

RESEARCH CENTERS AND FACILITIES

The Research Triangle Park

NC State is one of the three Triangle area top-tier research universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30 mile triangle formed by the three universities is The Research Triangle Park, a 7,000-acre research park founded in 1959 by leaders from academia, business and government. Today, The Research Triangle Park is home to some of the most innovative and cutting-edge research based companies in the world.

The unique “Research Triangle” area of North Carolina has captured national and international attention. The “triangle” is formed by the three geographic points of Raleigh, Durham and Chapel Hill that are home to the area’s top-tier research universities: NC State, Duke University and University of North Carolina at Chapel Hill. Because of this wealth of educational and research opportunities, the triangle contains one of the highest concentrations of Ph.D. scientists and engineers per capita, in the nation. The highly educated workforce in the Triangle is extremely attractive to companies, many of which engage in collaborative programs within the area universities.

Since it was established, The Research Triangle Park has witnessed a steady and stable increase in the number of companies and employees. Currently, there more than 170 organizations located in The Research Triangle Park. More than 42,000 people work in the Park, with combined annual salaries of over \$2.7 billion. Organizations in the Park include government research laboratories of the National Institute of Environmental Health Sciences, and the U.S. Environmental Protection Agency. Private companies such as IBM, GlaxoSmithKline, Nortel, Cisco, and RTI International are located in the Park. Talented scientists, engineers and managers from RTP companies frequently hold adjunct faculty appointments in one or another of the Triangle universities.

The Analytical Instrumentation Facility (AIF)

D.P. Griffis, Director, Analytical Instrumentation Facility

The Analytical Instrumentation Facility (AIF) provides NC State faculty and students with the highest level of modern microanalysis instrumentation currently available as well as trained specialists to assist with teaching, training, instrument operation, and experimental design. The unique combination of extensive analytical instrumentation and specialized staff makes AIF a valuable asset to both teaching and research at all levels. AIF staff provides the expertise to access AIF’s state of the art analytical capabilities, conducts training and provide guidance to students. AIF is located in the Larry K. Monteith Engineering Research Center on the NC State Centennial Campus. This laboratory space, located in the mixed-use (private industry/academics) environment of Centennial Campus, provides the optimum environment for teaching, research and technology transfer. AIF analytical capabilities encompass analyses of materials including ceramics, metals, semiconductors, polymers, and biological materials. The Variable Pressure Scanning Electron Microscope (VPSEM), which can operate at high chamber pressure for charge neutralization, provides electron microscopy and EDS (Energy Dispersive X-Ray Spectroscopy) elemental analysis on uncoated non conductive samples including biological, polymeric, textile, and other materials. The VPSEM facility is used extensively by undergraduate students in a wide range of disciplines. AIF has extensive capabilities in the areas of Atomic Force Microscopy (AFM) for high resolution surface topography measurement, Field Emission Scanning Electron Microscopy (FESEM) and Field Emission Transmission Electron Microscopy (FETEM) for high resolution imaging, dynamic Secondary Ion Mass Spectrometry (SIMS) for trace analysis, Time of Flight SIMS for molecular surface analysis, X-Ray Photoelectron Spectrometry (XPS) for chemical surface analysis, and Focused Ion Beam nanomachining for sample preparation and fabrication of nanostructures and a metallography laboratory. In addition, AIF has extensive facilities for specimen preparation for all of the above mentioned analytical techniques.

Animal and Poultry Waste Management Center

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The Animal and Poultry Waste Management Center coordinates collaborative research, education, and extension initiatives among universities, agribusiness and other organizations to address waste management concerns. Collaborating universities have included Georgia, Iowa State, Kentucky, Michigan State, Mississippi State, Ohio State, Oklahoma State, and Virginia Polytechnic Institute, and others. Agribusiness environmental groups and regulatory agencies serve the center in an advisory role. Center-sponsored projects include technology applications targeting environmental emissions from livestock operations, and the improvement of air and water quality associated with animal waste management. Other center work includes energy recovery from animal by-products and providing facilities and equipment for carrying out research and teaching activities focusing on converting animal by-products into economically feasible and socially acceptable value-added products.

