

# North Carolina (North Carolina Agricultural and Technical State University, North Carolina State University Combined) Plan Of Work 2025-2029

## Executive Summary

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### Overview

This Plan of Work includes research and extension programs for the College of Agriculture and Life Sciences (CALS) at North Carolina State University (NC State) and the College of Agriculture and Environmental Sciences (CAES) at North Carolina Agricultural and Technical State University (N.C. A&T). Our portfolio of solution-driven, cutting-edge research is creating new knowledge and technology which is then extended to all North Carolinians through NC Cooperative Extension. We are transforming science into everyday solutions that improve lives and allow North Carolinians to lead prosperous, healthy lives.

At North Carolina State University, the North Carolina Agricultural Research Service (NCARS) and NC State Extension are working hand in hand to solve the complex challenges facing food and agriculture. Our research and extension efforts extend beyond campus to our 101 extension centers, 18 research stations, 4 university field labs, and the N.C. Research Campus. Our statewide network of extension agents serves as the conduit through which the needs of the community are communicated to university researchers who then conduct basic and applied research and formulate solutions. Extension agents then deliver essential information into the hands of growers, industry, and members of the community through publications, digital content, workshops, field days, and consultations. The cycle continues as new challenges arise. Research and extension efforts at NC State focus on addressing four identified statewide critical issues: improving plant and animal agricultural systems; protecting environmental resources, enriching youth, family and community well-being; and enhancing food safety, nutrition and health.

N.C. A&T encourages innovative and interdisciplinary research necessary to advance agricultural technology, solve the problem of food insecurity, and save the environment. CAES uses digital and precision instruments along with artificial intelligence technologies to conduct climate smart research on the university farm, at the Center for Environmental Farming Systems in Goldsboro (CEFS), at the Center of Excellence in Post-Harvest Technologies (CEPHT) in Kannapolis, and on-campus in laboratories where investigations include agricultural economics, animal science, soil science, plant science, human nutrition, food science, and bioenergy. CAES extension utilizes a variety of instruments to assess the needs, make informed choices, or set priorities for the educational programs Cooperative Extension needs to focus on. Thus, CAES engages in cutting-edge research and promotes the application of inter-and-trans-disciplinary integrative approaches that include the outreach of Extension to increase critical mass and impact. To move forward with this aim, we are focusing on four integrative clusters (priorities): plant and animal

agricultural systems; food safety, nutrition, and health; youth, family, and community well-being; and environmental and natural resources. Specifically, research and extension at N.C. A&T will continue to open doors and make an impact on each of the critical issues facing North Carolina.

**Critical Issue: Enhancing Food Safety, Nutrition and Health**

NC State's research and extension efforts to Enhance Food Safety, Nutrition and Health and to keep Americans healthy and free from foodborne illness necessitate a focus on preventing food safety problems rather than taking a reactionary approach. NC State's integrated research and extension efforts focus on protecting the safety of foods along the entire supply chain, from production to consumption. To meet the growing need for healthy food, researchers are developing and producing new food products that promote health and prevent disease. At the same time, extension provides nutrition education programming to ensure that individuals, families, and communities have the knowledge they need to make informed choices about food and healthy lifestyles.

Within this area both research and extension at N.C. A&T will work to address the issues of human health, food safety, and healthy living habits. The research will focus on whole grain cereals, human health and human nutrition, probiotics strains, food allergy, food production process, bioactive compounds of food, post-harvest technology, and food security. Cooperative Extension will use research-based information to develop sound educational experiences to address nutrition and health issues and provide relevant resources families need to execute healthy lifestyle habits. Program delivery will target minority families, youth, and poor adults who live in rural communities and who are disproportionately affected by chronic diseases like high blood pressure, heart disease, cancer, diabetes, and obesity. Creative approaches will help families address the lack of access to healthy food experienced by many poor communities. Plots of land at the farm will be set aside and used as training opportunities to help families and communities develop skills to produce food. Urban agriculture production practices will be introduced to help families gain local food sources to meet their nutritional needs.

