

**NC STATE UNIVERSITY**

# **UNC Tomorrow: NC State Response**



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# Introduction

North Carolina State University was founded in 1887 under the provisions of the Morrill Act as a land-grant institution charged with meeting the needs of the people of North Carolina for a "liberal and practical education in the several pursuits and professions in life" and with making contributions to the economic development of the state of North Carolina.

As the people and the state of North Carolina have changed, NC State has changed, continuously evolving to keep pace with the challenges and opportunities faced by an increasingly diverse citizenry in an increasingly complex world. Through more than a century of change, NC State has stayed true to its roots in its traditional land-grant mix of basic and applied programs and in its commitment to outreach and engagement. As realized at NC State, the land-grant tradition is not simply a list of programs or a fixed array of disciplines, but a commitment to the discovery of knowledge and its use for human betterment. Enhancing the economic, intellectual, and cultural life of North Carolinians is the basis of the university's quest for excellence and its aspirations to preeminence.

## ***NC State today***

North Carolina State University's first hundred and twenty years have transformed a small college of seventy-two undergraduates and a faculty of six to one of the largest universities in the Southeast, with a student body of undergraduate, graduate, and lifelong education students of over 31,000, and nearly 8,000 faculty and staff. Today, NC State is a comprehensive research-extensive university known for its leadership in education and research, and globally recognized for its achievements in science, technology, engineering, and mathematics. A nationally recognized center of teaching, research, and outreach, NC State is one of two doctoral research-extensive institutions of the seventeen-institution University of North Carolina.

As the University of North Carolina embarks on its ambitious UNC Tomorrow plan, NC State is uniquely positioned to provide leadership in determining how the University of North Carolina can respond directly and proactively to the 21st century challenges facing North Carolina both now and in the future. NC State has long and deep experience in the active integration of teaching, research, and public service. It has a solid foundation of existing, unique programs in high-impact areas including agriculture, engineering, veterinary medicine, and design, and an existing statewide network for outreach and extension.

## ***NC State's position within the University of North Carolina***

The strength of UNC is its diversity. To serve the people of North Carolina, UNC's seventeen institutions have different missions, different strengths, and different foci. UNC Tomorrow asks its institutions to marshal these strengths in service of a single vision of North Carolina's twenty-first century needs, and NC State has important strengths to bring to this enterprise. Alone with UNC-Chapel Hill in the UNC system, NC State is designated by the Carnegie Foundation as a doctoral/research-extensive institution.

NC State's responsibility for graduate education and research is a crucial part of our identity and our mission, and a crucial factor in the success of UNC Tomorrow. Research capability is a potent force that drives innovation and economic development locally, statewide, and nationally. Industry comes to North Carolina to tap into its educated workforce, but also for easy, collaborative access to the best research minds. NC State's research culture permeates every aspect of our essence as a university. It structures our thought, informs our teaching, and directs our engagement beyond the campus. It is the foundation on which we have built an innovative learning environment that engages our faculty, undergraduates, and graduate students alike.

Research is important in every one of our disciplinary areas, but consonant with our founding principles, we make strategic investments in core areas that are both responsive and relevant to North Carolina's needs. The result is that in agriculture, science, and engineering, we are leaders in the UNC system, and our excellence is acknowledged in the nation and the world.

Intrinsically bound with our commitment to research in all its guises, basic and applied, is our responsibility for graduate education. Although the mission of graduate education may once have been confined to preparing the new professoriate, that mission has been eclipsed by 21st century realities. Over eighty percent of today's graduate students pursue careers not in academia, but rather in such fields as business, government and the nonprofit sector. Providing graduate education is an important component of NC State's mission to produce leaders for the state, the nation, and the world.

Because of our land-grant origins and long tradition, NC State is also UNC's unparalleled leader in the delivery of extension and outreach programs. NC State's responsibility for extension and outreach extends statewide. We have Cooperative Extension offices in all 100 counties of North Carolina and on the Qualla boundary of the Eastern Tribe of the Cherokee Indians. Our Industrial Extension Service is a national model, and we administer the North Carolina Small Business and Technology Development Center. The core mission of every one of NC State's colleges includes an outreach function that complements its responsibilities for teaching and research. Assessment of the quality of outreach activity is a component of every retention, promotion, and tenure decision.

## ***A comprehensive university***

Although our commitments to graduate education, research, and extension may be the factors that make NC State unique in the University of North Carolina, these commitments are only a part of what we are. NC State is a comprehensive university with a commitment to excellence across a wide range of disciplines. We are proud of our historical strengths in agriculture, science, engineering, and technology, but we believe that disciplinary breadth is an indispensable component of building the best and most innovative learning environment for our students and our state.

UNC Tomorrow has asked all UNC institutions to build their strength in areas where NC State has historically been strong: science, technology, engineering, and mathematics. It would be easy for NC State to rest on its laurels and build only where we are already strong. But we regard UNC Tomorrow as a prompt for us to build not only our strengths, but ON our strengths. This means respecting every part of our mission—which includes renewing our commitment to excellence in a comprehensive range of academic disciplines so that we can be the best university we can be.

## ***Growing pains***

NC State is committed to responsible stewardship of its acknowledged research assets. In recent years, however, after a period of rapid growth, some of our key research disciplines suffered an erosion in stature. Fifteen years ago, for example, the accomplishments and reputation of the College of Engineering at NC State were on a par with the very best colleges of engineering in the world. By 2007, however, NC State had dropped half a tier in US News and World Report rankings. The situation is similar in many of our science and laboratory fields, where our infrastructure and faculty hiring have not kept up with that of our peers.

But NC State has begun to take steps to regain our premier status. With the assistance of bond money and support from the NC Legislature, we have made substantial investments in our research and educational infrastructure, and we are committed to keeping those facilities state of the art. Facilities, however, are only buildings and labs unless we populate them with a critical mass of cutting-edge faculty, students, and staff to conduct research, make discoveries, and transfer this knowledge to the commercial sector. Accordingly, we have launched an effort to bolster our faculty, increasing salary and start-up packages, and pursuing cluster hires of faculty, where appropriate. While many factors need to be considered in any recovery effort, our recent investments have played an important part in the College of Engineering's move up four places in the 2008 US News and World Report ranking.

## **NC State today meets UNC Tomorrow**

NC State's early response to the work of the UNC Tomorrow Commission was to inventory our relevant work in UNC Tomorrow's focus areas. The resulting study, *Leading, Connecting, Transforming: Meeting the Needs of North Carolina: 100 NC State Programs that Impact the State*, provides incontrovertible evidence of the depth and breadth of NC State's involvement in serving the needs of North Carolinians. NC State regards the mandate of UNC Tomorrow as an opportunity for us to rethink and amalgamate the kind of individual efforts described in *Leading, Connecting, Transforming*. We believe that the whole can be greater than the sum of its parts.

Our first task in responding to UNC Tomorrow was to mine our earlier efforts in strategic and compact planning for strengths that we could bring to the current task. We were not surprised to discover that we had a very solid base.

Early in 2007, NC State established five focus areas that map into its strategic plan. These focus areas are a close match with the content areas of UNC Tomorrow.

