

Overview

The College of Sciences, NC State's home for the biological, mathematical and physical sciences, probes the deepest scientific questions and tackles the multidisciplinary issues of tomorrow in health, energy, security and the environment. The five-year-old college is one of the largest and most research-intensive units at NC State, with more than 3,700 students, 390 active research projects and \$41 million in annual research expenditures.

The college's departments and programs are well-regarded nationally, with *U.S. News & World Report* recently ranking five of our graduate programs in the top third of programs surveyed. This annual report reflects the priorities laid out in NC State's strategic plan and supported by the college's leadership.

Responsiveness to Universitywide Strategic Goals

1. Enhance the success of our students through educational innovation

The college developed initiatives to support students who joined NC State as part of the new Spring Connection admission program, including allocating funds to support an adviser in creating and teaching a spring orientation course. The course connected these students to resources across campus, provided students with regular access to a first-year adviser, and helped create a cohort of peer support.

The college is also developing innovative new degree programs. One example is an M.S. in Foundations of Data Science — an interdisciplinary initiative between the Departments of Mathematics and Statistics, as well as the Department of Computer Science in the College of Engineering — that is in the final stages of approval. The program aims to help the next generation of professionals harness the power of data for many types of careers.

2. Enhance scholarship and research by investing in faculty and infrastructure

Growing our faculty is among our top priorities. To that end, five new tenured or tenure-track faculty arrived on campus in 2017-18, and eight more accepted offers and will start in 2018-19. Several other 2018-19 offers remain outstanding or under negotiation.

The college is also investing in its infrastructure to improve facilities for students, faculty and staff. In Dabney Hall, home to our Department of Chemistry, a comprehensive floor-by-floor renovation and repair plan was developed, including improvements to the building's HVAC system and 120 fume hoods. The project is expected to begin in Fall 2018.

3. Enhance interdisciplinary scholarship to address the grand challenges of society

The college continues to be a leader in the Chancellor's Faculty Excellence Program cluster hiring initiative. As of summer 2018, Sciences is home to 16 of these cluster hires, the second-most of any college at NC State. The college has made interdisciplinary collaboration a key part of its strategy.

The college worked with the College of Agriculture and Life Sciences and the Office of Research and Innovation to establish METRIC, the university's new Molecular Education, Technology, and Research Innovation Center. METRIC, with facilities in Dabney Hall and Polk Hall, makes state-of-the-art scientific infrastructure and instrumentation for mass spectrometry, magnetic resonance and X-ray crystallography available to all departments and faculty. The director is David Muddiman, Jacob and Betty Belin Distinguished Professor of Chemistry.

The college has also been working with faculty leaders across campus on a Genetics and Genomics Initiative. Short-term goals include growing graduate programs and boosting research funding in these areas. In the long-term, the effort could result in a university institute. The effort is bringing together six colleges and more than 125 faculty.

4. Enhance organizational excellence by creating a culture of constant improvement

The college has been working to better organize its administration to increase efficiency and faculty involvement. One example is faculty and staff committees, where work began this year to overhaul the committee structure. A faculty committee was engaged to create new college bylaws, which are now under review.

The college's operations team has created new systems for more effectively accomplishing many of the college's activities, including the development of new standard operating procedures that are serving as models for other university entities. In information technology, the college collaborated with the university on the redesign of IT campus governance, a strategy from the NC State IT Strategic Plan. The new design will provide faculty and other non-IT stakeholders with a voice in the direction of IT on campus.

The college is organizing a leadership retreat to begin developing a new strategic plan. The plan will lay out the college's goals and provide a road map for achieving them.

5. Enhance local and global engagement through focused strategic partnerships

The college is committed to enhancing and expanding partnerships. NCSU Libraries has been a particularly valuable outreach partner, and in April the college welcomed about 800 people to the James B. Hunt Jr. Library for its annual State of the Sciences event. The event, sponsored in part by Eastman Chemical Company, featured the work of Sciences faculty and students through hands-on demonstrations, science talks and interactive technology.

The college also led the creation of Invisible Worlds, a semester-long collaboration between Sciences faculty and students and their counterparts in the College of Design that aimed to help the public understand scientific research in new ways. The result was a month-long art installation in a downtown Raleigh food hall in which attendees interacted with six exhibits to learn more about science. The exhibit was open to the public in June 2018.

The college is expanding its international footprint. One example is in the Department of Mathematics, which plans to offer a 3+x master's program with Nanjing Normal University in China. The program will allow talented senior undergraduates from China to get an accelerated M.S. degree in mathematics from NC State. The first students for this program should be accepted in the 2018-19 academic year.

Progress in 2017-18

1. Changes in service environment

The college experienced a significant leadership change in November 2017 when Chris McGahan, a prominent NC State pharmacologist, was named the college's third dean. She succeeded Bill Ditto, who stepped down to return to the faculty in the Department of Physics. McGahan is the first woman to hold the position.

