, presentations at meetings, career events, and other college- and university-wide involvement. Open to any student, math major, or otherwise, we meet on Mondays at 7:00 pm in the Undergraduate Math Lounge (SAS 2202) to get to know one another, do math puzzles, play games, learn together, and perform outreach.

We would love to have more people involved! Email us at ncsusumclub@ncsu.edu with any questions or to be added to our email list.



Stat Club

If you are interested in statistics or related professions or just want to meet and socialize with other statistics lovers, come join Stat Club. The purpose of the club is to expose people to the endless applications of statistics and what a career in statistics looks like by bringing in guest speakers from industry and academia. This is also a great way for members to network with industry professionals, NCSU faculty, and other statistics majors. Our meetings also consist of workshops to hone your marketability when applying for internships and opportunities. If you have any questions or want to be added to the mailing list, please email us at statistics-club@ncsu.edu. We hope to see you all soon!

Sports Analytics Club

The Sports Analytics Club at NC State is a student-run organization committed to the quantitative analysis of sports strategy and management.

This club is open to all students and faculty members of NCSU. The club encourages and enables students to share ideas and complete research projects on any topic related to sports statistics. We meet weekly on Monday nights at 6:30 pm in SAS Hall, room 1216. Email sportsanalytics@ncsu.edu if you would like to join our email list.

Putnam Club



2022 NCSU Putnam Winners (From left: Jarod Schneider, Mason McElroy, Etienne Phillips)

The Putnam Competition Club is a weekly problem-solving club based around preparation for the prestigious William Lowell Putnam undergraduate math competition. The Putnam Competition is hosted once annually in December, and the top scorers have included several respected researchers. Achieving a good score is often a resume booster! During the Putnam Competition Club meetings, we are motivated by solving interesting competition problems and developing problem-solving skills and mathematical knowledge. A typical meeting involves everyone working on trying to solve a problem -- either collaboratively or on their own -- and writing up solutions for practice. No prior competition experience or significant mathematical knowledge is necessary to participate and succeed, as the club is built around developing the necessary skills! Email ecphill6@ncsu.edu if you would like to learn more about The Putnam Competition Club.

Association for Women in Mathematics

The purpose of the Association for Women in Mathematics at NC State is to encourage women and girls to study and have active careers in the mathematical sciences and to promote equal opportunity and equal treatment of women and girls in the mathematical sciences. Events held by AWM include Sonia Kovalevsky Day on April 15, 2023, and an annual Math Research Competition.

Math Honors Program

The Math Honors Program began in the mid-1960s as a means of encouraging excellent undergraduates to pursue a program that would challenge their abilities and better prepare them for their postgraduate career. Since that time, the program has grown from an average of four to five participants, with one to two completing the program each year, to an average now of about 35–40 participants, with 10–14 students completing the program each year. More than half of the participants are double majoring in math and another area such as physics, computer science, math education, chemistry, engineering or a foreign language.

More information can be found by visiting

<https://math.sciences.ncsu.edu/undergraduate/undergraduate-programs/math-honors-program/>

Summer 2024 DRUMS: Directed Research for Undergraduates in Math and Statistics

The Mathematics and Statistics Departments of North Carolina State University invite qualified applicants for a Research Experiences for Undergraduates (REU) program that pairs mathematics and statistics students for interdisciplinary summer research projects.

Proposed projects span collaborative applications in atmospheric science, materials science, cardiovascular disease, precision medicine, climate change and wildland fires using tools from linear algebra, partial differential equations, probability, sensitivity analysis, parameter inference, optimization, and machine learning. In addition to the technical aspects of the program, students also receive background on useful auxiliary skills like mathematical programming, technical writing, applying for graduate school, and preparing scientific presentations.

Most DRUMS students will work at NCSU for 10 weeks during summer and remotely during the 2024 fall semester; some students may participate remotely for the entire program.

Formal summer activities will be announced. The work during the fall semester will be conducted online. Time commitment for this part of the program will be approximately 5 hours per week including a 1h weekly remote meeting.

We encourage students of all backgrounds to apply. This includes students who might have nontraditional mathematical and/or statistical training, or who are just beginning their mathematical studies. For more information, please visit:

<https://drums.wordpress.ncsu.edu/>

M.S. Foundations of Data Science

NC State's new Master's program in Foundations of Data Science (MSFDS) has now launched! MSFDS is a terminal professional degree program based on course work and integrated professional development activities. The program will equip its graduates with both depth and breadth, balanced across three core disciplines lying at the heart of data science. No research, thesis or comprehensive examination is required. MSFDS students are normally self-supported. In addition to a full-time on-campus option, part-time and online options are also available. Current Mathematics and Applied Mathematics majors also have an Accelerated Bachelor's/Master's (ABM) option available. For more information, please contact Dr. Mansoor Haider (mahaider@ncsu.edu) or fill out the interest form on our website.

Priority deadline for Fall 2024 admission: January 31, 2024
For more information or to apply visit: <https://go.ncsu.edu/fds>

Advanced Mathematics Courses

MA 326 Mathematical Foundations of Data Science

Instructor: Hangjie Ji

What are the key mathematical concepts underlying powerful machine learning models? In this course, we will cover foundational mathematical concepts essential to data science and data-driven mathematical modeling. We will discuss basics of machine learning, unconstrained optimization, neural networks and overfitting, parameter estimation and sensitivity analysis for mathematical models, and an introduction to topological data analysis. By applying these concepts to real and synthetic data, the students will be exposed to both practical and analytical aspects of basic data science tasks. Some familiarity with programming will be beneficial for students taking this course. Note that this course is an acceptable advanced math elective for MA/AMA majors.