1. Producing leaders for the state, nation, and world (4.1, 4.2, 4.7)
2. Creating educational innovation (4.3, 4.7)
3. Improving health and well-being (4.5, 4.7)
4. Fueling economic development (4.4, 4.7)
5. Driving innovation in energy and environment (4.6, 4.7)

As we progressed, we also looked back at ideas that had been incubated in our strategic, compact, and enrollment planning processes to ensure that proposed UNC Tomorrow initiatives were aligned with current university plans.

### **Our process**

To craft a response to the UNC Tomorrow Commission's final report, in January 2008 Chancellor James Oblinger named a Strategy Team led by Provost Larry Nielsen. Within the Strategy Team, one member was tapped to lead development of initiatives in each of the seven sections of UNC Tomorrow.

Two other teams were appointed to advise the Strategy Team: a Faculty Team, which included distinguished leaders, teachers, and researchers from all colleges, and a Partners Team, whose members were local leaders from government, business and industry, health, utilities, education, and other nonprofits.

The Strategy Team's early activities focused on soliciting campus advice. The provost met with a variety of campus groups, including the faculty, student, and staff senates; deans; vice provosts; department heads; Board of Trustees, Board of Visitors; a select group of student leaders; and executive officers. The spring General Faculty meeting was devoted to NC State's role in serving the goals of UNC Tomorrow.

Section leaders met with additional internal and external groups whose interests were aligned with one or more of the recommendations. These groups included research faculty and administrators, education advisory council, international faculty and administrators, and extension faculty and advisory council.

Based on advice offered by the Faculty Team, Partner Team, and other internal and external groups, the Strategy Team developed a broad strategy for identifying the initiatives that would go forward: Build on our unique mission and our strengths while responding directly to the UNC Tomorrow recommendations. A list and short description of possible initiatives was circulated and amended frequently, and section leaders worked with appropriate faculty and staff to draft formal initiatives. Consultation, selection, and writing converged at the end of April to produce a report for executive review and approval.

## NC State's response to UNC Tomorrow

In response to the recommendations for action from the Commission of UNC Tomorrow, NC State proposes 32 action initiatives, which are arranged in chapters in the order of the mandates of section 4 of the commission's final report, cross-referenced as appropriate. Please note that most of our initiatives could have been assigned to several different categories within UNC Tomorrow.

Initiative	4.1	4.2	4.3	4.4	4.5	4.6	4.7
Science in Support of our Economy, Citizens, Nation, and World	✓			✓	✓	✓	✓
Transforming Graduate Education	✓	✓	✓	✓			
Global Network	✓						
Communication across the Disciplines	✓						
Every Student a Leader	✓						✓
Enhancing NC State's Comprehensive Range of Disciplines	✓			✓			
Expanded Visual and Performing Arts Programs	✓			✓			
Faculty and Staff Professional and Leadership Development	✓		✓				✓
Increasing Access through Interinstitutional Collaboration	✓	✓	✓	✓		✓	
Access and Affordability of Undergraduate Education		✓		✓			
Access and Affordability of Graduate Education		✓		✓			
The NC State Hispanic Initiative	✓	✓		✓			✓
Education Extension Service			✓	✓			✓
Expanding STEM Teacher Education			✓				
William and Ida Friday Institute for Educational Innovation	✓		✓				
Supporting Teacher Excellence			✓				
STEM Center for Improved Science Teaching			✓				
Building a Premier College of Engineering	✓			✓	✓	✓	
Expanding the Industrial Extension Service				✓			✓
Entrepreneurship, Industry Clusters, and Economic Development				✓			✓
Science and Technology in Support of Health	✓			✓	✓		
Global Health Initiatives	✓				✓		
Sustainable and Healthy Food Supply	✓			✓	✓		✓
Health, Well-being, and Safety Programs for North Carolinians					✓		✓
Behavioral Health Institute	✓				✓		✓
Energy and Environment: Research and Extension	✓			✓		✓	✓
Sustainable Campus	✓					✓	
Healthy Built Environment	✓			✓	✓	✓	✓
Academy for the Environment	✓					✓	
Universitywide Extension and Engagement				✓			✓
Institute for Science and Technology – Engaged Public Policy	✓			✓		✓	✓
Expanding the Institute for Emerging Issues	✓			✓	✓	✓	✓



## 4.1 Our Global Readiness

*UNC should educate its students to be personally and professionally successful in the 21st century, and, to do so, should enhance the global competitiveness of its institutions and their graduates.*

At its most basic level, global competitiveness is no more than the inevitable outcome of institutional excellence. The world recognizes excellence, and excellence is the best way to be recognized by the world. At NC State, we educate our students to be personally and professionally successful by providing them with the best education possible. Our mission statement makes this point explicitly: "Enhancing its historic strengths in agriculture, science, and engineering with a commitment to excellence in a comprehensive range of academic disciplines, North Carolina State University provides leadership for intellectual, cultural, social, economic, and technological development within the state, the nation, and the world."

As a doctoral research-intensive institution, NC State has a responsibility for graduate education and research. Research capability is a potent force that drives innovation and economic development locally, statewide, nationally, and globally. Success in research brings international recognition to NC State and drives innovation and economic development locally, statewide, nationally, and globally. Industry comes to North Carolina to tap into its educated workforce, but also for easy, collaborative access to the best research minds. Accordingly, an important thrust of NC State's UNC Tomorrow response to 4.1 is to strengthen our faculty and our graduate and academic programs.

Although NC State is globally recognized for our achievements in science, technology, engineering, and mathematics, we are committed to the pursuit of excellence in everything we do. We have a strong and productive faculty that spans a comprehensive range of disciplines. We prepare our students for successful professional and personal lives by equipping them with the tools they will need to adapt to an ever-changing world. We review our curriculum and general education plan regularly to ensure that it is relevant and responsive to our students' needs. We have recently undergone an extensive review of our GEP, and a new version of that plan will be implemented in summer 2009. Our commitment to delivering an excellent comprehensive education is another focus of our UNC Tomorrow response.

NC State's rich learning environment exposes our students to hundreds of extracurricular learning, recreational, and cultural activities. Our Office of International Affairs provides leadership, innovation, and coordination to achieve our goal of integrating global perspectives into all aspects of the university's mission—teaching, research, extension, and engagement—and to strengthen NC State's international presence in the world. A third thrust of NC State's UNC Tomorrow response is to encourage our students to take advantage of the rich opportunities open to them by enhancing those activities and making them more visible.



# ***Science in Support of our Economy, Citizens, Nation, and World***

**UNC-T recommendation:** 4.1, 4.4, 4.5, 4.6, 4.7

**Type:** Expansion, integration of existing programs and partnerships

## **Description**

According to many economists, the most important determinant of U.S. economic growth is progress in science and technology—fields in which NC State has unique strengths. We can build on these strengths to produce research outcomes that can revolutionize existing fields, cause paradigm shifts, support discovery, and lead to radically new technologies. By exploring ways to combine our strength in basic and applied science, both natural and social, with our strengths in applied fields, including engineering, management, agriculture, veterinary medicine, education, textiles, design and natural resources, we can convert basic research advances into products and applications that benefit humans both in North Carolina and across the globe.