McGahan has spent her entire professional career at NC State and is recognized for her research scholarship and administrative leadership. She joined the College of Veterinary Medicine in 1983 and was head of its Department of Molecular Biomedical Sciences for 14 years immediately prior to her deanship. She is an avid eye researcher, having been funded continuously for more than three decades by a National Institutes of Health Research Project Grant. She was recently elected president of the International Society for Eye Research.

2. Initiatives

The college held two Crossroads Series lectures featuring scientist-turned-designer Amanda Phingbodhipakkiya and Michael Specter, a staff writer for *The New Yorker*. Close to 500 people attended the events, which were intended to bring together big thinkers from across disciplines to tackle issues at the intersection of science and society.

The college has made substantial progress on bringing all of its digital platforms into compliance with the university's branding initiative. A new, on-brand website for the Department of

Mathematics launched this year, and new sites for the Departments of Chemistry and Physics will launch during the first half of 2018-19.

3. Diversity

In July 2017, *Diverse: Issues in Higher Education* magazine recognized programs in the college on its list of “Top Producers of Minority Degrees.” NC State tied for 15th nationally for master’s degrees conferred to minority graduates in mathematics and statistics and had the highest ranking in these disciplines of any university in North Carolina.

Later in the year, the college hosted its annual Celebrating Diversity in STEM Dinner, which brought together diverse students with science leaders from among NC State’s faculty, alumni and friends. The keynote speaker was Machel Sanders, an NC State alumna who is secretary of the N.C. Department of Administration. The event was sponsored by BASF.

In February, the college held its first Diversity in STEM Symposium. The event, also sponsored by BASF, was attended by more than 200 students, faculty and staff. The keynote speaker was Donna Matthews Jarrell, an NC State alumna and director of the Center for Comparative Medicine at Massachusetts General Hospital.

College staff lead the Women in Science and Engineering (WISE) program, which gives first- and second-year female STEM students the opportunity to live and work with other women in STEM majors. The program expanded to 350 participants this year.

4. Instructional program advances

Advances to instructional programs included an Inclusive Learning Design initiative in the Department of Biological Sciences to develop, implement and assess 3D-printed tactile teaching tools. The department also worked with the College of Veterinary Medicine to create a neuroscience concentration within the comparative biomedical sciences graduate program. In

addition, the department worked cooperatively with the Department of Applied Ecology to transition the zoology graduate program to the new biology graduate program.

The Department of Marine, Earth, and Atmospheric Sciences rebooted its Climate Change and Society Program with new leadership, revised course offerings and significant improvements in online marketing. Increases in applications have already been realized.

5. Research

Between July 1, 2017, and June 30, 2018, Sciences faculty received 317 awards totaling \$45.6 million, a 15 percent increase over the previous year. Seventy-seven percent of faculty engage externally supported research.

Some research highlights from the academic departments:

Biological Sciences: The National Institute of Environmental Health Sciences awarded NC State a two-year, \$275,000 grant to address questions surrounding the chemical GenX, which has been found high concentrations in the Wilmington, N.C., drinking water supply. Environmental epidemiologist Jane Hoppin is the primary investigator on the project.

Chemistry: Joshua Pierce is leading a new effort aimed at speeding the identification of naturally occurring compounds with therapeutic potential, ultimately leading to the development of new medicines for infectious diseases, inflammation, allergies and pain management. This is a joint initiative between the department and the Comparative Medicine Institute.

MEAS: Marine scientist Chris Osburn was part of a team that looked at the effects of frequent hurricanes on estuaries. The team found that increased hurricane frequency had lasting negative effects on these ecosystems, including increased algal blooms and fish kills.

Mathematics: During the summer of 2017, the department hosted 15 undergraduates from around the country in its Research Experience for Undergraduates (REU) program in Modeling and Industrial Applied Mathematics. These top students contributed to four research projects mentored

by scientists from the Environmental Protection Agency, The Aerospace Corporation and the department.

Physics: Karen Daniels was part of a team that used naturally arising acoustic vibrations to monitor the state of granular materials. This passive approach represents a way to probe disordered or granular materials without disturbing them and may enable researchers to forecast the failure of these materials.

Statistics: Marcia Gumpertz conducted a “snapshot” survey of time to tenure, promotion and retention for female and minority faculty in four STEM fields at four large, land-grant institutions. The study demonstrated the importance of institutions and disciplines understanding their own patterns to evaluate and address disparities in these areas.

6. Extension

The Science House outreach program supported STEM-related activities across the state that directly reached more than 6,000 teachers and 24,000 students. More than 19,000 students and 400 teachers used the program’s rural-focused Equipment Loan Program during the year.

The N.C. Science Olympiad, which is part of The Science House, saw 18,000 students from across the state participate in its tournaments. Data collected by the Olympiad shows that NC State students who participated in the Science Olympiad before they came to the university were much more likely than their peers to pursue STEM majors.

