

Overview

The College of Sciences launched on July 1, 2013, bringing together NC State people and programs in the biological, mathematical and physical sciences. The College is one of the largest and most research-intensive units at NC State, with more than 3,700 students, 400 active research projects and \$50 million in annual research expenditures.

This annual report reflects the priorities laid out in NC State's strategic plan as well as *Launching a World-Class College of Sciences*, the College's 2013-16 launch plan, that was based on the university document.

Responsiveness to University-Wide Strategic Goals

1. Enhance the success of our students through educational innovation

College leadership, faculty and staff continue to develop innovative educational programs. They include the university's Life Sciences First Year Program, which launched in 2014. Students take a common set of first-year courses that prepare them for any of the life sciences programs across the College and the College of Agriculture and Life Sciences.

We have also been working to develop an Academy for Instructional Innovation that will extend the College's strengths in discipline-based educational research to implement nationwide reforms that transform student learning in the sciences. We are piloting one of the initiatives during the 2015 summer session.

Knowing that exposing students to undergraduate research is an effective experiential learning strategy, we created a new Undergraduate Research Advisory Committee charged with identifying and carrying out initiatives to expand research opportunities for undergraduate students. One new initiative will begin in Fall 2015, thanks to funding provided by the Provost's new Professional Experience Program.

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

Growing our faculty is among our top priorities. To that end, 25 new Sciences faculty were hired or began working at NC State in 2014-15. In addition to new hires, the College and university made significant investments to retain four faculty members. The College also made or was in the process of making offers for five spouse/partner hires in 2014-15.

The College's animal care facilities received accreditation from the Association for Assessment and Accreditation of Animal Care International (AAALAC) on the first attempt. This accreditation gives current and prospective faculty confidence that the facilities that house their research animals meet the highest standards for humane treatment.

Infrastructure improvements in 2014-15 included renovations in Ricks Hall that will support the growth and expansion of the research activities in bioinformatics, as well as the construction of a zebrafish core research area in the Toxicology Building.

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

Due to generous funding from the Provost's office, the College continues to enjoy great success with the Chancellor's Faculty Excellence Program, the interdisciplinary cluster hiring initiative. In the most recent set of clusters that was announced in April, two proposals co-led by our faculty — Carbon Electronics and Leadership in Public Science — were among the eight selected for funding. Hiring for the previous clusters in which the College gained positions is nearly complete, with the College gaining 13 faculty as a result.

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

The College's central human resources, business operations, research and academic affairs units are all undergoing restructuring to accommodate the needs of this large college. These activities include the creation of new leadership positions. Reporting structures are being revised and feedback loops established from the new leadership positions to the department heads who oversee the department personnel with similar functional responsibilities.

5. Enhance local and global engagement through focused strategic partnerships

Expanding and enhancing partnerships continues to be a top priority. To that end, Holly Menninger was named the College's first director of public science. She oversees a series of initiatives designed to build science literacy beyond the NC State campus, including building and enhancing partnerships with global public science leaders. Menninger played an important role in Citizen Science Association's recent decision to hold its next conference in Raleigh.

The partnership with the North Carolina Museum of Natural Sciences (NCMNS) continues to bear fruit. A major exhibit on "The Secret Life Inside You" (our microbiome), being developed with our input by the American Museum of Natural History in New York, will have its first outside installation in Raleigh, co-hosted by NC State and NCMNS. Lindsay Zanno, who holds a joint faculty position between NCMNS and our Department of Biological Sciences, was part of a group of more than 40 volunteers including graduate students, post-docs and museum educators that led the citizen science portion of the US2020 event in Research Triangle Park, which brought in hundreds of top K-12 students from around the state.

Progress in 2014-15

1. Changes in Service Environment

The College is undergoing a significant leadership change. Dean Daniel Solomon announced in September 2014 that he would be stepping down the following summer. In June 2015, Provost Warwick Arden announced that William Ditto, dean of the College of Natural Sciences at the University of Hawaii, Manoa, had been selected as the College's next dean. Ditto is an internationally recognized physicist with a rich background in research, innovation and academic administration. He starts in September 2015.

2. Initiatives

To better connect our students with top employers, the College and the university's Career Development Center hosted the second College of Sciences Career Fair in Fall 2014.