Conducting leading-edge discovery science that addresses the major problems of the world and the state demands a fully integrated multi-disciplinary approach. This new multi-disciplinary scientific paradigm has fostered a revolution in research, facilities, and instrumentation that was unimagined and unimaginable even a few years ago. Universities must invest heavily in the new instruments and facilities necessary to attract the appropriate faculty, train our future scientists, and solve pressing problems.

Under this initiative, NC State will encourage greater integration of basic science and applied disciplines by building broadly based multi-disciplinary consortia. Within the consortium structure, we will expand academic programs and educational outreach, encourage industry collaboration, and streamline our administrative structures to make inter- and cross-disciplinary interaction, programs, and shared resources easier to initiate and more sustainable.

NC State has experience in building multi-disciplinary consortia. We house more than sixty centers, institutes, and laboratories. Our Center for Comparative Medicine and Translational Research encourages sharing new discoveries and core facilities among more than 100 faculty in sixteen departments in four colleges to improve health care for all species. The Nanotechnology Initiative coordinates multi-disciplinary effort among dozens of faculty in fields including agriculture, chemistry, education, engineering, life sciences, management, physics, social sciences, textiles, and veterinary medicine, as well as community outreach, industry connections, and research centers and labs dedicated to nanotechnology.

The record also demonstrates that NC State can mount focused efforts to contribute to solving challenging, urgent, and global problems in health, energy, and the environment (see later initiatives). Over the last decade, our core science units have generated an increase of over 80 percent in external grant and contract funding. But we are at a crossroads. Without a significant commitment to building the infrastructure required by modern science and technology—both facilities and funds to equip new scientists—we cannot attract top talent. We can deploy those resources most efficiently by establishing shared user facilities and technical staff.

Finally, it is obvious that NC State's science consortia will be no more successful than the researchers within them. Our success depends on how well we develop and maintain a faculty and staff of the highest quality. We must aggressively build research, graduate, and professional programs in emerging areas, not only in engineering, but across the sciences and mathematics. This means recruiting and retaining top faculty, which requires not only the draw of excellent colleagues (cluster hires), but also competitive salaries, top-flight physical facilities, research resources, and access to excellent graduate students.

## **Partnerships**

NC State has a long history of powerful science partnerships with corporations and federal agencies in the region (especially via Centennial Campus) as well as the other Triangle universities. Expansion of our capacity in science research and education will deepen those partnerships through the sharing of students,

facilities and expertise, which will in turn result in the development of our workforce. The new North Carolina Research Campus at Kannapolis presents a remarkable new opportunity for interinstitutional collaboration in translational research on the science of nutrition and human health.

## Implementation

- Enhance and establish multi-disciplinary consortia in areas of science with potential for global competitiveness. The consortia will provide:
  - an umbrella structure to promote collaboration among related centers, institutes, departments, and programs
  - planning grants (to assess need from industry and other stakeholders, facilitate collaborations, and develop grant proposals and coursework),
  - retreats with training for faculty and students in inter- and cross-disciplinary research, management, and outreach
  - shared resources.
- Recruit and retain top faculty
  - Target cluster hires in areas of greatest potential for globally competitive science, based upon assessments of current strengths.
  - Establish a flexible pool for start-up funds. Attracting top talent will require a significant commitment to building the infrastructure required by modern science—both facilities and funds. Deploy these resources efficiently by sharing both facilities and technical staff.
  - Offer competitive graduate stipends and tuition remissions. Graduate students are the engine of research. Top faculty require the best and brightest graduate students.
- Develop and maintain shared facilities
  - Survey faculty to assess their needs.
  - Develop an implementation plan and user policies for centralized service facilities.
  - Reassign or hire permanent staff to operate and maintain the facilities.
  - Establish procedures to ensure coordination in hiring plans for new faculty and staff across the colleges.

## Funding

*Current funding:* State appropriated funds, external contracts and grants (federal and industry), and limited private foundation support.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$5 million	\$40 million	70%	10%	10%	10%		

*Leveraging the investment:* The new appropriated support will allow growth in external funding (federal and industry) of 10 percent per year for ten years. Cost savings and efficiencies will come from consolidation of separate instrumentation procurement and maintenance to shared facilities with centralized staff (est. \$2 million beginning in 2011).

## Responsibility

The vice chancellor for research and graduate studies along with the provost and the deans of all colleges.

## Assessment

Eternal program review procedures provide periodic expert assessment of the quality and impact of research and education programs. External advisory boards and review teams provide perspective on global competitiveness. Evidence of impact includes growth in external funding levels, growth in size and quality of graduate programs and numbers of graduates, numbers of patents and spin-off companies, and awards and honors to faculty and students. The ultimate indicators are contributions to economic growth and to the solution of society's problems attributable to the work of NC State's faculty, staff, and students.

## ***Transforming Graduate Education***

**UNC-T recommendation:** 4.1, 4.2, 4.3, 4.4

**Type:** Expansion, integration of existing programs and partnerships, new programs

### **Description**

To be globally competitive, NC State must attract the world's best graduate students and provide them with cutting-edge education that prepares them for leadership roles in a complex global society. As career-relevant graduate education is becoming necessary for advancement in business, government, and the nonprofit sector, we must develop new models of graduate education that prepare students for a variety of careers in addition to academia. In our transformation of graduate education, NC State must build on our existing successful models for graduate education, but also ensure that we prepare students with breadth of knowledge, real-world experience, and the practical skills desired by employers. Accordingly, we will launch the following initiatives:

**Preparing Future Leaders:** NC State already offers four programs that enhance graduate education. Professional Development Seminars, Responsible Conduct of Research, the Certificate of Accomplishment in Teaching, and Preparing the Professoriate serve both graduate students and postdoctoral fellows by providing preparation in teaching skills, research ethics, career skills, effective oral and written communication, critical thinking and analytical reasoning, networking and teamworking, problem-solving, creativity and innovation, work ethics and professionalism, and career management. PFL programs facilitate interdisciplinary dialogue across campus and serve our rapidly growing population of distance graduate students through online, face-to-face, and hybrid workshops and seminars. In this initiative, we will expand our PFL programming to serve all of the over 7,000 graduate students and 400 postdoctoral fellows at NC State, and we will extend our programs to other UNC graduate institutions.

**Professional Masters:** Professional science master's degrees are nonthesis, interdisciplinary degrees that develop a new breed of graduates prepared to enter the workforce in industry, bridging the gap between scientific and business communities. PSM students develop technical expertise in science as well as skills in communication, an understanding of business processes, and sensitivity to complex ethical issues. To integrate these concepts, students conduct industry case-study projects and serve internships with prospective employers in lieu of thesis research. PSM degrees provide career preparation for graduating senior science majors, working professionals looking to obtain the skills needed to advance, and for citizens needing to retool and upgrade their skills in order to compete for new jobs in a rapidly changing economy.

NC State currently has three successful PSM programs, financial mathematics, microbial biotechnology, and advanced analytics. The advanced analytics program, just completing its first year, demonstrates the success of these degrees: All twenty-three students in the one-year program have received job offers averaging \$80,000 per year; the incoming class will double in size. Under this initiative we will move to institutionalize the PSM model to address North Carolina workforce needs—e.g., in renewable-energy systems, transportation, nutrition, food safety, science and technology communication, environmental assessment, applied physics, geographic information systems, human development and family sciences, and biopharma.