Center for Advanced Computing and Communication

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The Center for Advanced Computing and Communication (CACC) is a former National Science Foundation (NSF) sponsored Industry/University Cooperative Research Center. The center’s mission is to carry out basic and applied research on problems having both industrial and academic relevance, to transfer these results to members, and to provide students with a challenging education opportunity. The research goal is to create concepts, methods, and tools for use in analysis, design, and implementation of advanced

computer and communication systems. Current members include Cisco Systems, Friday Institute, IBM, MCNC, National Security Agency, and Tekelec.

Center for Advanced Electronic Materials Processing (AEMP)

M.C. Ozturk, Interim Director

The Center for Advanced Electronic Materials Processing was established in 1988 as a National Science Foundation Engineering Research Center. More, recently, it has included the SRC/SEMATECH Research Center program on Front End Processes for advanced semiconductor devices in collaboration with a large number of other universities. The center's program is interdisciplinary involving collaboration among chemists, physicists, materials scientists and electrical, chemical and mechanical engineers. The research focuses on the development of processing technologies capable of producing nanometer scale electronic devices. The center is responsible for the operation of the NCSU Nanofabrication Facility and the Triangle National Lithography Center - an affiliate of the National Nanotechnology Infrastructure Network. These cleanroom facilities are open to students, faculty, and world-wide researchers to fabricate and test nanostructures. Undergraduate Scholar Awards are available for qualified undergraduates with interest in electronic materials and devices.

Center for Advanced Processing and Packaging Studies

K. P. Sandeep, Site Director

The Center for Advanced Processing and Packaging Studies was established in October 1987 to promote cooperative research between university and industrial researchers and to further scientific knowledge in areas of food and pharmaceutical aseptic processing and packaging. The mission and focus of the center is to conduct industrially relevant research directed at developing methods and technologies for the safe production of marketable, high quality aseptic and refrigerated extended shelf-life products. The center is funded by industrial members from the food, processing and packaging industries and receives support from the National Science Foundation and the universities involved. Students working on CAPPS projects will be exposed to industrial concerns and be given the opportunity to work first-hand with industry in solving problems and making practical application of their research. Cooperative research opportunities are available in the Department of Food Science at NC State and also at other universities.

Center for Chemical Toxicology Research and Pharmacokinetics

J. E. Riviere, Director

The Center for Chemical Toxicology Research and Pharmacokinetics performs scientific research on cutaneous function and structure focused on cutaneous toxicology, metabolism and pharmacokinetics and transdermal drug delivery, employing innovative animal and mathematical models and other predictive systems including cell cultures and novel analytical techniques. Current research is focused on the absorption of chemical mixtures and the toxicology of nanomaterials. This provides the necessary research base to support a rigorous graduate and post-graduate training program in comparative pharmacology and toxicology designed to produce health scientists for academia, industry and government. Besides laboratory research, CCTRP also operates the US and global Food Animal Residue Avoidance Databank (FARAD), performs the residue avoidance data analysis, and provides assistance to those who have questions about how to prevent residues in animal-derived food.

Center for Engineering Applications of Radioisotopes

Robin P. Gardner, Director

The Center for Engineering Applications of Radioisotopes was established in 1980 within the Department of Nuclear Engineering and associated with the Department of Chemical Engineering. It is composed primarily of faculty and their graduate students and post-doctoral students doing research related to the measurement applications of radiation and radioisotopes in industry. This includes the use of short-lived radioactive tracers, radiation gauges, radiation analyzers, industrial and medical tomography, and radiation detection physics. CEAR has devoted much effort to the development and use of Monte Carlo simulation for the design and inverse analysis use of these applications. Excellent experimental facilities are available including solid state and very large NaI detectors and the NC State PULSTAR Nuclear Reactor. In addition, CEAR has its own computer cluster, which was donated by Weatherford. The center's programs are financed largely by an Associates Program for oil well logging and grants from industry and federal agencies such as NIH and DOE.

