

Annual Report 2015-2016

College of Engineering

North Carolina State University

Overview

The College of Engineering's (COE) long-term vision continues to be "to become and be perceived as the leading public college of engineering in the US and one of the preeminent colleges of engineering in the world." We feel this is a *necessary condition* for NC State to achieve its vision of emerging as a preeminent technological research university as stated in the University's strategic plan. Since none of our peer colleges of engineering are standing still, this vision assures that COE maintains and improves its national and global rankings.

COE is committed to providing a premier educational experience for our students and a world-class environment for our faculty members that makes them global leaders in discovery, learning and innovation. Underlying this mission is a sustained effort to engage and invest in vital areas of research growth and educational need. It involves, first and foremost, making strategic investments in faculty and infrastructure in areas that provide the greatest potential for attracting external funding and best serve the needs of our country and state. At the core of the COE's vision is enhancing student success through the integration of research and education, recruiting and retaining outstanding faculty members and students and providing opportunities for interdisciplinary research at both graduate and undergraduate levels.

We are also committed to providing our students an educational experience that builds upon essential engineering fundamentals to develop their broader understanding of behavior, policy, entrepreneurship and global perspective. This includes the adoption of new academic initiatives, such as the NAE Grand Challenge Scholars program, which commits COE to the development of opportunities that provide our students creative learning experiences connected to the NAE Grand Challenges. These programs offer authentic experiential learning with clients and mentors that include interdisciplinary experience, entrepreneurship and innovation experience and global and cross-cultural perspectives. We feel all these efforts are consistent with the University's strategic plan and complement the development and implementation of its academic mission.

Our persistent efforts to attract and retain the highest quality faculty combined with our success in highly competitive national programs such as the NSF ERC program and others have continued to move us forward in almost every major "data" category in the latest *US News* graduate engineering rankings. We improved our *US News* graduate ranking to 27th overall nationwide this year. Our rank among public colleges of engineering improved to 15th. This is

the second year that the College has improved its *US News* ranking and represents a move up from 31st nationwide and 18th among public just three years ago. This is the highest ranking that COE at NC State has had in many years. The College's online master's degree program ranks 12th overall in *US News* rankings of online graduate engineering programs and 7th among online graduate computer information technology programs by *US News & World Report*.

Changes in the Service Environment

The College received approval for an increase in its engineering fee that began in fall 2015. In this first year, the fee increase has allowed the College to provide significant enhancements to the student experience and to maintain and improve laboratories and classrooms. Having the fee allows the College to expand important services for both undergraduate and graduate students. In addition, the fee provides much-needed funds for upgrading laboratory space for undergraduate research efforts as well as to upgrade classroom space for greater usability.

As reflected in the campus 2020 enrollment plan, the College is committed to expanding its number of doctoral students by 50 percent over the fall 2011 headcount. In order to achieve this goal and also maintain the College's admirable Ph.D. time-to-degree statistics, it will be necessary to increase the number of faculty members available to mentor these doctoral students while also increasing the financial resources available to support the students. Studies have shown that the two greatest impediments to Ph.D. completion are lack of financial support and poor advising.

Over the last four years, with assistance from the Provost, the College has been able to increase the number of tenured and tenure-track faculty and continue to improve its facilities and infrastructure. This has resulted in significant increases in research productivity and growth in graduate enrollment. The College hired 21 new faculty members in 2015-16.

Major Initiatives

The citizens of North Carolina voted to pass the Connect NC bond referendum in May 2015. This bond provides \$75 million in support of the construction of the Engineering Oval building, which will be located on Centennial Campus and will house the Department of Civil, Construction, and Environmental Engineering and the Fitts Department of Industrial and Systems Engineering as well as College administration. The \$75 million from the bond along with \$2 million in appropriated planning funds represents half of the \$154 million total budget that is being raised using a public-private funding model. The College continues to work to generate private funding to help finance the Engineering Oval building. The College has raised

more than \$21 million toward the \$60 million needed from private donors. The University will provide the remaining \$17 million for the project.

Diversity

The College is committed to supporting a diverse faculty, staff and student body that is welcoming to all individuals. Efforts within the College to increase diversity continue to be successful.