We will design our PSM programs in conjunction with North Carolina industries to provide the skilled workforce they need and constantly update our programs as technical workforce skills needs change. We will create centralized modules in professional skills, business practices, nonprofit management, and public policy that can be used in any of the PSMs. We will also provide training and assistance to faculty in establishing and maintaining employer connections, managing case studies and internships, and building mentorship programs. In the future, we plan to expand the concept of professional master's education to all areas at NC State and will launch a similar series of offerings in the humanities and social sciences (PMAs).

## Partnerships

We will share the seminars, workshops and other training modules for both the PFL and PSM programs with all other interested UNC campuses with graduate programs. In developing new PSMs and PMAs, we will involve partners from industry, nonprofits, and government as we design curricula, provide internships and case studies, secure mentors, and establish employer advisory boards.

## Implementation

**Preparing Future Leaders** (implementation over the next five years as funds are available by Graduate School staff and graduate fellows)

- Create a microteaching studio and resource room to allow program participants to practice their teaching, job interviewing, and leadership skills as well as interact with global partners.
- Expand programming to offer half-day workshops and weekend retreats to explore key topics in more depth.
- Reach broader audiences by recording seminars with video, web, or pod technology, and disseminating the recordings to other UNC campuses.
- Host a colloquium on engagement in graduate education, and develop tiers within programs to tailor our services to the professional development needs of individuals.
- Engage external speakers to connect NC State graduate students and postdocs to larger conversations about state, national, and global issues.
- Create graduate certificate programs in professional development and leadership and ethics; offer instructional design grants; fund graduate fellows and award stipends to faculty mentors.

## Professional Masters

- Hold faculty interest and training meetings, UNC-wide colloquium on professional graduate education, workshop at the North Carolina Council of Graduate Schools. (2008)
- Prepare request for UNC GA to establish an interim blanket professional master's degree program, which can progress to self-standing degree programs as appropriate. (2008-2009)
- Develop employer connections, determine workforce needs, and develop curriculum. (ongoing)
- Establish seven to ten PSM tracks in the areas of greatest workforce need (2009-2011)
- Expand model and training to other UNC institutions (2010-ongoing)

## Funding

*Current funding:* \$420,000 recurring in state-appropriated funds

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$880,000	30%	30%	35%	5%		

*Cost Savings:* \$300,000 recurring will result from providing professional development programs centrally through the Graduate School, relieving the need for colleges and departments to provide their own programming.

## Responsibility

The Graduate School, working with graduate programs in all colleges.

## Assessment

To assess the success of the programs, we will establish an administrative process to track job placement of the participating postdocs and graduate students. (Advancement Services is the most logical clearinghouse for such information). We will use satisfaction surveys for students and postdocs both while they are in the programs and after they have engaged in their new careers. We will also survey their employers. Finally, we will assess how effectively the programs provide essential workplace skills and career-specific learning.

## **Global Network**

### **UNC-T recommendation: 4.1**

**Type:** Expansion of existing program

### **Description**

NC State has a long history of international activities. Over the years, the university has established bilateral partnerships with over 150 institutions in more than sixty countries, most developed by individual faculty and departments. In recent years, the university has developed a new strategy to expand its global reach: developing international centers in strategic locations based on partnerships with peer institutions.

International centers use the facilities at partner institutions as a home base for students and faculty working in the area. Students combine local university classes, NC State classes taught on site, and distance-learning courses delivered by NC State or accredited institutions to take advantage of an international experience while completing their degrees on time. In addition, the centers give faculty opportunities to expand the range and depth of their research and to build international recognition based on strong global collaboration.

NC State's international centers involve multiple academic units and open up whole regions and continents by providing necessary infrastructure (staffing and administrative, teaching, and research space) so that faculty and students can concentrate on instruction, research, and engagement. They conserve limited resources by allowing NC State to focus resources on a limited number of sites. NC State's centers can be used to expand study abroad, recruit new international students, integrate international experience into academic programs, and develop new global academic curricula including dual and joint-degree programs.

At present, NC State has international centers in the Czech Republic, India, Chile, and China. This initiative expands NC State's global network of international centers to twenty distributed across six continents. Our current goals are four centers in Asia, six in Europe, four in Latin America, three in Africa, two in the Middle East, and one in Australia.

### **Partnerships**

NC State's international centers build on collaborations among colleges and departments and on existing and future partnerships with institutions abroad. NC State will actively seek opportunities to collaborate in establishing international centers with other UNC institutions and with UNC's state-to-state international partners.

### **Implementation**

In order to accommodate predicted student and faculty interest, estimated to be 300 students and associated faculty per year at each site, NC State will establish or expand two centers per year through 2017 with a goal of twenty international centers. We are currently developing centers in South Korea (with benefit of a multi-million dollar grant from the Korean government), India, South Africa, and England; we are making preliminary assessments for centers in France, Brazil, Mexico, Jordan, and Turkey.

International center coordinators on campus and in key international locations will arrange activities with host institutions and provide assistance to students and faculty with travel and housing. They will identify locations and partners for international service learning and undergraduate research activities, and arrange access to classrooms, laboratories, and technology to support onsite and distance education instruction and research. Coordinators will be assigned from faculty ranks and must be reassigned from on-campus duties.

Improved administrative services on campus will develop and approve increased numbers of international agreements and dual-degree programs, assist departments and colleges in integrating international experience into academic majors, and support increased numbers of study abroad and non-credit service learning students, international students, visiting faculty and short-term trainees.

## Funding

*Current funding:* International programs are currently supported through the tuition of students involved in the programs, whether by reciprocal arrangements or by direct payment. In some cases, partner universities and foreign governments provide support. Extramural competitive awards support some research, education, training, and capacity-building collaborations with international partners.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$1 million	\$1.25 million		35%	25%	25%	15%	

## Responsibility

The Office of International Affairs will lead the effort to expand our international centers, working with faculty groups to determine the most appropriate locations for new centers and with the Study Abroad Office, the Office on International Services, the Global Training Initiative, Undergraduate Admissions, the Division of Undergraduate Academic Programs, the Graduate School, and the colleges to implement activities at international centers.

## Assessment

Assessment of this initiative will be based on the following measures; responsible offices are listed by each measure:

- Number of international centers developed (goal is two active centers per year through 2017) (Office of International Affairs—OIA)
- Number of collaborations with UNC and other U.S. and international institutions (OIA)
- Increased international grants and publications (OIA and Sponsored Programs)
- Number of faculty involved in instruction, research, and engagement at international centers (colleges and OIA)
- Increased study-abroad enrollment (goal is to increase participation by 12-13 percent each year for the next ten years) (Study Abroad Office)
- Increased number of academic programs incorporating international components without increased time-to-degree (colleges, Undergraduate Programs, and the Graduate School)
- Increased number of international students, particularly undergraduates (goals are a 300 percent increase in international undergraduate applications and a 200 percent increase in admission offers to new international applicants over the next two years) (Office of International Services, Undergraduate Admissions and the Graduate School)
- Increased enrollment in short-term academic and training programs (Office of International Services)
- Increased scholarship support for study abroad and international students (OIA)
- Modification of faculty expectations to include international activities for RPT and other faculty rewards (Provost's Office and faculty governance groups)



# ***Communication across the Disciplines: Institute for Research and Instruction in Communication and Digital Media***

**UNC-T recommendation: 4.1**

**Type:** Expansion of an existing program

## **Description**

In the late 1990s, driven by the importance of developing our students' communication skills, NC State created the Campus Writing and Speaking Program, the first program at a large research university to integrate support for writing and speaking across all undergraduate colleges. NC State soon joined an elite list of a dozen institutions, including Harvard, Chicago, Princeton, Yale, Clemson, and Cornell, by winning national recognition for its writing across the disciplines program.