**Critical Issue: Enriching Youth, Family & Community Well-Being**

NC State Extension continues to provide opportunities to Enrich Youth, Family and Community Well-Being through the 4-H youth development program. 4-H programs increase opportunities for youth to develop life skills, grow confidence, independence, resilience, and STEM skills through engaging hands-on learning in safe, healthy, and enriching environments. Extension programs also address critical challenges affecting consumer and family well-being. These other focus areas include parenting, childcare, family relationships, financial management, aging, healthy homes, and disaster readiness, response, and recovery. At the community level, Extension works with individuals, community groups and local governments on leadership skills, workforce development, entrepreneurship, civic engagement, volunteerism, community planning, and disaster preparedness.

CAES researchers and Extension staff at N.C. A&T are dedicated to working with NC's minority population, socially disadvantaged and disabled growers, elderly population, youth, and children to improve their lifestyle. Researchers will focus on the challenges of the elderly population, textile and fashion design, healthy eating habits, early childhood development, and childhood obesity. Extension will expand programming efforts to ensure that vulnerable individuals, families, and communities gain essential skills to flourish and reach their potential. Financial resource programs will equip financially vulnerable households to use their resources to meet their needs effectively. Family life programs will build skills to strengthen family relationships, and leadership skills will prepare these communities to help themselves. Disaster education programs and developing volunteers to help expand program reach will also be focus areas. 4-H programs in these communities will help youth explore their potential for careers and build skills they can use for a lifetime. 4-H programs on financial literacy, leadership development, agriculture, and healthy lifestyles will be focus areas. 4-H STEM programming that exposes youth to the workforce of the future to boost their economic potential and fight intergenerational poverty will play a significant role in 4-H programming. Cooperative Extension will increase STEM training for staff, place area support to improve the ability of staff and community partners to conduct STEM programming, and develop and maintain cutting-edge learning experiences like the Innovation Station and Speedway To Healthy that allow access to programming by traveling to targeted communities.

### **Critical Issue: Improving Plant and Animal Agricultural Systems**

Research efforts at NC State to Improve Plant and Animal Agricultural Systems focus on developing new methods to increase crop yields, developing new varieties, extending growing seasons, enhancing agricultural and environmental sustainability and producing new and improved technology. Through integrated research and extension programs, NC State is solving challenges related to the productivity and profitability of both large- and small-scale farms. Researchers and extension educators are also developing and disseminating knowledge and technology to improve landscaping and gardening. Research and extension programs in animal systems are focused on developing and disseminating knowledge and methods for animal breeding, reproduction, nutrition, genetics and genomics, physiology, environmental stress, product quality, and health and well-being.

Within this area, N.C. A&T will work to address cross-cutting and emerging issues of animal and plant health and production. In animal systems, researchers will study the efficiency of different feeding sources to improve animal productivity and gut health. Also, researchers will study to find the solution for viral, bacterial, and parasitic effects in animals and poultry. In plant systems, the focus will be on sustainable agriculture, alternative and high-value crop production, season extension, climate change adaptation, value-added agriculture, digital agriculture, soil health, pest control, and agro-economics. Additionally, Urban agriculture is an area of growing interest and importance in addressing food security, promoting sustainable practices, and fostering community development. Urban agriculture is a feasible option for farmers to engage in small-scale, localized food production and do more across the urban community. Extension will continue to expand its work with

livestock producers, emphasizing limited resources and small-scale minority farmers. The farm pavilion will focus on sustainable agriculture and local and community food systems, housing its applied research and demonstration programs' staff and providing space for meetings, forums, and conferences.

### **Critical Issue: Protecting Environmental and Natural Resources**

NC State research and extension programs are promoting environmental stewardship and protecting the natural environment in efforts to Protect Environmental and Natural Resources through conservation and sustainable agriculture and timber production and climate smart agriculture practices. These integrated research and extension efforts also aim to tackle the critical issues impacting the quality of our soil, water and air by providing scientific solutions for animal waste management, wastewater treatment, nutrient management, septic systems, wetland management, soil properties, and fishery and pond management.