The College also worked with the Career Development Center on a Spring 2015 Diversity Alumni Panel and a number of other initiatives.

In April, the College held its second State of the Sciences event. The speaker was Madeleine Jacobs, the former CEO of the American Chemical Society, the world's largest scientific group. State of the Sciences is NC State's top science education and outreach event.

The College also launched the Faculty in Action Seminar Series, which featured five faculty who spoke to students about their lives and careers, and the Sciences Connections series, which was created to help faculty from across this large college get to know each other and engage in more interdisciplinary collaboration.

3. Diversity

According to the most recent data available from Diverse: Issues in Higher Education, the College ranks fourth nationally in the awarding of master's degrees in mathematics and statistics to African-American students and fifth in the awarding of doctoral degrees in the physical sciences to Hispanic students. College-wide, 55 percent of our undergraduates and 43 percent of our graduate students are female. The Women in Science and Engineering (WISE) program, which gives new female STEM students the chance to live and work with other women in STEM majors, had 300 participants in 2014-15.

We continue to stress diversity in our faculty hiring. Of particular note is the Department of Physics, which recently hired an African-American faculty member and its ninth tenure/tenure-track female faculty member. No other physics department in the nation has more tenure/tenure-track women on its faculty. And thanks in part to recent hires, women will hold three of the College's six permanent and interim department head and chair positions (a group that includes one Latina) and half of its associate deanships as of Aug. 16, 2015.

In April 2015 the College hosted its Women in STEM Dinner, which brought together some of our top female students with leading women in the sciences. Dr. Meg Lowman, widely known as "Canopy Meg" for her fascinating research on life in the treetops, delivered an entertaining keynote entitled, "How to Raise a Girl Scientist."

4. Instructional Program Advances

During the 2014 Summer START Program, the College piloted COS 295, The Science of Change, which uses project-based learning around a theme of change to introduce students to strategies for academic success and to the major scientific disciplines housed within the College. The course should be fully implemented as COS 100 in Fall 2016.

Several online programs in statistics have been approved, including two online graduate certificate programs, a graduate certificate in applied statistics and data management and a graduate certificate in statistics education as well as the complete master of statistics online.

5. Research

Between June 1, 2014, and May 31, 2015, Sciences faculty received 379 awards totaling \$32.7 million. It is important to note that the \$6.5 million grant to the Center for Human Health and the Environment (CHHE, see below) is not included, as it is coded to the Office of Research, Innovation and Economic Development. Some highlights:

Biological Sciences: Rob Smart and other researchers from CHHE received a five-year, \$6.5 million grant from the National Institute of Environmental Health Sciences to investigate the effects of environmental factors on human health.

Chemistry: LORD Corporation has partnered with the department to establish the first LORD Undergraduate Summer Research Fellowship. The new award is tied to a semester-long research project in which teams of students use primary literature sources to investigate a topic selected by NC State chemistry faculty and LORD scientists.

MEAS: A National Science Foundation grant to three faculty funded the purchase and deployment of a marine “drone” that will be used to carry out very high resolution automated mapping of the sea/estuary floor and water column. MEAS is emerging as a national leader in the use of automated observing platforms in the geosciences.

Mathematics: The department successfully renewed funding for the Research Experiences for Undergraduates (REU) program from the National Science Foundation and the

National Security Agency. The new funding allows support for 20 REU participants, making the program one of the larger REU programs in mathematics in the country.

Physics: Harald Ade is leading the largest of six grants awarded by the University of North Carolina General Administration to support game-changing research in areas of strategic importance to the state. The \$2.8 million “NC Carbon Materials Initiative” grant includes materials design, processing and manufacturing for defense and energy needs.

Statistics: Marie Davidian is a principal investigator on a \$10.4 million grant from the National Cancer Institute, which will help researchers develop new statistical methods that can be used both to design clinical trials for cancer treatments and analyze the resulting data. The new funding represents a five-year extension of the original \$12.5 million grant.

6. Extension and Public Service

The Science House K-12 outreach program supported 578 STEM-related activities across North Carolina that reached more than 1,300 administrators, 5,600 teachers and 36,000 students during 2014-15. Part of The Science House’s programming is the giant North Carolina Science Olympiad, which reached 17,554 students statewide and saw the number of participating schools rise 9 percent in 2014-15.