Center for Research in Mathematics and Science Education

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The Center for Research in Mathematics and Science Education is a part of the College of Education's Friday Institute and conducts program evaluation for the North Carolina Mathematics and Science Education Network. CRMSE conducts evaluations of the programs, projects, and services offered by the 11 MSEN centers and nine Pre-College Programs throughout the state that provide professional development and student outreach for North Carolina's teachers and strive to improve Science, Technology, Engineering, and Mathematics teaching and learning (STEM).

In addition, CRMSE is one of nine UNC System Universities with a Pre-College Program component. The mission of the NCSU NC-MSEN Pre-College Program is to prepare underserved students at the middle and high school levels (grades 6-12) for careers in education and science, technology, engineering and mathematics (STEM). The NCSU NC-MSEN Pre-College Program currently serves 450 students in Franklin, Granville, Johnston, Nash, and Wake Counties through year-round enrichment activities. The program partners with school districts to recruit students from underserved populations who have not been prepared to pursue college preparatory level mathematics and science based courses. Students participate in exciting, uplifting and challenging activities throughout the school year.

Web site: www.ncsu.edu/crmse.

Center for Research in Scientific Computation

H. T. Banks, Director

The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center of the greater University of North Carolina System. The CRSC is administered by NC State and the College of Physical and Mathematical Sciences. The purpose of the center is to promote research in scientific computing and to provide a focal point for research in computational science, and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for training and graduate students in applied mathematics. With advanced computing methodologies students and post doctoral fellows address important issues in applications involving model development and control design.

Research topics of interest to CRSC faculty include a variety of problems in scientific computation, numerical analysis, and numerical optimization with applications to such areas as fluid mechanics and flow control, smart materials and structures, nondestructive testing, acoustics, material sciences and manufacturing processes, population dynamics, environmental sciences, signal processing, computer performance evaluation and nuclear reactor physics.

The CRSC, in cooperation with the Department of Mathematics, sponsors a university/industrial research project program. The main goal of the Industrial Applied Math Program (IAMP) is to provide substantive non-academic research related experiences for graduate students, postdoctoral and faculty participants while contributing to the research efforts of industrial participants.

Center for Transportation and the Environment

Downey Brill, Director

The Center for Transportation and the Environment conducts programs of research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment. Funded in part by the U. S. Department of Transportation and the North Carolina DOT, CTE is the only university transportation in the country that pursues ways to improve surface transportation systems while protecting the environment. CTE is considered a national resource for current information about transportation and environmental research, policies, and best practices. The center conducts an innovative and aggressive outreach program, using satellite- and computer-based technologies, to assist transportation and environmental professionals with their most critical information needs. For more information, visit CTE's Web site at: cte.ncsu.edu.

Electron Microscope Facilities

There are three electron microscope facilities at NC State available to graduate students and faculty for research purposes. The College of Agriculture and Life Sciences Center for Electron Microscopy is located in Gardner Hall, and the Analytical Instrumentation Facility on Centennial Campus is in the Monteith Engineering Research Center. The College of Veterinary Medicine Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is located at 4700 Hillsborough Street in Raleigh.

The College of Agriculture and Life Sciences Center for Electron Microscopy

J. M. Mackenzie, Jr., Coordinator, CALS Center for Electron Microscopy

The College of Agriculture and Life Sciences Center for Electron Microscopy occupies approximately 300 square feet in the basement of Gardner Hall. It is a centralized facility that services the ultra-structural needs of twenty-two departments. The College of Agriculture and Life Sciences Center for Electron Microscopy offers complete service support in all areas of Biological Electron Microscopy. The Center has a JEOL 5900LV scanning electron microscope, which has low vacuum capabilities and two transmission electron microscopes: a JEOL 100S and a Philips 400T. The Center is equipped with all of the necessary biological, preparatory equipment including a new Cressington Cryo-Fracture, Deep-Etch System.