The CWSP focuses on communication within disciplinary majors, where faculty have the disciplinary expertise to convey expectations, conventions, structures, media, and knowledge of contexts and audiences to students. It provides faculty with instructional strategies to enable them to pay attention to writing and speaking in their instruction without suffering significant new instructional burdens. It helps departments develop and assess communication outcomes, and it serves individual faculty through semester-long seminars, campuswide workshops, research assistance, guest presentations, and other programming.

Under this initiative NC State will expand the CWSP on campus and plan for and establish an Institute for Research and Instruction in Communication and Digital Media, in which the CWSP will be housed. The institute will conduct research on new media and genres of communication rapidly proliferating as a result of emerging digital technologies, disseminate the results of that research, and engage in multiple activities to help faculty in all disciplines at NC State incorporate good communication into their coursework.

## **Partnerships**

CWSP collaborates with other campus units including the Campus Writing and Speaking Tutorial Services, the Faculty Center for Teaching and Learning, the Division of Undergraduate Academic Programs, and the doctoral program in Communication, Rhetoric, and Digital Media. It has partnered with several colleges on substantial NSF grants, research on student communication abilities, and assessment projects. With UNC Charlotte, it has proposed a systemwide consortium for communication across the curriculum. Other partnerships could include working with the Department of Public Instruction on more effective articulation between secondary schools and with UNC system institutions in the area of writing and speaking.

The Institute for Research and Instruction in Communication and Digital Media will involve a variety of partners in the digital humanities as well as areas such as computer engineering, the College of Education, and the Friday Institute for Educational Innovation.

## **Implementation**

### **Years 1 & 2**

- Increase programming on campus
- Build faculty development learning communities
- Enhance current website with more online resources
- Speed up consultations with departments on curricular changes (departmental grants, formative profiles of writing and speaking in every undergraduate unit)
- With broad consultation, produce a plan to create an Institute for Research and Instruction in Communication and Digital Media

**Year 3**

- Expand CWSP mission into graduate education
- Expand collaborations on campus (Preparing the Professoriate; Distance Education; Communication, Rhetoric, and Digital Media program, etc.)
- Enhance support for the integration of writing and speaking in online instruction, especially through emerging technologies (asynchronous and synchronous)

**Year 4**

- Organize a UNC systemwide Communication across the Curriculum Consortium
- Revive the annual Wildacres CXC Conference previously coordinated by UNC Charlotte
- Collaboration with Department of Public Instruction

**Year 5**

- Seek private support for the Institute for Research and Instruction in Communication and Digital Media.

**Funding**

*Current funding:* \$140,000 in state-appropriated funds.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$2.8 million		55%	35%	10%		

**Responsibility**

The director of the CSWP will be responsible for this initiative. A committee of faculty from across the campus will advise CWSP on innovations the program could foster, including the use of digital media in communication in the disciplines and new models for collaboration, and in planning for the institute.

**Assessment**

Each undergraduate program assesses the communication skills of students as part of its learning-outcomes assessment. We use these data to assess the effectiveness of CWSP programming. We will also collect and analyze data measuring faculty satisfaction with CWSP programming, and will assess changes in faculty behaviors and the consequent effects on undergraduate programs.

## ***Every Student a Leader***

**UNC-T recommendation: 4.1, 4.7**

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

To prepare our students for leadership, NC State must build their skills in critical inquiry, expose them to interdisciplinary problem solving, and teach them sound leadership strategies for community engagement, from local to global. This initiative will integrate existing NC State programs and partnerships in leadership preparation and will foster the growth of students as citizens and leaders by expanding relevant courses and curricula offerings and by offering intentionally designed, mentored experiences in communities across the state, the nation, and the world. The goal is to require documentable leadership-development experience for every NC State undergraduate. Such experience will be officially recognized at graduation and noted on the student's transcript.

NC State has a foundation of excellence in preparing our students for leadership in the workplace and community. Current activities include inquiry-based coursework and service learning integrated in courses across disciplines; leadership-development seminars, workshops, conferences, and institutes; noncredit leadership certificate programs; leadership forums for students, faculty, and corporate leaders; community volunteerism; domestic and international service-learning trips; community-engaged study abroad and internships; meaningful workplace experiences through Cooperative Education (available at home and abroad); student- and faculty-designed capstone projects with communities across the state and around the world; community-engaged undergraduate research; and professional development for faculty on community-engaged teaching and research.

Each of NC State's colleges is already involved in preparing students for leadership in the workplace and community through coursework and support for preprofessional student organizations. Additionally, there are units with a universitywide scope dedicated to providing opportunities for leadership development. These include the General H. Hugh Shelton Leadership Center; Center for Student Leadership, Ethics and Public Service; Center for Excellence in Curricular Engagement; University Honors Program; Office of Undergraduate Research; Fellowship Advising; university academic merit scholarship programs; ROTC; Athletics Department; Institute for Nonprofits; Graduate School; Study Abroad; the Division of Student Affairs; and numerous campus organizations and living/learning communities.

This initiative will increase the number of students involved in leadership-preparation activities and the quality of the programs' impact. Collaboration among related units will become more visible and will deepen for enhanced synergy. Programs will coordinate with departments and registration and records to document each student's leadership preparation experience and note it on the student's transcript.

### **Partnerships**

By definition, all community-engaged leadership development involves external partners. Local, state, national, and international partners already have reciprocal relationships with the university, sharing expertise and human and material resources to accomplish mutually beneficial goals. Strategic partners for future program growth and expansion will include NC DPI, other UNC campuses, North Carolina community colleges, LeaderShape, domestic and international partners.

### **Implementation**

- Expand opportunities for undergraduate students' involvement in rigorous interdisciplinary approaches to learning and problem solving (opportunities through new General Education Program, undergraduate research, course based service learning projects).
- Strengthen the depth and quality of internal campus curricula and programs, increasing the leadership development content base of all activities (leadership philosophy, strategies, human interaction, social action processes).

- Establish a campus coordinating body (a representative group) to articulate, vet, and disseminate a set of shared goals for "Every student a Leader." This body will also coordinate the ongoing assessment of the initiative's impact.
- Expand and develop programs as models reaching beyond the campus community (NC State to local communities/NC State to the world).
- Outreach to and partnerships with other universities and agencies through unique university assets (distance education, scholarly research and dissemination mechanisms, action projects).
- Explore private support for leadership programs.
- Develop a system for collecting, storing, and verifying leadership experiences to be recorded on the transcript.