Climate data queries made through the online retrieval system for the State Climate Office grew by nearly 50 percent. The office also extended a rainfall-alert-system partnership with the N.C. Department of Transportation to help the agency identify high-risk areas susceptible to flooding during extreme precipitation.

7. Faculty

Faculty in the college received many prestigious awards this year. Eight of those faculty members were among the 29 faculty recognized by NC State at the May 2018 Celebration of Faculty Excellence, an annual event that honors faculty who have won prestigious state, national and international awards and created new knowledge in their fields. In addition, seven of the 22 faculty recently honored by the NC State Alumni Association were from the College of Sciences, and three of the five 2017 Chancellor's Innovation Fund awards went to Sciences projects.

Among our faculty award highlights:

Biological Sciences: Lisa Parks, Outstanding Advising Award Certificate of Merit, National Academic Advising Association; Ann Ross, Promoted to Research Associate, Smithsonian National Museum of Natural History

Chemistry: Maria Oliver-Hoyo, Fulbright Scholar; Laura Sremaniak, Equity for Women Award, NC State Council on the Status of Women

MEAS: Gary Lackmann, Elected Member, American Meteorological Society Council; David McConnell, Elected President, National Association of Geoscience Teachers; Helena Mitsova, Waldo-Tobler GIScience Prize, Austrian Academy of Sciences

Mathematics: Tye Lidman, Sloan Research Fellowship, Alfred P. Sloan Foundation; Ralph Smith, Fellow, Society for Industrial and Applied Mathematics

Physics: Harald Ade, Alexander Quarles Holladay Medal for Excellence, NC State; Bill Ditto, Elected Member, National Academy of Inventors; Lex Kemper, NSF CAREER Award; Divine Kumah, NSF CAREER Award; Richard Longland, Early Career Research Award, U.S. Department of Energy; John Thomas, Fellow, American Association for the Advancement of Science

Statistics: Eric Chi, NSF CAREER Award; Marie Davidian, Founders Award, American Statistical Association; Jung-Ying Tzeng, Fellow, American Statistical Association

8. Students

The college's total student population in fall 2017 was 3,758, with 2,722 undergraduates and 1,036 graduate students. The first-year class had a weighted high school grade point average of 4.56 and an average SAT score of 1299. Fifty-one percent of the freshmen were in the top 10 percent of their high school classes. The class hailed from 86 of North Carolina's 100 counties, as well as 24 other states and 12 countries.

Ashley Lawson, a junior majoring in mathematics and mathematics education, was awarded a 2018 Truman Scholarship, a highly competitive and merit-based national award for those seeking to go to graduate school in preparation for careers in public service. She will use the scholarship to pursue her Ph.D. in public administration and development sociology.

Meredith Bain, a junior majoring in mathematics and German, was NC State's 15th recipient of the prestigious Udall Scholarship, which is awarded to students focused on Native American or environmental issues. She plans to earn a J.D. with a concentration in energy law.

9. Fundraising

The college enjoyed an outstanding fundraising year. Gifts and new commitments totaled more than \$8.7 million, including a \$4.5 million anonymous bequest to benefit applied mathematics that is one of the largest gift commitments ever received by the college. The gift will endow a \$2.5 million distinguished faculty chair, a \$1.5 million undergraduate scholarship fund that will provide six full-tuition scholarships, and a \$500,000 graduate fellowship.

Overall, the college added 18 new scholarships, one endowed faculty chair, two fellowships, one faculty award and two graduate awards. There were 224 members of the college's Dean's Circle leadership giving society, a record. With three-and-a-half years remaining in the universitywide Think and Do the Extraordinary campaign, the college has raised nearly \$44 million of its \$60 million goal.

The college also filled two new Goodnight Innovation Distinguished Professorships that were created by longtime NC State supporters Jim and Ann Goodnight. The recipients were Roy He in the Department of Marine, Earth, and Atmospheric Sciences and Fred Wright in the Departments of Statistics and Biological Sciences. The ability to recruit and retain faculty through the creation of endowed positions is one of NC State's campaign priorities.

10. Administration

In addition to the new dean, the college experienced several leadership changes this year. John Blondin, who was formerly associate dean for research, was named the new senior associate dean for administration. Adam Hartstone-Rose, associate dean for academic affairs, returned to the Department of Biological Sciences, and Jamila Simpson was named interim associate dean for academic affairs. Searches for new associate deans for research and academic affairs are under way.

In the departments, Len Stefanski was named head of the Department of Statistics and Carolyn Mattingly was named interim head of the Department of Biological Sciences. A search for a permanent head of the Department of Marine, Earth, and Atmospheric Sciences is ongoing.

11. Recommendations and concerns for the future

Low levels of tenured and tenure-track faculty, as well as staff, continue to be an issue facing many college units. Pending the availability of resources, hiring more faculty and staff is among the college's highest priorities.

Graduate student stipends across the college are low and hinder recruiting efforts. Aging infrastructure in several buildings also continues to be a concern, as does the lack of IT support and resources to support our activities. More laboratory space will be needed as the faculty become more research-intensive.