The Center provides advanced, digital imaging capabilities. We provide access for Macintosh, PC and UNIX based systems allowing transparent information transfer regardless of user's platform preference.

Formal instruction is provided through the Microbiology curriculum for transmission electron microscopy, scanning electron microscopy, ultramicrotomy and digital imaging. The Center also provides support, service, and training in a wide variety of advanced digital imaging. Advanced techniques are usually taught on an individual basis. The Coordinator invites any prospective users to discuss the most effective strategy for completing their imaging project.

The CVM Laboratory for Advanced Electron and Light Optical Methods

M. J. Dykstra, Director, LAELOM

North Carolina State University

The LAELOM is a full-service facility providing clinical and research support for the CVM as well as the full NC State campus. The LAELOM houses a FEICO/Philips EM208S/Morgagni transmission electron microscope and a JEOL JSM-6360LV low vacuum scanning electron microscope with all the necessary support equipment for tissue preparation as well as extensive darkroom facilities for the production of electron microscopy images. The LAELOM also houses an extensive collection of light microscopy instruments, including an Olympus Vanox motorized compound light microscope that can capture images with film, a 3 CCD video camera (live images) or a high-end SPOT RT Slider cooled CD camera. Bright field, polarized, and epifluorescence images can be recorded with this microscope. A motorized Zeiss AxioImager upright microscope with polarizing, bright field, phase, DIC epifluorescence and deconvolution capabilities is available. A Wild photomicroscope with a digital camera is also available for viewing and recording images from larger specimens with bright and dark-field optics. A Nikon C-1 confocal scanning laser microscope system with a heated stage coupled to a Nikon Eclipse 2000E motorized inverted photomicroscope is equipped for bright field, polarized, and epifluorescence image capture with a digital camera. We also have a Nikon 2000S inverted microscope equipped with Hoffman optics (for looking through plastic vessels producing interference contrast-like images) and for epifluorescence with a digital camera. For morphometry needs, the program Image-Pro Plus is available.

Institute for Emerging Issues

Anita Brown-Graham, Director

The Institute for Emerging Issues (IEI) is a public policy, think-and-do-tank at NC State University. Through research, ideas, debate and action, IEI is a catalyst for innovative public policy, engaging students, faculty and the private sector in its ongoing programs of work. Encouraging civic leadership in business, government and higher education, IEI frames future challenges for North Carolina by identifying and researching emerging issues, specifically around topics that relate to the state's growth and economic development.

The Institute brings together new combinations of leaders to debate and refine ideas mobilizing and supporting champions through programs of work that turn ideas into action.

To learn more about IEI, please visit www.emergingissues.org or call (919) 515-7741.

Institute of Statistics

Sastry G. Pantula, Director

The Institute of Statistics is comprised of two sections, one at NC State and the other at UNC-Chapel Hill. At NC State, the Institute of Statistics sponsors statistical collaborations within the university and with its partners in industry and government. It also sponsors methodological and theoretical research in the statistical sciences and cross-disciplinary research. The Institute coordinates the teaching of statistics at the undergraduate and graduate levels. Instructional functions and the granting of degrees are performed by the Department of Statistics, which forms a part of the Institute.

Institute for Transportation Research and Education (ITRE)

Nagui M. Roupail, Ph.D., Director

The Institute for Transportation Research and Education is an inter-institutional center of the University of North Carolina system. Chartered by the North Carolina General assembly in 1978, ITRE conducts research and training for numerous public agencies at the federal, state, and local levels of government and private industry. Additionally, the Institute provides financial and research support for undergraduate and graduate students from various disciplines. The Institute is comprised of several specialty groups including public transportation, highway systems, commercial vehicle and safety, and pupil transportation. The Institute is also the home of the Center for Transportation and the Environment and the North Carolina Local Transportation Assistance Program (LTAP), both federally-funded centers. To learn more about ITRE, please visit us at <http://itre.ncsu.edu>, or call us at (919) 515-8899.