We will implement this program by enhancing existing opportunities so that the proportion of students acquiring documentable leadership experiences increases by at least 10 percent per year. We will annotate experiences on transcripts beginning in 2010. Pending approval by appropriate campus governance bodies, we will begin requiring a leadership experience for the 2012 incoming freshman class.

## Funding

*Current funding:* State appropriated funds, student/user fees, and limited private foundation support

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$1.75 million		40%	20%	40%		

*Cost savings:* \$120,000 will result from redirected faculty development efforts and synergistic effects of training, implementing, and evaluating best practices in leadership development through and for community-engagement in diverse programs.

## Responsibility

Expanding leadership preparation opportunities for students will be the responsibility of units already involved in leadership education. The efforts of these units will be better coordinated in order to enhance their scope and effectiveness. Documenting the impact of these programs will be the responsibility of program staff. Officially recording leadership activities in the Student Information System will be the responsibility of the registrar.

## Assessment

Each collaborating unit currently documents process, outcome, and impact data and uses these data to support and improve existing programs (including strong student /alumni testimony). Most have advisory boards that monitor programmatic strategies and impacts. We will establish a new local representative body to help us set and monitor our standards and goals for creditable activities.

State, national, and international recognition of models developed by the various units is significant and ongoing, as is associated scholarship. Another measure is student and community demand, as most programs are at capacity relative to current resources.

## ***Enhancing NC State's Comprehensive Range of Disciplines: Expansion of the College of Humanities and Social Sciences***

**UNC-T recommendation:** 4.1, 4.4

**Type:** New/expansion of existing programs

### **Description**

The great land-grant universities bring a broad range of disciplinary and interdisciplinary resources to address global problems. Among NC State's peer institutions, Michigan State, Ohio State, and Penn State Universities and the Universities of Florida, Georgia, Maryland, Minnesota, Illinois, and Wisconsin have traditional strengths not only in fields like science, agriculture, engineering, and technology, where NC State has acknowledged strengths, but also in the humanities and social sciences. Among our peers, NC State awards the lowest proportion of non-STEM degrees. To prepare our students to develop globally relevant and significant responses to local, state, national, and international challenges, NC State must renew and reinvigorate its commitment to excellence in a comprehensive range of academic disciplines.

As many commentators have said, the future belongs to those who can creatively combine the sciences and humanities. NC State is the ideal institution to bring these intellectual forces into synergy for the benefit of students, communities, and businesses. Under this initiative, NC State will broaden and deepen its disciplinary scope by strengthening existing graduate programs and establishing new graduate programs and research centers in the humanities and social sciences. Establishing and expanding humanities, arts, and social sciences graduate and undergraduate degree programs will help our students and North Carolina better understand the regional and global forces that have shaped and will continue to shape its language, culture, economy, and society.

The new interdisciplinary centers and programs we establish will bring together expertise from other colleges, external agencies, and industry to strengthen research and outreach addressing economic and community challenges (including public policy, forensic sciences, public communication of science and technology, leadership in the public sector, and support for non-profits), international challenges (including teaching and research in areas of the world and languages where the United States has strategic interests, perhaps in conjunction with the military), and health-related challenges (including health communication and aging),

### **Partnerships**

NC State is committed to multi- and interdisciplinary collaboration in instruction, research, and engagement. This commitment requires expanded involvement of faculty and students from the College of Humanities and Social Sciences, whose perspectives complement those of the other colleges. In addition, NC State will actively seek opportunities to collaborate with UNC institutions and other educational, government, and private partnerships through which we can broaden the impact of our teaching, research, and outreach.

### **Implementation**

During the period 2008-2010, NC State will expand support for existing doctoral programs in psychology; economics; sociology; public administration; and communication, rhetoric, and digital media and will also develop new doctoral programs in public history, sociolinguistics, and Hispanic studies. We will strengthen master's programs in public administration, anthropology, history, and international studies, and for professional masters programs in social work, public administration, and technical communication. We will explore new professional master's programs combining behavioral sciences, engineering, and physical and life sciences to prepare professionals who can bring multi-disciplinary perspectives to state, national, and global issues.

We will develop proposals for interdisciplinary research and outreach centers in family and community health, public communication of science and technology, aging in context, health policy and communication, support for nonprofits, and forensic sciences. These centers will bring together the Colleges of Humanities and Social Sciences, Textiles, Agriculture and Life Sciences, Physical and Mathematical Sciences, Engineering, Management, Design, and Education.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$11 million		45%	45%	10%		

## Responsibility

The College of Humanities and Social Sciences will be responsible for developing new degree programs and research centers, in collaboration with other colleges and the Graduate School, the Division of Research and Graduate Studies, and the Office of the Provost.

## Assessment

We will track increases in the following measures:

- Enrollment in existing and new graduate programs
- External funding acquired by CHASS faculty
- Private fundraising
- Positive external reviews of graduate programs
- Achievement of appropriate program accreditation
- Adjustment of instructional assignments to enable increased research and outreach activities
- Support for graduate students
- Adequate facilities and equipment

## ***Expanded Visual and Performing Arts Programs***

**UNC-T recommendation:** 4.1, 4.4

**Type:** Expansion of existing program

### **Description**

The visual and performing arts programs that are currently housed in the NC State's Division of Student Affairs under ARTS NC STATE (craft, music, dance, and theater) complement academic programs in art and design in the College of Design and in arts applications in the College of Humanities and Social Sciences. CHASS currently offers tracks in music, theater, and film and is developing a proposal for a major in film studies. Under this initiative, NC State will assess the feasibility of expanding its visual and performing arts programs with the goal of developing new majors in the visual and performing arts.

Majors in visual arts, music, theater, and dance are consistent with NC State's commitment to pursue excellence in a comprehensive range of disciplines. They expand the range of academic and performance opportunities available to students and produce arts programming that improve the attractiveness and quality of life in the region. Arts programs at NC State contribute to and benefit from collaboration with the university's science, technology, and engineering programs. To enable and enhance their impact, the arts increasingly rely on technology through collaborations such as computer-generated music, recording technology, physiology of dance and musical performance, and computer-assisted choreography, set design, and film editing. Students who have benefited from education that combines knowledge and skills from traditional arts and STEM disciplines will become the leaders in the development of new directions in art and culture. Because NC State already has strong visual arts programs in our College of Design, the major effort in this initiative will be in the area of performing arts.

New and expanded visual and performing arts programs will contribute to the economic transformation and community development of North Carolina's regions and the state as a whole. Graduates of arts programs at NC State are trained to assume leadership in current and emerging arts areas. They join the core of the state's creative class and develop the platform for clusters of creativity and innovation that will create jobs and contribute to quality of life. Both are essential to state and regional economic and community development.

### **Partnerships**

Expansion of the performing arts programs into academic degree programs will require collaboration among program faculty, the Division of Student Affairs, and faculty and administrators in the Colleges of Design and Humanities and Social Sciences to determine the appropriate location and structure for arts degrees and to create opportunities for interdisciplinary and integrated arts degrees such as world music and jazz studies. The performing arts programs will also partner with faculty in the Colleges of Engineering, Management, Education, and other colleges to develop programs that draw on the expertise of all of NC State's faculties and offer opportunities for collaborations in technology and the arts unique within UNC as well as in arts entrepreneurship and arts education. NC State will also actively explore collaborations with other major arts programs within UNC.

