Academics

Departments in the College of Engineering
- Biomedical Engineering
- Chemical and Biomolecular Engineering
- Civil, Construction, and Environmental Engineering
- Computer Science
- Electrical and Computer Engineering
- Edward P. Fitts Industrial and Systems Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering
- Nuclear Engineering

Departments in other colleges
- Biological and Agricultural Engineering
- Forest Biomaterials
- Textile Engineering, Chemistry and Science
Among all U.S. engineering colleges*
- 9th in BS degrees awarded
- 12th in MS degrees awarded
- 12th in PhD degrees awarded
- 10th in total degrees awarded

* ASEE Profiles 2014
Undergraduate Enrollment

- Undergraduate enrollment increased by 18% or over 1,000 in the last decade
- Quality of entering freshmen improved with more than 70% in top 10% of high school class
- Master’s enrollment has more than doubled in last decade with 22% growth in last five years
- Doctoral enrollment has increased by 50% in last decade
- Total enrollment has grown by 33%, from 7,467 to 10,103, over last decade

Graduate Enrollment

- Enrollment Growth
  - Undergraduate enrollment increased by 18% or over 1,000 in the last decade
  - Quality of entering freshmen improved with more than 70% in top 10% of high school class
  - Master’s enrollment has more than doubled in last decade with 22% growth in last five years
  - Doctoral enrollment has increased by 50% in last decade
  - Total enrollment has grown by 33%, from 7,467 to 10,103, over last decade
Diversity Profile

- 9th in BS degrees awarded to African Americans among non-HBCUs*
- 16th in BS degrees awarded to women*
- 12th in MS degrees awarded to women*
- 15th in PhDs awarded to women*
- 7th in number of African American T/TT faculty*
- 9th in number of women T/TT faculty*
- Women and Minority Engineering Programs, co-recipients of the 2015 Claire L. Felbinger Award for Diversity

* ASEE 2014 data
- 290 tenured and tenure-track faculty members
- 15 members of the National Academy of Engineering
- 2 National Medal of Technology and Innovation recipients
- 2 North Carolina Award for Science recipients
- 1 US Army Commander’s Award recipient
- 1 Emmy Award winner
- 3 Inventors Hall of Fame members
- 1 *Electronic Design* Hall of Fame member
- 3 among AIChE 100 Engineers of the Modern Era
- 76 NSF CAREER Awards since 2000 or more than 7 per year on average
- 1 Presidential Early Career Awards for Scientists and Engineers (PECASE)
- 5 Presidential Mentoring (PAESEM) Awards
Research expenditures have grown from $127 million to $176 million, or 39 percent since 2009-10.

14th overall and 10th among public COEs in the US in total research expenditures*

*ASEE 2014 data
NC State University will emerge as a preeminent technological research university recognized around the globe for its innovative education and research addressing the grand challenges of society.
Emphasis on the integration of research and education
Highest level of competition among colleges of engineering for National Science Foundation (NSF) funding

Largest and most prestigious awards offered by the NSF Engineering Directorate … $40 million over 10 years

100+ universities compete in first round

16 or fewer are site visited

8 or fewer are invited for Blue Ribbon Final Competition

4 or fewer are eventually awarded
In its history, NC State has received three NSF ERCs:

- 1988 – Center for Advanced Electronic Materials Processing (AEMP)
- 2008 – Center for Future Renewable Electric Energy Delivery and Management (FREEDM) Systems
- 2012 – Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)

NC State is one of only two universities currently leading two ERCs and is one of only two universities ever to receive three ERCs.
NAE Grand Challenges for the 21st Century

- **Sustainability**
  - make solar energy more economical
  - provide energy from fusion
  - develop carbon sequestration methods
  - provide access to clean water
  - manage nitrogen cycle

- **Health**
  - advance health informatics
  - engineer better medicines
  - reverse-engineer the brain