Integrated Manufacturing Systems Engineering Institute

T. J. Hodgson, Director

The Integrated Manufacturing Systems Engineering (IMSE) Institute was established in 1984. IMSE provides multidisciplinary graduate-level education and practical training opportunities in the theory and practice of integrated manufacturing systems engineering at the masters level. IMSE focuses on providing a manufacturing presence and a program environment in the College of Engineering where faculty, graduate students and industry can engage cooperatively in multidisciplinary graduate education, basic and applied research, and technology transfer in areas of common interest related to modern manufacturing systems technology. The objective of the IMSE program is to offer students with traditional discipline backgrounds in engineering and the physical sciences an opportunity to broaden their understanding of the multidisciplinary area of manufacturing systems. Core areas of concentration are offered in manufacturing systems, logistics, and mechatronics, and bio and medical device manufacturing.

Nonwovens Cooperative Research Center

B. Pourdeyhimi, Director

The Nonwovens Cooperative Research Center (NCRC) was established in 1991 and has been funded by the National Science Foundation (NSF), the State of North Carolina and industrial membership. The NCRC is located at the College of Textiles on the Centennial Campus. The center serves the nonwovens industry through its programs of generic fundamental and applied research in the technologies of the industry as well as through an active program of technology transfer. The core research programs are centered on product performance, process development and analysis, and materials application/development. The center also pursues non-core research projects sponsored by companies on specific problems on a propriety basis.

The center provides opportunities to gain hands-on experience in nonwovens research to students studying toward various degrees. An undergraduate minor in the science of nonwovens is offered as well as a Graduate Certificate in Nonwovens. A master's degree is possible as an option for the graduate degree in Textile Technology, along with a Ph.D. in Polymer and Fiber Sciences. Faculty members from NC State, Georgia Tech, Clemson University, University of Tennessee, etc., are involved in several research projects funded by NCRC. Over 65 companies are industrial members. This includes the seven top roll goods producers representing over half of all worldwide sales in this area. Industrial members come from many countries including Germany, Turkey, Japan, Korea, and Canada.



Nuclear Reactor Program

Ayman I. Hawari, Director

The mission of the Nuclear Reactor Program is to enhance, promote, and utilize the PULSTAR research reactor and associated laboratory facilities for research, teaching, and extension. Specialized facilities are available to university faculty, students, state and federal agencies, and industry. The laboratory contains the 1 megawatt steady-state, pool-type, PULSTAR nuclear reactor with a variety of associated academic, testing, and research facilities including: Distance Learning through Video and Internet Teleconferencing; an ultracold neutron source, a neutron radiography facility; an intense slow positron beam facility; a powder neutron diffraction facility; a neutron activation analysis and radioisotope laboratory; a low level counting laboratory equipped with high purity germanium gamma spectrometers and beta liquid-scintillation systems; and a Cobalt-60 gamma irradiation facility.

The 50,000 square-foot Burlington Engineering Laboratory complex on the NC State campus houses the Department of Nuclear Engineering and the 1 MW PULSTAR Nuclear Research Reactor Facility.

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Oak Ridge Associated Universities (ORAU)

NC State has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of 99 doctoral granting colleges and universities and a management and operating contractor for the U. S. Department of Energy (DOE) with principle offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops capabilities crucial to the nation's technology infrastructure, particularly in energy, education, health, and the environment. ORAU works with and for its member institutions to help faculty and students gain access to federal research facilities; to keep members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among our members in areas where their collective strengths can be focused on issues of national importance.