Expanded performing arts programs will bring additional opportunities for NC State's extension and engagement mission in the arts, complementing extension activities in the College of Design and the College of Humanities and Social Sciences. ARTS NCSTATE has a long tradition of outreach and involvement in the region through exhibits and performances, technical assistance, programs for K-12 teachers and students, and collaborations with regional and statewide performing groups such as the Raleigh Civic Symphony, the NC Symphony, and the NC Dance Festival.

The art and design programs in the College of Design contribute to NC Cooperative Extension programs and have a significant presence in Raleigh and the region, including the Contemporary Art Museum, the Fishmarket Gallery, and the Downtown Studio. The College of Humanities and Social Sciences contributes to university outreach through its partnership with the Full Frame Documentary Film Festival and programs that bring national and international artists to North Carolina for performances. Similarly, NCSU Libraries has created exceptional new spaces for photographic and visual arts exhibits of national prominence. Our Gregg Museum of Art and Design mounts nationally acclaimed exhibits that emphasize areas of strength within our curricula, including ceramics, textiles, paper and North Carolina crafts.

## Implementation

This initiative will expand on the process behind the university's 2008 recommendation to establish a music major. In June 2007, Provost Nielsen and Vice Chancellor for Student Affairs Stafford charged a group of administrators from their two divisions to develop a feasibility study for the major. Working closely with faculty in the Music Department, the group recommended that a major be established, and developed estimates of the staffing, budget, and space needs for new majors and concentrations in music.

Under this initiative, additional groups will be charged with developing feasibility plans for implementing appropriate recommendations from the feasibility study for a music major and study the feasibility of majors in dance and theater, relying on the expertise of faculty to draft recommendations similar to those in the music study. A space study group will develop a facilities plan for expanded performing arts academic and performance programs. Feasibility studies will consider how existing student and community performance groups might be associated with the expanded academic programs.

## Timeline

- 2009–2010: Decision on implementation of a music major. If approved, proposal for the degree; consideration of transition of faculty to an academic college; recruitment of students in new music degrees; short- and long -term facilities plan.
- 2009–2011: Feasibility studies for additional majors in performing arts
- 2010–2011 Enrollment of students in music major, if approved
- 2011–2012: Implementation plans for additional performing arts majors based on feasibility studies

## Funding

*Current funding:* \$3,740,534 from student fees, state appropriations, ticket revenue, and private and institutional support.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$2 million		85%	5%	5%	5%	

## Responsibility

The establishment of degrees in the performing arts will be coordinated by the Provost's Office in collaboration with the Division of Student Affairs and its program directors, the College of Design, the College of Humanities and Social Sciences, and other colleges.

## Assessment

- Enrollment projections for new majors based on needs assessments and admissions surveys of potential majors, including performing artists in the region and the state
- Needs assessment and financial plan for program and space costs for majors
- Development of assessment plans for majors and minors and performing arts groups
- Assessment of impact of expanded programs on economic and community development in the region



## ***Faculty and Staff Professional and Leadership Development***

**UNC-T recommendation:** 4.1, 4.3

**Type:** Expansion of existing programs

### **Description**

NC State's strategic plan establishes the university's intention to "develop a faculty and staff of the highest quality," including "attracting, developing, and retaining excellent scholars, teachers, and researchers" and providing "competitive compensation, professional development opportunities, and a supportive and productive work environment" that are "critical to attracting and retaining high-quality faculty and staff." NC State supports the Board of Governors' efforts to bring faculty salary averages at UNC institutions to the 80th percentile of their peer institutions and efforts to improve benefits provided to UNC faculty and staff.

NC State has surveyed its faculty to identify actions that could contribute to their well-being, satisfaction, and success, and a staff well-being survey is being administered during spring 2008. The results of both surveys will be discussed widely across campus. To ensure that the issues raised by the survey are taken to heart and responded to by the institution, the provost has established an Advisory Committee on Faculty Well-Being to recommend actions that will enhance and support faculty effectiveness and sense of engagement. The university is administering an EPA non-faculty compensation survey to assess labor market data and more systematically evaluate how compensation for non-faculty positions compares to the external and campus labor markets.

In 2008, a Working Group on Faculty Development appointed by the provost made a number of recommendations to promote a comprehensive approach to the professional development needs of faculty, including expanding the existing Faculty Center for Teaching and Learning into a more comprehensive Center for Faculty Development. The center will coordinate with other faculty and development programs to ensure responsiveness and to prevent duplication of programming. The Division of Human Resources' department of Training and Organizational Development offers a wide range of training programs available to faculty, staff, and administrators; specialized training for managers in university business practices, policies, and procedures; and professional development certificate programs. Leadership development opportunities are provided to faculty, staff and administrators by a number of campus offices, including the Office of the Provost, Human Resources, the Shelton Leadership Institute, and several colleges.

Under this initiative, NC State proposes to develop a professional and leadership development collaborative, including representatives from the new Center for Faculty Development, Human Resources, the various colleges, and other campus providers of training and development programming. The collaborative will help inform and guide needs assessments, coordinate programming, and integrate opportunities for development across the institution, and improve and communication to faculty, staff, and administrators about development opportunities.

### **Partnerships**

NC State will actively seek opportunities to collaborate with other UNC institutions, with the Association of Teaching Center Directors, the UNC TLT Collaborative, HR partnerships with peer institutions, and national organizations to develop joint program and identify best practices in individual and organizational development.

### **Implementation**

In 2008, the Office of the Provost will implement recommendations from the Report of the Working Group on Faculty Development, including assigning responsibility for faculty development to a vice provost and establishing the Center for Faculty Development. The vice provost will oversee the hiring of the center director and appointment of the Advisory Committee on Faculty Development and, with the associate vice chancellor for human resources, will convene the collaborative.

In 2008-2009, the collaborative will oversee needs assessments and propose new, expanded, or reduced programming to ensure that resources are directed at identified needs, that unnecessary duplication of programming is eliminated, and that individual and institutional goals and needs are met. A resource website will be created, with adequate staffing to ensure that the site is comprehensive, user friendly, and current. When needs are identified that are not addressed by current programming, the collaborative may propose the commitment of additional resources to ensure that NC State is meeting the continuing development needs of faculty, staff, and administrative leaders.

## Funding

*Current funding:* \$514,000 in state funds allocated by the university.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$75,000	\$300,000		80%	15%		5%	

## Responsibility

The provost will establish the Center for Faculty Development. The director of the Center for Faculty Development will be responsible for establishing the collaborative proposed by this initiative.

## Assessment

The vice provost in charge of faculty development, along with the associate vice chancellor for human resources, and campus program directors, will be responsible for assuring the following:

- Regular, comprehensive needs assessment and associated programming to meet new and existing campus goals and activities
- Coordination of staffing and resources to ensure adequate programs and resources and to avoid unnecessary program duplication
- Assessment of satisfaction among participants with development programs and resources.
- Outcome assessments to ensure that programs intended to positively impact individual and organizational success and effectiveness.