In this area, N.C. A&T will work to protect the natural environment and provide solutions for waste management and conventional energy. CAES researchers will investigate an advanced biological system that involves alternative energy, limiting waste streams while protecting and improving water quality. CAES researchers will also study the efficient way of water management to irrigate crops and the best way of landscaping to add aesthetic value to the land. CAES researchers will be involved in a multistate climate change project to study the impact of climate change on socially disadvantaged farmers and communities of color. Researchers will be developing adaptation and mitigation solutions to improve agriculture and natural resources and will be proposing policies to address the issues of environmental justice and climate change. Extension will continue to support small-scale producers and landowners in their efforts to develop diversified farm operations while integrating climate-smart and conservation practices, including agroforestry, silvopasture production, and riparian buffers.

### **Merit and Scientific Peer Review Process**

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At NC State a thorough scientific and merit review of each proposed HATCH project is conducted at the departmental level before submission to the North Carolina Agricultural Research Service (NCARS). This departmental review consists of two steps with an informal review (PI's responsibility) and a formal review (Department Head's responsibility). HATCH projects must be aligned with one of the critical issues from the Plan of Work. Next, research projects undergo a budgetary review and are submitted to USDA/NIFA for approval. The merit of Smith Lever Extension programs developed by Extension Specialists is determined by the Department Heads, State Program Leaders, and the Extension Director. Program merit is guided by emerging needs identified through needs assessments, Extension agent feedback, state/local advisory councils, governmental officials, and commodity group or other stakeholder representatives. At the state level, extension leadership and specialists identify broad areas and scope for Extension to focus

its work. At the local level district directors, county directors, and field faculty review local needs to develop local priorities and individual plans of action. At the local level, District and County directors assess the merit of Extension programming.

Evans-Allen projects are supported through the Office of Agricultural Research (OAR) in N.C. A&T State University's College of Agriculture and Environmental Sciences. The research director, in conjunction with the leadership team, faculty, and staff, determines the need, priority, and scientific feasibility of proposed Evans-Allen projects and the development and implementation procedure for project documentation, merit review, and selection. This process assures that research proposals are scientifically sound and relevant to society's food and agricultural needs and that no duplication of efforts is undertaken elsewhere. Prior to proposal development, the alignment of the research topic with the needs of the state and the direction of the four program initiatives of CAES is determined. Upon agreement by the department chair, the associate dean for research, the research director, and the principal investigator, a proposal on the topic for submission through the Evans-Allen program is prepared. A merit review process is conducted that includes a review by an external panel comprised of individuals from both within and outside the University who are knowledgeable of or familiar with the area of research. Proposals are then reviewed by the associate dean for research, who determines if additional review and substantive revision are necessary. Upon acceptance by the associate dean for research and research director, proposals are transmitted to NIFA/USDA for approval. Upon NIFA approval, proposals are submitted to the OAR for budgetary review. At N.C. A&T Extension, state program leaders, specialists, regional extension directors, and selected county faculty provide internal merit reviews of extension programs based on statewide needs and stakeholder input. They collectively develop extension programs, which provide the broad areas and scope for extension to focus its work. Program specialists develop specific objectives, program descriptions, measures of progress, impact indicators, cost-benefit analysis, and volunteer involvement/value for each objective. County Extension Centers select objectives that most fit local needs. They plan, implement, and evaluate educational programs to address objectives outlined in the state plan of work.