In 2015-16, COE added six more female faculty members and two more African-American faculty members, bringing our totals now to 50 female faculty members, 19 African-American faculty members and 10 Hispanic faculty members. Since 2006, the College has essentially tripled the total number of women and doubled the number of underrepresented faculty members. While the College has made good progress, we still have farther to go to achieve a level of diversity in our faculty that would mark us as a leader in this regard among our peer engineering colleges.

The College has made excellent progress in recruiting female students. Our 2015 first-year engineering class was 25 percent female, which set the College well above the national average. The anticipated enrollment of female students for the fall 2016 first-year class is more than 29 percent. We hope to realize similar successes in recruiting underrepresented minorities in the near future.

A minority summer research program was implemented in summer 2015 for first-year and transfer students. The students spend time working in research labs prior to their fall semester. Six students had experiences in research labs in 2015.

Instructional Program Advances

- Research experiences for COE undergraduates continue to be a high priority in the College, as is the Engineering Entrepreneurship Program. Funds made available from the engineering student fee have allowed the College to increase the offerings available for students.
- The College continues to grow the professional master's degree programs in electric power systems engineering, biomanufacturing and nanoengineering. The UNC/NC State Joint Department of Biomedical Engineering plans to launch an international professional science master's degree program: "BME Translational Innovation" (BME-Train).

- Many of our departments have embarked with curriculum update and revision efforts consistent with feedback they received from the ABET accreditation visit in fall 2010 and external reviews of their graduate programs. Many of these efforts are guided by the National Academy of Engineering (NAE) “Engineer of 2020” report and the evolution of our curriculum to better address the needs of future engineering graduates.
- The College has also been actively engaged in efforts to better define and provide a career path for non-tenure-track faculty, and particularly non-tenure-track teaching faculty, as a way of enhancing quality and commitment to teaching.
- The College supports faculty and staff efforts to impact and enhance engineering education across the K-20 spectrum. Examples include:
 - continued support for the K-12 outreach activities in the NSF ERC proposals
 - internal support for The Engineering Place, home of the COE K-12 engineering outreach activities
 - support for more than 16 engineering summer camps at NC State for elementary, middle and high school students and satellite camps in Rocky Mount, Hickory, Havelock and Charlotte
- Our faculty and staff also continue to play an important role in the development and implementation of the NC State-Wake County Early Career High School on our campus, including their role in curriculum development around the concepts of the NAE Grand Challenges
- A new undergraduate dual degree program was approved with UNC Pembroke. The joint undergraduate degree program will allow students to spend three years at UNC Pembroke and two years at NC State and graduate with bachelor’s degrees from both institutions. Under this program students receive a B.S. in physics from UNC-P and a B.S. in either electrical or mechanical engineering from NC State.
- The newly combined undergraduate program in biomedical engineering will undergo ABET accreditation in September 2016.

Research

Our aspirations, mission and strategic investments have enabled a culture that has produced some spectacular successes that have enhanced, in a very significant way, the reputation of COE and NC State as a premier technological research university. These successes include recognition as the Southeast hub for the new NNMI in Smart Manufacturing, sponsored by the US Department of Energy.

- Annual research awards through June 2016 are at \$88,265,662, or more than double the \$40M in annual research awards generated by COE eight years ago.
- Research expenditures for 2015-2016 are estimated to come in at \$180 million.
- COE also generated \$16,531,378 in F&A in 2015-16.
- The Center for Advanced Electronics through Machine Learning (CAEML) was launched in summer 2016. The center is funded through the National Science Foundation's Industry/University Cooperative Research Centers (I/UCRC) program and by industrial members of the center. The center is led by the University of Illinois at Urbana Champaign with NC State and Georgia Tech and will focus on ways to speed up design and verification of microelectronic circuits and systems, reducing development costs and time-to-market for manufacturers of microelectronic products. The center is funded for five years.
- The College of Engineering at North Carolina State University was selected to receive more than \$7.1 million from the Department of Energy to further research on nuclear energy. Faculty members in the Department of Nuclear Engineering and the Department of Civil, Construction, and Environmental Engineering will lead four research projects. The College also received funding for upgrades to its PULSTAR nuclear reactor and funding for three fellowships and three scholarships. Over the last eight years, the College has received \$24 million in DOE funding for nuclear research, third most of any university in the nation.
- The College of Engineering will lead the Southeast hub for a new Smart Manufacturing Innovation Institute (SMII) that aims to spur technological innovation to improve the efficiency of advanced manufacturing in the United States. SMII will work in the areas of advanced sensors and controls, data analytics, advanced predictive modeling and simulation software, and application toolkits that can dramatically reduce energy expenses in advanced manufacturing. The new institute will be led by the Smart Manufacturing