ORAU's Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU's members, private industry, and major federal facilities. Activities include facility development programs, such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research and support programs as well as services to chief research officers (see www.orau.org).

Throughout the Oak Ridge Institute for Science and Education (ORISE), the DOE facility that ORAU operates undergraduates, graduates, postgraduates, as well as faculty enjoy access to a multitude of opportunities for study and research. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science — and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits can be found in the *ORISE Catalog of Education and Training Programs*, which is available at www.orau.gov/orise/educ.htm. Contact Ray Fornes (NC State Councilor to ORAU), (919) 515-7865 for more information about ORAU programs or see www.orau.org.

Plant Disease and Insect Clinic

Web site: www.ncsu.edu/pdic

The Plant Disease and Insect Clinic (PDIC) provides a unique diagnostic and educational service to plant growers in North Carolina. It is an integral part of the extension program in the Departments of Plant Pathology and Entomology. The PDIC receives approximately 3,600 problem samples each year. County Agents, Extension Specialists, consultants and growers submit samples from nurseries, greenhouses, agricultural crops, forests and urban landscapes. This provides an opportunity to observe and work with practical problems currently developing and causing damage.

Changes in agricultural technology and trade patterns influence the range of pest problems encountered and require new types of assays and more sophisticated laboratory examinations. Participation in the National Plant Diagnostic Network (NPDN) assures that new problems discovered in NC will be properly documented in the NPDN database and tracked appropriately to help safeguard agriculture in NC and the US. Plant problems must be correctly diagnosed and proper control strategies employed as quickly as possible for growers to minimize losses. The PDIC provides a vital link between the numerous highly specialized resources and faculty members at NC State and problems as they arise in the field. New or unusual outbreaks of plant diseases and insects can be quickly detected through the PDIC.

Power Semiconductor Research Center

B. J. Baliga, Director

The Power Semiconductor Research Center was established as an industrial consortium at NC State University on July 1, 1991. It has garnered support from around the world with more than a dozen companies participating in the venture. The mission of the center is to perform fundamental studies on semiconductor technology for power electronics applications. Although many centers have been established in the past for performing research in the area of microelectronics, PSRC was the first center to focus the research towards power electronics applications. The power electronics that will benefit from this research have widespread utility in society. These applications are computer power supplies and automotive electronics at relatively low operating voltages (50 to 100 volts); displays, telecommunications, appliance controls, and motor drives at medium operating voltages (300 to 1,500 volts); and traction (electric trains), and power transmission systems at high operating voltages (2,000 to 10,000 volts). Power semiconductor devices determine the pace for technological advancements in power systems because of the continuing trend to reduce size and weight and to improve the efficiency. This has important social implications in terms of conservation of fossil fuels and reduction of environmental pollution.

The applications require three basic components: (1) three terminal power switches, (2) power rectifiers, and (3) power/high voltage integrated circuits. The research program at PSRC was structured with the goal of developing improved power semiconductor chips in all of these three categories from a short and long term perspective. The following research thrust areas have been worked on since the inception of the center: (a) Power rectifiers, (b) Power MOS-Gated Thyristors, (c) Large Area Power MOS Technology, (d) Dielectrically Isolated Devices for Power Integrated Circuits, (e) Silicon Carbide Technology for Power Devices, and (f) Cryogenic Operation of Power Devices. Although the research is directed toward the development of generic, pre-competitive technology, care has been taken to maintain strong industrial relevance. Silicon devices have been developed which allow 2 to 20 fold improvement in performance for low voltage applications. This technology has already been licensed for product introduction. Theoretically projected performance of silicon carbide high voltage devices has been confirmed experimentally. This technology is expected to play an important role in the 21st century. The research has been documented and shared with the sponsors in the form of 45 patents and 259 technical reports provided to them over the last 10 years of operation. Due to the strong support of the international industrial community, this center is now recognized as the premier research organization for power semiconductor technology in the world. More details can be found at www.psrc.ncsu.edu

In 2008, the research activities at PSRC have been integrated into the research program within the recently awarded NSF Gen-III Engineering Research Center "FREEDM."