## Stakeholder Input

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### **Actions to seek stakeholder input that encourage their participation**

NC State College of Agriculture and Life Sciences is committed to seeking, receiving, and using input from all stakeholder groups, including under-represented groups and the general public. NC State makes a concerted effort to involve and inform college partners and other stakeholders in planning efforts. The college is fortunate to work closely with a large number of North Carolina commodity organizations, biotechnology companies, service organizations and societies, agricultural advocacy groups and others to encourage their input and support. NC State Extension routinely reaches out to stakeholder groups including residents, governmental officials, advisory leaders, commodity group

representatives, volunteers and other clients. County extension personnel interact daily with stakeholders in such a way that input is effectively gathered and communicated to administration and faculty. An Advisory Leadership System is functional in each of North Carolina's 100 counties and the Eastern Band of the Cherokee. The Advisory Council represents geographic, cultural and economic diversity within the communities we serve. This council provides the voice of the groups they represent. Extension county staff serve on local boards and committees to encourage stakeholder involvement in extension activities. Local extension staff attend community meetings and events and as members of the communities they serve, engage stakeholders, and actively seek input. NC State Extension encourages past program participants and other stakeholders to join our electronic mailing list. We also utilize listening sessions and surveys to collect stakeholder input.

The N.C. A&T CAES Advisory Board meets three times a year and provides advice and counsel on matters related to the College's strategic direction, priorities, and external relations, as well as advice on staying relevant and addressing the needs of its stakeholders. The Board comprises industry/commodity group leaders, alumni, students, partner agencies, and small farmers. It provides eyes and ears into the communities served by N.C. A&T and provides a forum for CAES to hear from constituents and communicate information relating to research and outreach. The Strategic Planning Council (SPC) is the advisory leadership group for Cooperative Extension at N.C. A&T and is the voice for NC residents who lack the financial resources, educational background, or other social factors that limit their involvement in the decision-making process. Council members help Extension reach more clientele, ensure the relevancy of programs, and interpret the value of Extension to stakeholders. The SPC meets three times per year, one of which is a joint meeting with NC State's State Advisory Council. The Strategic Planning Council members also attend other special meetings to provide organizational review and input. Two members who serve on both councils facilitate networking and collaboration between both councils. With these organized groups emphasizing and providing significant stakeholder input into program direction, a planned and proactive process is operational that assures that programs are reviewed and overall needs assessed continuously, but no less than once every two years, with greater frequency encouraged.

### **Methods to identify individuals and groups**

NC State is committed to identifying and giving stakeholders the opportunity to provide feedback and ensure that local programs meet local needs and priorities. Stakeholders are identified through commodity groups, community partners, the Advisory Leadership System, volunteers, staff participation and attendance at community events, other clients, public outreach efforts, and the needs assessment process. Stakeholders are also identified through outreach efforts using mass media, social media, and the Extension website. The Advisory Leadership System, functional in each of North Carolina's 100 counties and the Eastern Band of the Cherokee, is used to identify groups and individuals from whom to collect input. The advisory council represents geographic, cultural and economic diversity within the communities we serve. The system provides a means to

engage a comprehensive stakeholder group. This system is monitored administratively to assure that a diverse group of stakeholders are engaged.

The N.C. A&T CAES works with its College and departmental advisory boards to identify stakeholders. These boards are comprised of industry, commodity, and organizational groups, as well as small farmers and alumni, who help the College identify stakeholders and assist with obtaining input into CAES' strategic direction and priorities. Cooperative Extension at N.C. A&T employs various strategies to foster inclusive stakeholder engagement, particularly focusing on underrepresented voices. At the core of this effort is the Strategic Planning Council (SPC), serving as the advisory leadership group for Cooperative Extension. Comprising representatives from communities facing socio-economic challenges, the SPC ensures diverse perspectives are integrated into decision-making processes. By interpreting the value of Extension programs and reaching out to underrepresented demographics, the SPC guarantees program relevancy and broadens outreach. This proactive approach not only identifies individuals and groups that may otherwise be overlooked but also ensures that Extension initiatives are inclusive, pertinent, and responsive to the evolving needs of the communities they serve.