Leadership Coalition, based in Los Angeles, in partnership with the U.S. Department of Energy. NC State will be the home of one of five regional hubs.

- Seven young faculty members received National Science Foundation CAREER awards.
 - Dr. Alper Bozkurt, assistant professor of electrical and computer engineering, for his research proposal, “Bio-electro-photonic Microsystem Interfaces for Small Animals.”
 - Dr. Chih-Hao Chang, assistant professor of mechanical and aerospace engineering, for his research proposal, “Three-Dimensional Nanolithography with Inexpensive Hardware.”
 - Dr. Hsiao-Ying Shadow Huang, assistant professor of mechanical and aerospace engineering, for her research proposal, “Restoring Function in Chronic Venous Insufficiency: Unraveling the Structural Mechanics of Venous Valve Tissues.”
 - Dr. Brina Montoya, assistant professor of civil engineering, for her research proposal, “Stabilization of Mining and Energy Related Byproducts using Bio-Mediated Soil Improvement.”
 - Dr. Brendan O’Connor, assistant professor of mechanical and aerospace engineering, for his research proposal, “Mechanical Behavior of Flexible Electronic Films.”
 - Dr. Srikanth Patala, assistant professor of materials science and engineering, for his research proposal, “Mapping the Genome of Metallic Grain Boundaries — Structure, Thermodynamics and Kinetics.”
 - Dr. Edgar Lobaton, assistant professor of electrical and computer engineering, for his research proposal, “Data Representation and Modeling for Unleashing the Potential of Multi-Modal Wearable Sensing Systems.”

Extension and Outreach

The Engineering Place for K-20 Outreach

The various Engineering Place programs, including Engineering on the Road, Family STEM nights, summer camps, campus visits, the Solar House and others served more than 17,000 students nationwide this year. Staff worked with schools in eight states on incorporating engineering into school curriculum, provided teacher workshops to several hundred teachers on integrated STEM and went to the National Science and Engineering Festival, which hosted 600,000 people. Engineering camps continue to be a great success and have grown across the state, with partner camps in Hickory, Charlotte, Wilson, Havelock, and Morganton. The camps had about 1,800 campers. The Engineering Place had twice as many applicants as slots for day camps for grades 3-10 and three times the applicants for 11th and 12th grade overnight camps. For the second year, visually impaired and blind students came to campus from across the US for the nation's only engineering camp for VIB students.

Industry Expansion Solutions (IES)

IES has served as the North Carolina Manufacturing Extension Partnership (NCMEP) Center since 1995, operating under the College of Engineering. The North Carolina affiliate for MEP became available through a full-and-open competition held in fall 2014, the first time since 1995. IES submitted a comprehensive proposal and won a new five-year award that began in 2015.

IES, through NCMEP, continues to help state manufacturers with important networking. Some examples include Manufactured in North Carolina (MNC), which is the premiere searchable supply chain directory for North Carolina manufacturers, designed to showcase the capabilities and innovations of NC companies to domestic and global B2B markets and the membership-based mfgNC CONNECTIONS – North Carolina Manufacturing Extension Partnership.

While much of IES' attention has been focused on small to medium-sized manufacturers, it also serves businesses in other sectors and government agencies across the state; economic benefits to those entities — new efficiencies or new employment in hospitals, schools or service companies — are not included in MEP survey results.