- **Security**
  - restore and improve urban infrastructure
  - prevent nuclear terror
  - secure cyberspace

- **Joy of Living**
  - enhance virtual reality
  - advance personalized learning
  - engineer the tools of scientific discovery
Solving Society’s Energy Challenges

NSF Engineering Research Center for Future Renewable Electric Energy Delivery and Management (FREEDM) Systems

- Center Director: Dr. Iqbal Husain
- “Top 10 Emerging 21st Century Technologies”
  ~MIT Technology Review
- $40 million, 10-year grant from NSF
- Creating the “Internet for Energy” for renewable energy generation and storage
- Over 40 industry partners and catalyst for numerous “clean-tech” companies
- Unconditional renewal in 2015 through 2018
Next Generation Power Electronics Innovation Institute (PowerAmerica)

- NC State University Lead Institution
- Director: Maj. Gen. Nick Justice
- $140 million grant from U.S. DOE
- Develops advanced manufacturing processes to enable large-scale production of wide bandgap semiconductors
- Comprises university, government and 12 energy sector leaders such as Cree, ABB, Toshiba, Delphi Automotive, John Deere Electronic Solutions
- Spinoff from the FREEDM Systems Center
NSF Nanosystems Engineering Research Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)

• Center Director: Dr. Veena Misra
• Potential $40 million ten-year grant from NSF
• Awarded in 2012 and unconditionally renewed in 2015 for another five years
• Developing and employing nano-enabled devices and sensors to create innovative, battery-free, body-powered, and wearable health monitoring systems
• Currently has 33 industry partners
CASL: The Consortium for Advanced Simulation of Light Water Reactors

A DOE Energy Innovation Hub for Modeling & Simulation of Nuclear Reactors

- Renewed for a 2nd 5-years at $121.5 million in 2015
- Mission: Reduce capital & operating costs - Reduce nuclear waste – Assure nuclear safety
- Vision: Create a virtual reactor for predictive simulation of Light Water Reactors

NC State Leaders

Chief Scientist for CASL: Dr. Paul Turinsky

CASL Education Director: Dr. Mike Doster

Core National Lab Partners
- Idaho National Laboratory
- Los Alamos National Laboratory
- Oak Ridge National Laboratory
- Sandia National Laboratories

Core Corporate Partners
- Tennessee Valley Authority
- Electric Power Research Institute
- Westinghouse Electric Company

Core University Partners
- NC State University (Lead)
- University of Michigan
- MIT
Consortium for Nonproliferation Enabling Capabilities

A research and education hub for the development of enabling technologies and technical talent for meeting the grand challenges of nuclear nonproliferation

- Five-Year, $25 million, National Nuclear Security Administration grant
- NC State is the lead institution
- Leadership:
  - Dr. Yousry Azmy, Director
  - Dr. Robin Gardner, PI and Chief Scientist
  - Dr. John Mattingly, Co-PI
- 3 National Lab partners: ORNL, LANL and PNNL
- Six University Partners:
  - University of Michigan
  - University of Illinois
  - NC A&T State University
  - Purdue University
  - Georgia Tech
  - Kansas State University
- 11 NC State faculty and staff in 6 departments from 3 colleges including College of Humanities and Social Sciences and College of Sciences
- Next generation of methods and tools to detect, locate, identify, and characterize Special Nuclear Material (SNM)
NSA Science of Security Lablet (SoSL)

- Based out of Computer Science
  - Led by Dr. Laurie Williams and Munindar Singh
  - 14 supported NC State faculty; 18 supported NC State students
  - Multi-disciplinary: 4 NC State colleges and institutes
  - 6 collaborating university partners

- Other NSA SOSL lablets: Carnegie Mellon, University of Illinois Urbana-Champaign, and University of Maryland

- Projected $2.0-$2.5M funding per year per lablet

Critical cyber systems must inspire trust and confidence, comply with applicable security and other policies, predictably protect the integrity of data and resources as well as the privacy of data owners, and perform reliably and safely. Therefore, a scientific basis for the design, analysis and operation of trusted systems is needed.
Centers, Institutes and Laboratories