### **Methods for collecting stakeholder input**

One source of stakeholder input comes from direct interactions NC State research scientists and county-based extension personnel have with families, schools, producers, industry and other agribusiness representatives. NC State maintains close ties with state agricultural industry associations, schools, and community organizations. The association boards identify high-priority research areas. NC State Extension conducts a formal needs assessment which includes collection of stakeholder input using mailed and online surveys, focus groups and interviews. NC State uses electronic/web surveys, one-on-one interviews, listening sessions, and focus groups to collect stakeholder input for the needs assessment and subsequent program prioritization process. Stakeholder input is also collected from advisory leadership councils located in each county. Strategic planning efforts in extension and for the entire college benefit from concentrated efforts by college leadership to engage stakeholders through listening sessions, focus groups, and state-wide conferences and workshops. Many of the departments within the College of Agriculture and Life Sciences have formal advisory groups with stakeholder members that meet on a regular basis providing input and direction for research and extension programs.

The Strategic Planning Council is crucial in organizing a grassroots leadership conference each year to collect input from the stakeholders from all three regions of NC (Mountains, Piedmont, and Coastal Plains). This conference serves as a platform for engaging diverse groups to gather input, identify local needs, and develop solutions. Additionally, the council members act as community advocates for the N.C. Cooperative Extension system, meeting with local and state legislators to advocate for equitable funding and to share our Extension vision and impacts. Furthermore, SPC members participate on their County Extension Advisory Boards, acting as liaisons between the County and the University. Also, to ensure appropriate, inclusive, and adequate stakeholder input, Cooperative Extension

implements environmental scans in each county and on the Eastern Band of Cherokee Indian reservation. The scans provide a wide range of needs, issues, trends, and emerging issues. They are submitted and stored in a central database. In addition, state specialists (at N.C. A&T and NC State) review and compile trend data relative to their area of expertise. Trend data are shared with county staff on alternate years or more often, depending on the severity of the issue. N.C. A&T Extension also conducts a series of listening sessions, focus groups, and statewide conferences and workshops to get feedback from stakeholders. In addition, N.C. A&T CAES uses mail surveys, electronic/web surveys, focus groups, and community forums to collect stakeholder inputs for the needs assessment and program prioritization process.

### **A statement of how the input will be considered**

Stakeholder input is used by NC State to set program priorities, identify emerging issues, redirect extension programs, redirect research priorities, set staffing priorities and direct budget priorities. Because research and extension activities are directed toward the development and implementation of new knowledge and technology, faculty members are constantly relating industry and consumer needs to the discovery process. Stakeholder input is used in determining research and extension directions and gaining program support and advocacy for research and extension initiatives. For example, the commodity association boards provide information on high-priority research areas to be used in requests for proposals, and boards then decide which proposals to fund. This type of stakeholder input has a direct effect on research activities and subsequent extension programming. Our environmental scanning process identifies key issues of concern and needs of the community and allows us to translate these needs into science-based programs and services. Citizens, commodity association members and representatives, county commissioners, state legislators, and many other leaders and policy makers identify these emerging issues, program needs and priorities which inform program direction, budgets, staffing, and plans of action. This is a huge ongoing function that is ingrained in program planning and implementation for both research and extension. It is our intent to involve and serve the citizens of this state in the most effective ways possible to enhance the quality of their lives and economic well-being.

The stakeholder input collected by N.C. A&T is used to set program priorities, identify emerging issues, redirect extension programs, redirect research priorities, set staffing priorities, and direct budget priorities. Because research and extension activities are directed toward the development and implementation of new knowledge and technology, faculty members are constantly relating industry and consumer needs to the discovery process. Stakeholder input is also used in determining research and extension directions and gaining program support and advocacy for research and extension initiatives. For example, the commodity association boards provide information on high-priority research areas to be used in requests for proposals, and boards then decide which proposals to fund. This type of stakeholder input has a direct effect on research activities and subsequent extension programming. Our environmental scanning process identifies key issues of concern and community needs and allows us to translate these into science-



based programs and services. Additionally, feedback gathered from our SPC informs decisions regarding the council's structure, its community engagement efforts, and its involvement with legislation. Stakeholder input also aids in identifying programming needs within the community. Moreover, this input helps determine the requisite positions at both the state and county levels, aligning them with established priorities and identified needs. All input is instrumental in guiding strategic planning and visioning processes.