In 2015-16, IES delivered 387 industry service projects for fees and 108 short courses, workshops and conferences. Additionally, clients of IES or IES' NCMEP affiliates in 63 North Carolina counties returned surveys to NIST's third-party survey company, reporting results they attributed to work done by NCMEP affiliates. Manufacturers reported \$864.3 million in economic impact from NCMEP activities and the creation of and/or retaining of 4,081 jobs.

Biotechnology Training and Education Center (BTEC)

The Golden LEAF Biomanufacturing Training and Education Center (BTEC) offers a wide array of courses to NC State students. Enrollment in BTEC undergraduate and graduate programs remains strong, with 842 seats filled during the fall and spring semesters. BTEC is also a critical player in extension and economic development, particularly in providing human resources needed to grow and enhance the biomanufacturing sector in North Carolina. Its efforts, which include the involvement of the NC Community College System, are supported by bio-related industries in the state. During this fiscal year, BTEC received more than \$1.37 million in revenues from non-state sources. Outside monies came from contracts and grants (\$914K), BTEC's industry training program (\$328K) and bioprocess and analytical service projects (\$131K) via testing services agreements.

The BTEC model has been highly successful and has encouraged the development of similar biomanufacturing training centers in the United States, Europe and Asia. BTEC

continues its efforts to establish partnerships with universities, companies and trade organizations to generate new research and development programs. BTEC is seeking funding opportunities to expand its staff and facilities to enable the center to provide a more extensive array of services to NC State students, incumbent workers, large biomanufacturers and start-up companies.

Faculty

The College of Engineering Faculty Advancement Unit connects over 300 faculty at all ranks with the tools needed to excel at all levels of their careers. Associate Dean and Professor Dr. Christine Grant emphasizes building community by establishing a culture of faculty care, faculty-to-faculty peer relationships that cross departments. The unit uses traditional resources, as well as innovative techniques, to encourage outstanding research, teaching and professional development via transformational faculty development programs, directly impacting the research productivity, teaching effectiveness and the extension mission. The Office's mission is to recruit, promote and retain excellent faculty across the College; actively engage faculty, administrators and staff across departments; and celebrate faculty success, achievement and promotion.

Strategic visits to federal agencies (e.g., NSF, Sandia Laboratories, EPA and AFOSR) empower faculty to stimulate new funding opportunities and broaden current research development. The programs have resulted in new grants, invitations to serve on panels, new collaborations and myriad opportunities for graduate students. An added outcome of group travel has been the enhancement of cross-departmental camaraderie, community and collaboration and the formation of new cohorts.

Some of the most relevant COE Faculty Advancement programs for tenure track early career faculty consisted of the new faculty orientation workshop (NFOW); NSF CAREER workshop; Retention, Promotion, Tenure roundtables; and NSF introductory funding agency trips. The COE Teaching Professors Learning Community creates a community to share ideas about teaching and learning, best practices, to learn from invited speakers, to maintain connections and deepening pedagogical knowledge.

The Faculty Advancement Unit leads and actively participates in college, university and national initiatives to broaden participation of women and underrepresented minorities on Engineering faculties. Faculty serve as mentors and coaches in cross-campus Building Future Faculty and NSF ADVANCE programming at NC State, working at the national level to connect with diverse faculty members and networks to raise the visibility of NC State to diverse candidates. Below are selected faculty highlights from 2015-16.

- Growth in research is directly tied to our faculty growth, which is why our major investment continues to be in faculty hiring.
- Twenty-one new tenured/tenure-track faculty and two new non-tenure track faculty joined the COE and affiliated departments in 2015-16.
- Hires include three full professors, three associate professors and 15 assistant professors.
- The total new faculty hired by COE since 2007-08 is 166, with 145 of these being tenure/tenure-track faculty and 21 non-tenure-track faculty.
- Five professors received endowed professorships:
 - Dr. Youngsoo “Richard” Kim was named the Jimmy D. Clark Distinguished University Professor in the Department of Civil, Construction, and Environmental Engineering
 - Dr. Henry Christopher Frey was named the Glenn E. Futrell Distinguished University Professor in the Department of Civil, Construction, and Environmental Engineering
 - Dr. Franky So was named the Walter and Ida Freeman Distinguished Professor in the Department of Materials Science and Engineering
 - Dr. Edward Jaselskis was named the E.I. Clancy Distinguished Professor in the Department of Civil, Construction, and Environmental Engineering
 - Dr. Jack R. Edwards was named the Angel Family Distinguished Professor in the Department of Mechanical and Aerospace Engineering
- Four professors were named Distinguished Professors:
 - Dr. Mladen Vouk was named a Distinguished Professor in the Department of Computer Science
 - Dr. Troy Nagle was named a Distinguished Professor in the Department of Electrical and Computer Engineering
 - Dr. Morton A. Barlaz was named a Distinguished University Professor in the Department of Civil, Construction, and Environmental Engineering
 - Dr. Veena Misra was named a Distinguished Professor in the Department of Electrical and Computer Engineering