- Analytical Instrumentation Facility (AIF)
- Center for Additive Manufacturing and Logistics (CAMAL)
- Center for Dielectrics and Piezoelectrics (CDP)
- Center for Educational Informatics (CEI)
- Center for High Performance Simulation (CHiPS)
- Center for Nuclear Energy Facilities and Structures (CNEFS)
- Center for Transportation and the Environment (CTE)
- Consortium for Advanced Simulation of Light Water Reactors (CASL)
- Consortium for Nonproliferation Enabling Capabilities (CNEC)
- Constructed Facilities Laboratory (CFL)
- The Ergonomics Center of North Carolina (TECNC)
- Institute for Next Generation IT Systems (ITNG)
- Institute for Transportation Research and Education (ITRE)
- Laboratory for Integrated Manufacturing Science and Technology (L-IMST)
- Minerals Research Laboratory (MRL)
- Nanofabrication Facility @ NC State (NNF)
- NSF Nanosystems Engineering Research Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)
- NSF Engineering Research Center for Future Renewable Electric Energy Delivery and Management (FREEDM) Systems
- NC Clean Energy Technology Center (NCCETC)
- Nuclear Reactor Program (NRP)
- Research Triangle Nanotechnology Network (RTNN)
- Research Triangle MRSEC on Soft Matter
- Water Resources Research Institute (WRRI)
• Entrepreneurship Garage provides a space and tools and equipment for students to pursue their ideas and develop new products and new companies.

• Albright Entrepreneurship Living and Learning Village on Centennial Campus promotes innovative and collaborative entrepreneurship among students.

• Students in NC State’s Engineering Entrepreneurs program create solutions that have a global impact, including
  • A fingernail polish that can detect drugs in beverages, giving women a new tool to avoid sexual assault that is going to market this year.
  • The world’s first low-cost tuberculosis test that is now being used in rural India.
  • A tool that makes handling sewage safer and more efficient in third world countries that won $350,000 in Gates Foundation funding.
Minority Engineering Programs

- Summer Transition Program (STP)
- Minority Summer Research Program (MSRP)
- STudent Advancement & Retention Teams (START) Mentoring Program
- E144/E145 (Academic & Professional Development Courses for Freshmen)
- Minority Engineering Student Organizations Advising: (AISES, NSBE and SHPE)
- MEP Overnight Recruitment Stay
- Industry Access to MEP Students
K-12 Outreach

- Reaches >17,000 K-12 students and teachers across the state each year
- Summer camps for elementary through high school located across the state (42 camps in 2015)
- Teacher workshops/Research experience for teachers
- Family Engineering Nights for schools
- Engineering On the Road
- Partnership efforts (Girl Scouts, Marbles Museum, Boys and Girls Club)
- Freshman Engineering Design Day, featuring high school and middle school students
More than two-thirds of the College of Engineering is housed on Centennial Campus.

- EB I: Departments of Chemical and Biomolecular Engineering and Materials Science and Engineering
- EB II: Departments of Computer Science and Electrical and Computer Engineering
- EB III: Departments of Biomedical Engineering and Mechanical and Aerospace Engineering
- Biomanufacturing Training and Education Center (BTEC)
- NSF FREEDM Systems Engineering Research Center
- NSF ASSIST Engineering Research Center
Engineering Oval is the next step in moving the College to Centennial Campus.

Engineering Oval will enhance the university’s ability to continue to attract and support the world’s best engineering students and faculty.

Engineering Oval will support the future of infrastructure, manufacturing and health systems in North Carolina.
Long-Term Goal

“To become and be perceived as the leading public college of engineering in the country and one of the premier colleges of engineering in the world”
Our daily commitment to our students is to ensure that the “E” in Engineering truly stands for *Excitement*. 