## Critical Issues

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### **Enhancing Food Safety, Nutrition and Health**

Last Updated: 2024 Initiated on: 11/26/2019

Term Length: Long-term (>5 years)

There is a critical need to ensure we have a safe and nutritious food supply. Our efforts help protect the availability and safety of the food supply through research and extension efforts focused on all levels along the food supply chain, from production to consumption. To meet the growing need for nutritious and safe food, our work includes development and production of new food products that promote health and prevent acute and chronic diseases. Efforts include the protection and defense of agriculture against diseases, natural disasters, adulteration, agroterrorism, etc. There is also a critical need to ensure that individuals, families, and communities have the knowledge to make choices about selecting safe and nutritious food and living healthy lifestyles that reduce their risk of foodborne and chronic disease and that they have access to safe, high-quality food at reasonable prices.

Science Emphasis Areas: Family & Consumer Sciences, Food Safety, Human Nutrition, Sustainable Agricultural Production Systems, Youth Development

### **Enriching Youth, Family & Community Well-Being**

Last Updated: 2024 Initiated on: 11/26/2019

Term Length: Long-term (>5 years)

There is a critical need for youth to develop skills necessary for future success. Our work provides opportunities for youth to participate in 4-H clubs, camps, school enrichment, afterschool, and special interest programs. There is also a critical need to address the challenges affecting consumer and family well-being. Our research and outreach focus on areas such as human and youth development including parenting, childcare, family relationships, college and career readiness, financial management, aging, healthy homes, and disaster readiness, response, and recovery. Critical issues facing communities include economic, social, and environmental resiliency. Our programs focus on local foods and urban agriculture, leadership, workforce development, farmworker health, tourism, civic engagement, economic development, digital skills, community planning, and disaster preparedness.

Science Emphasis Areas: Environmental Systems, Family & Consumer Sciences, Food Safety, Human Nutrition, Sustainable Agricultural Production Systems, Youth Development

### **Improving Plant and Animal Agricultural Systems**

Last Updated: 2024 Initiated on: 11/26/2019

Term Length: Long-term (>5 years)

There is a critical need to increase agricultural food, feed, fiber, and fuel productivity and to increase the profitability of farms and agribusinesses. This must be accomplished while providing safe, nutritious food for a growing population and being good stewards of our natural resources. Plant systems address plant production, protection, the development of new plant varieties and plant products, organic farming and land management, landscaping, gardening, and discovering and disseminating solutions to production issues including weeds, pests, and diseases. Animal systems focus on developing and disseminating knowledge and methods for animal breeding, reproduction, nutrition, genetics and genomics, physiology, environmental stress, processing and product quality, health, wellbeing, and biosecurity.

Science Emphasis Areas: Agroclimate Science, Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems, Family & Consumer Sciences, Food Safety, Sustainable Agricultural Production Systems

### **Protecting Environmental and Natural Resources**

Last Updated: 2024 Initiated on: 11/26/2019

Term Length: Long-term (>5 years)

There is a critical need to proactively and comprehensively promote environmental stewardship and to protect environmental resources and ecosystem functions through conservation, sustainable and climate-smart agriculture and timber production. Subsequently, it is critical to address the issues impacting the quality of our soil, water, air and the plants and animals that depend on it. Our work includes providing scientific solutions for animal waste management, wastewater treatment and management, nutrient management, septic systems, wetland management, soil properties, saltwater intrusion, and fishery and pond management. Programs support the expansion of production systems for biofuels and bio-based products, including non petroleum-based fuels, power sources, and chemicals. We also have robust extension programs that support forestry and wood products.

Science Emphasis Areas: Agroclimate Science, Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems, Family & Consumer Sciences, Sustainable Agricultural Production Systems, Youth Development