Students

Our students are the College’s main focus. Each year, we recruit the highest-quality students possible and work to bring all students successfully through to graduation.

Undergraduate enrollment. The fall 2015 undergraduate enrollment was 6,230 (1,331 first-year students, 1,421 sophomores, 1,380 juniors, 2,098 seniors) and represented an increase of 59 students over the fall 2014 enrollment of 6,171. Enrollment of women increased to 1,317 (21.1 percent) in fall 2015, compared to 1,229 (19.9 percent) the previous year. Enrollment of

minority students was 592 (9.5 percent) in fall 2015, which is a decrease of 19 over the previous year. Fall 2015 minority enrollment included 233 African Americans, 242 Hispanic students, 15 Native Americans and 102 minority students of more than one race.

Graduate student enrollment. Graduate student enrollment for fall 2015 was 3,264 (2,111 master's and 1,153 doctoral) compared to 3,159 (1,980 master's and 1,179 doctoral) the previous year. International students made up 60 percent (1,962 students) of the enrollment; 21 percent (698) of the students were women. Minority enrollment was 13 percent of domestic students (161 students).

Undergraduate degrees awarded. The number of bachelor's degrees awarded for 2015-16 was 1,373, compared to 1,238 for the 2014-15 year.

Graduate degrees awarded. The number of graduate degrees awarded during 2015-16 was 1,134 (966 master's degrees and 168 doctoral degrees). In 2014-15, there were 994 degrees awarded (817 master's degrees and 177 doctoral degrees).

Undergraduate recruiting. During spring 2016, Engineering Academic Affairs offered six yield events for fall 2016 accepted students. One such event was offered specifically for women and minority freshmen students and highlighted the Women in Science and Engineering program as well as the Minority Engineering Programs and the Women in Engineering program. The event was designed to not only increase enrollment of women and underrepresented students, but also to make the opportunities and community support aspects for these populations more visible to prospective students.

Included in the College's spring yield events were four Experience NC State visitations offered by the university for accepted freshmen. Each College event included information sessions, student panels made up of Engineering Ambassadors, parents' sessions and tours of Centennial Campus.

Additionally, the Engineering Open House in March 2016 drew approximately 4,000 people including admitted and prospective high school, middle school and community college students plus parents.

Graduate student recruiting. Master's applications from Fall 2011 to Fall 2015 increased by 51 percent. Interest remains strong, despite the fact that most master's students are self-supporting. Doctoral applications, however, decreased by 17 percent during this same period, which represents a challenge to our ability to grow at the doctoral level. COE master's and doctoral applications in Fall 2015 represented 58 percent and 40 percent of the university total, respectively.

From the 2013-2014 academic year to the 2016-2017 academic year, COE (including Engineering Foundation) expenditures on graduate student recruiting and educational

enhancements will have increased by 95 percent, to \$1.7 million. Additionally in 2016-2017, the Provost is providing \$667,000 in recruiting funds for doctoral fellowships, which did not exist in 2013-2014. During this same period, the Associate Dean of Graduate Programs position has been created, as well as the Manager for Graduate Diversity position, and an assistant to the Director of Graduate Programs. The College and Provost collectively are investing in graduate programs and graduate recruiting at unprecedented levels. This includes improvements in the quality of graduate education in the College, such as travel funds for students to attend conferences.