Web traffic for the State Climate Office, which is administered in the College, grew by 55 percent in 2014-15. The office also hosted 7,000 direct educational contact hours and hosted 16 visitor groups and provided 40 invited presentations.

7. Faculty Recognitions

Biological Sciences: Trudy Mackay, Alexander Quarles Holladay Medal for Excellence; Reade Roberts, Beckman Young Investigator Program Fellowship

Chemistry: Dan Comins, Fellow, Royal Society of Chemistry; David Muddiman, Award in Chemical Instrumentation, American Chemical Society; Joshua Pierce, NSF CAREER Award

MEAS: Viney Aneja, Executive Committee, United States Environmental Protection Agency Board of Scientific Counselors; Gary Lackmann, Edward N. Lorenz Teaching Excellence Award, American Meteorological Society

Mathematics: Loek Helminck, Fellow, American Mathematical Society

Physics: David Haase, Board of Governor's Award for Excellence in Teaching; Jackie Krim, David Adler Award, American Physical Society; Dean Lee, Fellow, American Physical Society; Bruce Sherwood, Fellow, American Association for the Advancement of Science

Statistics: Ana-Maria Staicu, NSF CAREER Award; Webster West, William D. Warde Statistics Education Award, National Mu Sigma Rho Statistics Honorary Society

8. Students

The College's total student population in Fall 2014 was 3,767, with 2,909 undergraduate students and 858 graduate students. The first-year class had a weighted high school grade point average of 4.54 with a two-part average SAT score of 1265. Sixty percent of the freshmen were in the top 10 percent of their high school classes. The class hailed from 74 of North Carolina's 100 counties, as well as 27 other states and nine countries.

We are also proud to report that physics and mathematics student Mia de Los Reyes won a prestigious Astronaut Scholarship for the second year in a row. At the graduate level, three current students and three alumni were awarded NSF Graduate Research Fellowships.

9. Fundraising

The College enjoyed another excellent fundraising year. Gifts and new commitments totaled \$7 million in 2014-15, up 24 percent from the previous year. Highlights included an alumni-led effort to establish a distinguished professorship in physics in honor of the late Wesley O. Doggett and a \$300,000 commitment to support scholarships for middle school students participating in the Imhotep Academy, which is part of The Science House.

In addition, the College has raised more than \$2.3 million for its signature Daniel L. Solomon Scholars Program since the program was renamed in Fall 2014 for the College's inaugural dean. The total raised since the program's inception now stands at \$5 million.

10. Administration

In addition to the changing deanship, the College experienced several other leadership changes. David Bristol was appointed senior associate dean for administration in July 2014, and

Jackie Krim announced that she would step down as associate dean for research on July 1, 2015. Krim was replaced on an interim basis by Ray Fornes, who served in that capacity for many years in the former College of Physical and Mathematical Sciences.

At the department level, Emilie Rissman began serving as head of the Department of Biological Sciences in November 2014. Loek Helminck, head of the Department of Mathematics, and Morteza Khaledi, chair of the Department of Chemistry, announced that they would be stepping down early in 2015-16. Khaledi, who stepped down on July 1, was replaced on an interim basis by Ed Bowden, a professor in the department.

11. Recommendations and Concerns for the Future

A lack of high-quality, contiguous space is a primary concern for the College, so we have proposed that the university conduct a space analysis. At the very least, the study should address the College of Sciences and College of Agriculture and Life Sciences units that were affected by the recent reorganization. We hope that one major result of this study would be a reassignment of spaces for the Department of Biological Sciences to put researchers with complementary interests closer to one another. Solving these space issues, including creating efficiencies through shared user facilities, would be a win-win for the College and the university because the “collision potential” of putting so many talented scientists from different areas near each other is an excellent way to help NC State fulfill its mission.

The College is also critically short on modern research space. Hopefully this need will be high on the agenda during further planning for the new signature science building as well as renovations for Broughton, Dabney and Cox Halls.

Another area of concern is graduate student stipends. The availability of first year stipends alone is not sufficient for recruiting and retaining outstanding doctoral students, and stipend levels across the College, particularly those in the departments of Mathematics and Chemistry, are not competitive. Over the next several years, we intend to raise stipend levels through a variety of methods, including requesting new funds from the Provost.