MA 432 Mathematical Models in Life and Social Sciences

Instructor: Mette Olufsen

The aim of this course is to provide fundamental skills to build and analyze mathematical models that can be applied to areas within biological (primarily) and social sciences. This course aims to introduce skills necessary for modeling, including analysis of problems, model design, identification of the model type (focus will be on models that can be solved using ODEs), and discussion of solution and analysis methods. For the latter, the focus will be on understanding how sensitivity analysis and parameter estimation can be used as part of this process. Techniques will be built using an examples approach, where we, during the semester, will discuss a number of classical model types used to study biological and social science questions.

The Caldwell Fellows

The Caldwell Fellows Program seeks first-year university students who are engaged in the life of the community (both on and off campus), who are curious, natural leaders, and who are willing to learn and reflect on themselves. The program provides intensive leadership development opportunities, volunteer service, and experiential learning opportunities. It also includes an annual \$6,300 tuition scholarship and access to an annual \$2,700 experiential learning grant.

The application can be found in Pack Assist. If you decide to complete and submit the application, the deadline to apply is January 8, 2024, including designating a recommender to submit answers to questions about your candidacy, your transcript from the Fall semester, several essays you will write, and a short video you will create. If you have any questions, please feel free to contact Chester Brewer, Associate Director at ckbrew2@ncsu.edu.

Dr. Duca's Achievement as Alumni Distinguished Undergraduate Professor

In the spring of last year, Alina Duca was honored as an Alumni Distinguished Undergraduate Professor for the 2022-23 academic term. This esteemed award, sponsored by the NC State Alumni Association and administered by the Office of the Executive Vice Chancellor and Provost, as well as the Office for Faculty Excellence, stands as a top recognition for exceptional undergraduate teaching at NC State. Throughout her faculty appointment at NC State, Alina will proudly hold this well-deserved distinction.



We want to take a moment to congratulate Alina on this exceptional accomplishment and commend her for her profound contribution to the teaching mission and vision of NC State.

Source: <https://math.sciences.ncsu.edu/2023/04/17/alina-duca-wins-the-alumni-distinguished-undergraduate-professor-award/>

Student Excellence Award



Etienne Philips

Congratulations to Etienne Philips for being awarded the Student Excellence Award from the College of Science Advancement Office.

The award honors one Senior and one Graduate student who demonstrates exemplary leadership qualities within the college and across NC State. Leadership roles may include community service, philanthropy, campus involvement, research or leadership in the classroom.

Undergraduate Updates

Miranda Powers



Hello! My name is Miranda Powers, and I am a senior Applied Mathematics Major. I have a Financial Mathematics Concentration and a minor in Economics. This past summer, I had the opportunity to intern at Credit Suisse as a Risk Analyst. Throughout the summer, I grew my knowledge of Investment Banking and Risk Management Framework through the completion of two projects. Through these projects, I focused on the overall risk assessment, mitigation actions, forward-looking, and lessons learned from a given scenario. I also focused on conducting a comprehensive analysis of two internal stress test scenarios and evaluating their respective impacts on portfolios through sock simulations and comparisons. This experience allowed me to gain soft skills such as team collaboration, leadership, and presentation skills that will help me further my career. My advice for students would be to stay open to a lot of career paths and opportunities. You may never know you have an interest in something until you try it out!

This summer I spent my time as a Summer Sales Associate with Transamerica, a life insurance company. I studied and tested for my Health and Life insurance licenses for North Carolina in May so I could learn from my mentors while helping sell insurance products throughout the program. This experience helped me learn a lot about the sales industry; it is a long term game, all about networking and making connections with clients. My sales internship did not include much mathematical knowledge but it gave me a lot of insight into actuarial science, which is an industry that calculates risk, most often for insurance companies. When I met with clients, it was necessary to touch on age, personal health, family health, and other background information so that underwriters and actuaries could calculate the risk that the client has on the company. Overall, the experience allowed me to have real life experience in the finance industry and see how corporate jobs function.

Nicole Berkin



Puzzles, Jokes, Etc.

One of the unique things about Dr. Brown is that she does participation index card questions with each of her classes. This allows her to get to know her students and learn a little bit about what they enjoy outside of the classroom by asking them a question to write on an index card at the start of each class. One of Dr. Brown's favorite index card questions is what is your favorite math joke. Included are some of her students' favorite math jokes.

Me: Why was 6
afraid of 7?
Them: IDK
Me: -0.359441702
Them:
Me: It's $\cos(789)$

1.
What tool is best for doing
math?

2.
**Consider all seven digit numbers
whose digits comprise a
permutation of the digits
 $\{1,2,3,4,5,6,7\}$. (There are $7! = 5040$
such numbers). How many of these
numbers are exact multiples of 11?**

3.
**My twin lives at the
reverse of my house
number. The difference
between our house
numbers ends in two.
What are the lowest
possible numbers of our
house numbers?**

A farmer sends his son to university.
After a semester, the son comes
back, and the farmer asks him what
he learned. The son responds, "Pi r
squared." the farmer replies, 'Well,
that's plain wrong. Pies are round.
Cornbread are squared?"

1. The multi-pliers 2. 576 3. 19 and 91 (for a difference of 72)