Distance Engineering Education Programs

The College offers several distance education courses and degree programs for students in North Carolina, across the United States and in other countries. Last year, graduate students participated from 41 states, Puerto Rico and the countries of Brazil, Mexico, Saudi Arabia, Nigeria and Canada. Sixteen online graduate degrees are now available.

More than 970 working professionals were in enrolled graduate classes as matriculated or non-degree students. The college offered 290 graduate courses during the fall and spring semesters and 32 courses during the 10-week summer term. The total number of graduates in the online graduate degree program for 2014-15 was 184. Forty percent of the matriculated students in graduate programs were from North Carolina. Other students in large numbers were from South Carolina, Virginia, Texas, California and the state of Washington. A total of 447 students have graduated from an online degree program in engineering or computer science since 2013. The online program was ranked 12th by *US News and World Report* for online engineering programs in 2016 and the computer science degree program was ranked 7th.

The College also administers 2+2 engineering programs on the campuses of UNC Wilmington and UNC Asheville and in Havelock. Several students have remained in Havelock or in Asheville to complete a Bachelor of Science in engineering (BSE) degree program in a special area of concentration. The Mechanical Engineering Systems concentration graduated three students in Havelock and 27 students graduated from the Mechatronics Engineering program in Asheville. Both programs have had an increase in their enrollments and admissions during the past academic year. These BSE programs are ABET accredited.

Enrollment in the Computer Programming Certificate, designed for individuals who already have an undergraduate degree in an area other than computer science, has also increased in registrations and 33 students graduated in this program during the academic year. The certificate program serves as an opportunity for these students to complete undergraduate prerequisites for the Master of Computer Science online program.

Women in Engineering (WIE) program

The WIE program continued to be feted nationally, as the percentage of women in our first year class rose above 29 percent for the first time. The national average remains at 18 percent. Fifty incoming female students attended the ESCAPE to Engineering bridge program. The functions of University Orientation are incorporated into programming as well as field trips to statewide industries, social activities and success-based activities. This camp is funded by donations from John Deere, Praxair and ABB.

The WIE program staff continues to work in conjunction with Academic Affairs staff on recruitment and retention issues for women. WIE and MEP staff worked together on many efforts that are addressing intersectionality between gender and ethnicity, which will benefit our students greatly. Programs included Dinner Dialogs for students within departments, the Tools Workshop (where students can learn how to solder, use power tools, pipette and other skills needed in today's engineering laboratories), Taste of Engineering and programs with John Deere, Caterpillar, Duke Energy, Praxair, Glaxo-Smith-Kline and other wonderful industry partners.

Minority Engineering Programs

The Minority Engineering Programs offer a variety of specially designed initiatives aimed at recruiting and retaining talented minority engineering students.

The Overnight Minority Recruitment Weekend is geared toward high school seniors who have been admitted to the College. Thirty-two admitted minority students along with approximately 70 family members/guests participated in this year's event. This represents a 14 percent increase in student participants, and a 16.6 percent increase in family participation.

The Summer Transition Program (STP) is a major minority engineering student recruiting program that brings new students to campus during the second summer session before fall of their freshman year to assist them in making a smooth transition from high school to college by offering courses in mathematics, chemistry, study skills and the College's computing environment. Using information provided by the University's admissions database, 382 potential STP participants were invited to apply for the program. Twenty-six applications and surveys were received and all were accepted as participants.

In the 2015–16 academic year, four sections of E144 – Academic and Professional Preparation I, were available to the 141 incoming minority engineering freshmen. The fall course had 126 students enrolled. E144 is specifically designed to help minority engineering students become better acclimated to our campus and the College.

Engineering Career Fair

The Engineering Career Fair continues to be one of the largest in the country with more than 340 companies attending our events in the fall and spring semesters of 2014-15.

Fundraising

Fueled by strong and early support for Engineering Oval, the NC State Engineering Foundation had another record-setting fundraising year with giving totals to the College at \$30,468,121. Fiscal Year 2016 ended on June 30, 2016. This is the fifth consecutive year with an increase in gift commitments.