Precision Engineering Center

Thomas A. Dow, Director

Web site: www.pec.ncsu.edu

The Precision Engineering Center, established in 1982, is a multidisciplinary research and graduate engineering program dedicated to providing new technology for high precision manufacturing. Research activity in the PEC involves measurement and fabrication of optical, biological, electronic, or mechanical devices where the tolerances required for operation are on the order of 1 part in 100,000; that is, for a 25 mm (1 inch) long part the error must be less than 250 nm (250×10^{-9} m). Components that require this technology include contact lenses and other optical components, hard disk heads for computer memory devices, integrated circuits, space telescopes, injection molding dies, bearings and gears. Current projects in the center involve development of new mechanical designs and control algorithms, novel actuators that include piezoelectric or magnetic drivers, unique fabrication and measurement techniques and high-speed controllers to implement these concepts. With support from government and industry, the PEC pulls together faculty, staff, and students from across the university to develop new ideas and transfer those ideas to US industry.

Sea Grant College Program

Michael P. Voiland, Executive Director

The North Carolina Sea Grant College Program is a state/federal partnership program involving all campuses of the UNC system. Headquartered at NC State, NC Sea Grant also has regional extension offices in three NC coastal communities. Sea Grant combines the universities' expertise in research, extension and education to focus on practical solutions to coastal problems. Graduate and undergraduate research opportunities are available through Sea Grant funded faculty researchers and through two North Carolina fellowships and two national fellowship programs.



Southeastern Plant Environment Laboratory— Phytotron

C.H. Saravitz, Director

The Southeastern Plant Laboratory, commonly called the phytotron, is a facility especially designed for research dealing with the response of biological organisms to their environment. The high degree of control within 60 growth chambers makes it possible to duplicate any climate from tropical rain forests to arid desert.

The NC State phytotron concentrates on applied and basic research related to agricultural problems encountered in the southeastern United States. The ability to control all phases of the environment, however, allows inclusion of research dealing with all aspects of plant science. The facilities are available to the resident research staff, participants in NC State's graduate research program, and to foreign visiting scientists.

Triangle Universities Laboratory

Werner Tornow, Director

TUNL is a laboratory for nuclear physics research, funded by the US Department of Energy. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and students from Duke University, UNC-Chapel Hill, and NC State. There is extensive collaboration between the participating universities and with visiting physicists from the United States and abroad. The accelerators are a 15-MeV tandem Van de Graaff accelerator and low-energy accelerators dedicated specifically to nuclear astrophysics studies. The newest addition to the TUNL accelerators is the High-Intensity Gamma-ray Source (HIGS) at the Duke Free-Electron Laser Laboratory. Polarized and pulsed beams are available as well as cryogenically polarized targets. In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities.

Water Resources Research Institute

Upton Hatch, Acting Director
Web site: www.ncsu.edu/wrri/

The Water Resources Research Institute is a unit of the University of North Carolina System and is located on the campus of NC State University. It is one of 54 state water institutes that were authorized by the Water Resources Research Act of 1964 to administer and promote federal/state partnerships in research and information transfer on water-related issues. WRRRI receives federally appropriated funds through the U.S. Department of Interior, state funding through the UNC system, and local government consortia funding to enable it to identify and support research needed to help solve water quality and water resource problems in North Carolina. Faculty and graduate students of senior colleges and universities in North Carolina conduct research. The Institute also arranges research partnerships and competes for federal, state and foundation grants and contracts. WRRRI publishes reports on completed research projects and arranges for technology transfer from researchers to state agency personnel, local governments and others who can put the research results to work. The Institute also sponsors educational seminars, workshops and conferences to promote wise use of the state's water resources. WRRRI also provides public information on water issues through publication of a newsletter, listservs and on their web site.