The Campaign for Engineering Oval launched this past year with Leadership Gifts recorded at \$15,275,000 (Goal is \$60 million). Endowment gifts were off slightly this year at \$7,094,856 (Compared to \$9.2 million in FY '15). Endowments to the College generally fall into one of two categories: scholarships and professorships. There are now 292 permanently endowed scholarships in the College and 44 permanently endowed professorships.

The annual giving program for the College of Engineering raised a total of \$1,483,151 for the College of Engineering Leadership Fund and all nine department enhancement funds. This represents a 19-percent increase from the previous year. The Dean's Circle, the College's leadership annual giving society, grew by 76 members, bringing our total membership to 421 alumni and friend donors, representing a 22-percent increase from the previous year. These gifts often represent our "pipeline" for major gifts and an important part of the College's overall advancement plan.

Administration

- Dean Louis A. Martin-Vega was elected president of the American Society for Engineering Education (ASEE) for 2016-17. The ASEE has more than 12,000 members and is the largest professional society devoted to engineering education.
- Elizabeth Parry was recognized by the American Society for Engineering Education (ASEE) in summer 2016 for her work improving outcomes at a Raleigh elementary school. Parry is the partnership coordinator and instructor in First Year Engineering with The Engineering Place.
- The 2015 Paul Zia Distinguished Lecture Series in Civil Engineering and Construction featured Dr. Henry Petroski, Mr. Jonathan McGormley and Ms. Linda A. Figg, who spoke on "Structural Failures, the I-35W Bridge Collapse and Replacement." More than 500 people attended the event.

- The Engineering Place hosted the annual North Carolina Future City competition, in which some 2,500 K-12 students from across the state participate.
- The College hosts an annual social event for the FIRST Robotics regional competition participants. Approximately 650 high school students attended the spring 2015 event.

Recommendations and Concerns for the Future

Our persistent efforts to attract and retain the highest quality faculty combined with our success in highly competitive national programs such as DOD and DOE and the NSF ERC programs and others have continued to move us forward in almost every major “data” category in the latest *US News* graduate engineering rankings. While it is gratifying to see that we are moving in the right direction, our peer institutions are also making strides to improve, so we are aware that maintaining and improving upon this ranking will continue to be a significant challenge.

As was the case last year, the biggest challenge nationally is that no one is standing still and many of our peers and aspirational peers are receiving significant commitments to grow even more their faculty size and resources in engineering. These investments by our peers and aspirational peers increase competition for top faculty members and create the need for available funds to retain our current top faculty. This pressure will only continue to increase as other institutions move forward with expansion plans.

Another major challenge will be dealing with unplanned increases in undergraduate enrollment in 2015-16 and going forward. Our previous plan had been to maintain, or possibly reduce, our undergraduate enrollment; however, increased demand has necessitated the rise in enrollment. The adverse impact that this will have on what is already a strained student-faculty ratio for a research college of engineering may ultimately lead to stagnation or reduction in research productivity since the inverse relationship between these two metrics is well known and documented. We still plan, however, to grow our graduate enrollment, particularly our Ph.D. enrollment, which is critical to both enhancing the rankings and reputation of COE as well as furthering the achievement of NC State’s strategic plan.

The College also faces the challenge of raising private sector capital support for moving the rest of the College to Centennial Campus. This effort, which is now under way with the solicitation of private sector capital funding for the construction of EB Oval, represents a shift in the way university academic buildings are funded and built and involves exploring all possible funding options for future capital investments for academic space. The support of the administration for the public/private capital funding model that we are now implementing is very much appreciated and has allowed us to move forward in a significant way on this option.

The support the College has received in the past from the Legislature and the University has been crucial in assuring that we did not lose ground among our peers nationwide. I, and all of us in the College, am most appreciative of this, especially in light of the budget reductions and challenges we have had to face together. The steps that have been taken during this last year through the approval of the differential engineering enhancement fee and the support from the Legislature and the Connect NC bond for partial funding of EB Oval represent very significant steps forward in our quest to be among the premier colleges of engineering in the nation. The support of our administration in both of these efforts means a great deal to all of us in the College and for this, as well as other related support, we are most grateful. While many challenges remain, the opportunities right now seem equally bright, and we look forward to certainly a brighter future than we were envisioning last year.