## 4.2 Our Citizens and their Future: Access to Higher Education

*UNC should increase access to higher education for all North Carolinians, particularly for underserved regions, underrepresented populations, and nontraditional students.*

Known as the "People's University," NC State is a vital educational and economic resource with a wealth of programs that provide services and education to all sectors of the state's economy and its citizens. Consistently ranked a national best value and among the nation's top 40 public universities, NC State is an active and vital part of North Carolina life. We are the largest university in the UNC system, and our student body includes a large enrollment of nontraditional student, part-time students, and lifelong learners.

In line with its land-grant roots, NC State is an experienced leader in implementing best practices in increasing student success and access to the university. Our Pack Promise program is a set of principles designed to minimize the loan burden for needy students, encourage first-generation college student attendance, promote access and academic success for students from low income families, and connect faculty with students to enhance the student's academic experience through undergraduate research opportunities. In response to UNC Tomorrow 4.2, we will expand Pack Promise, institute a new pre-college extension and engagement service, and introduce initiatives to address the needs of returning veterans and new Hispanic populations.

As one of two doctoral research-extensive institutions in the UNC system, NC State has a special responsibility for meeting the needs of its graduate students. Providing graduate education is an important component of NC State's mission to produce leaders for the state, the nation, and the world. To keep graduate education affordable, in 1997 NC State implemented its Graduate Student Support Plan. The GSSP is a support package consisting of a stipend to cover living costs, tuition (in-state and out-of-state), and health insurance. The GSSP has improved NC State's competitiveness in recruiting a diverse group of the best graduate students in the state, region, nation and world, regardless of background. In response to UNC Tomorrow, NC State will expand its GSSP and will introduce more graduate certificate programs to accommodate post-baccalaureate students who would like to enhance their credentials or transition into a new field without uprooting their families for an extensive period of time

In addition, NC State will explore innovative new delivery systems that make higher education accessible to students with disabilities, or students whose work and family obligations prevent them from enrolling in place- and time-bound campus-based programs. NC State delivers distance education by a variety of methods, including video, podcasting, online, and face-to-face in offsite locations. Students admitted to NC State's distance education programs learn the same material and benefit from the same high-quality educational experience as campus-based students. Distance classes are designed and taught by the same faculty who teach classes in on-campus programs. In response to UNC Tomorrow, NC State will expand its distance education offerings, particularly for graduate programs.

Finally, NC State is interesting in building partnerships with community colleges and other UNC institutions across North Carolina to meet demand in all program areas where NC State is the natural lead due to expertise, capacity, and/or location. Both our 2+2 model and the our shared BS Engineering model are scalable to additional colleges and universities. In response to UNC Tomorrow, we will strengthen our partnerships with other educational institutions to streamline articulation and develop more seamless relationships.



## ***Increasing Access and Enriching Programs through Interinstitutional Collaboration***

**UNC-T recommendation:** 4.2, 4.1, 4.3, 4.4, 4.5

**Type:** Expansion of existing program

### **Description**

The greatest contribution UNC institutions can make to the economic development of the state is to provide North Carolina with an educated and effective workforce. As a careful steward of the state's resources, NC State is committed to collaborating with other colleges and universities, both to expand access to its own programs and to enrich the educational opportunities for NC State students by directing them to opportunities elsewhere. In some program areas, NC State is the natural lead due to expertise, capacity, and/or location. Collaboration is particularly important in cases when a critical program is very expensive and it is more cost effective for the state to build on its strengths and share a program than to build a new one.

### **Partnerships**

NC State teams with other UNC institutions, other colleges and universities, and many community colleges in several different ways.

- **Articulation agreements:** To assist prospective transfer students, NC State has developed program-specific articulation agreements in engineering or agriculture with many community colleges. Wake Tech students benefit from our new NC State-Wake Tech Partnership for Access to College Program. The statewide BioNetwork connects community colleges across the state under the auspices of the Biomanufacturing Training and Education Center headquartered on Centennial Campus.
- **2+2 programs:** Students complete the first two years of an NC State curriculum on a community college campus under the guidance of NC State faculty, and they complete the remainder of the bachelor's program in Raleigh. NC State's College of Engineering has seven such programs, six with community colleges and one with UNC-Wilmington.
- **Joint and dual degrees:** Capitalizing on our separate strengths, we have developed joint programs from which students graduate with a diploma from both partner universities. Examples include graduate programs in biomedical engineering with UNC-Chapel Hill, an undergraduate engineering program in mechatronics with UNC-Asheville, and a master's program in family life and parenting with UNC-Greensboro. We also offer a joint degree with the Institut d'Administration des Entreprises in France, with Seoul National University, and with several other international peers.
- **Distance education:** We deliver face-to-face graduate education programs in several counties and at UNC-Charlotte, and our electronically delivered courses and programs reach students all over the state and beyond. Some programs like the BSE at Craven Community College combine face-to-face with electronic teaching by NC State faculty.

### **Implementation**

Under this initiative, we will expand all four types of interinstitutional collaborations to increase access to NC State's unique programs, enriching both the programs and the state.

**Engineering strategies:** In the state of North Carolina, NC State is the logical lead in engineering education. Despite a recent needs analysis commissioned by the legislature that concluded that no additional engineering programs are needed in the state, several North Carolina communities remain interested in establishing local engineering programs as a strategy to promote economic development in their areas. A logical and cost-effective solution is for NC State to form partnerships with the community colleges and universities in those communities to serve those interests.

Both the 2+2 model and the BS Engineering model are scalable to additional colleges and universities. In lieu of a formal agreement, the community colleges' pre-major engineering curriculum, coupled with the approved engineering courses in the common course library, offers a readymade pre-engineering program from which students can transfer to NC State. To expand engineering education across North Carolina, we plan to take the following steps.

- Conduct new statewide needs analysis and interest surveys to determine the prioritized order for additional investments in program expansion and program development.
- Hold a series of workshops with community colleges to develop the details of expanded interaction and build on best practices.
- Develop web-based engineering education resources for use by community colleges that wish to establish a pre-engineering program.
- Develop cross-disciplinary graduate degree programs to meet need of professional development and continuing education.

**Other programs:** NC State will take the lead in establishing joint programs with four community colleges, four UNC institutions, and two private colleges through the Upper Coastal Plain Learning Council.

Several new partnerships are under discussion with additional community colleges, military bases (degree completion programs), and UNC institutions. For example, we are talking with the NC School of Science and Math about facilitating transfer of their math and science courses to NC State. NCSSM discussions have also focused on a BS/MS program in which their juniors can move into one of our applied math master's programs and complete it in three years.

A multi-campus graduate program in climatology is also being discussed with UNC-Asheville and other partners such as Asheville's arboretum, the minerals lab at Fletcher Mountain, and various federal agencies and corporations near both cities. We are also actively pursuing initial conversations with UNC-Asheville about joint programs in architecture and environmental studies, and with UNC-Wilmington about programs in historic preservation and environmental studies.

## Funding

*Future costs:* The following estimate includes programs in a variety of areas and would be scaled up or down according to the outcome of discussions underway.

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$0.4 million	\$1.2 million	100%					

For new collaborative programs in engineering, new costs are minimal and certainly well below establishing a new school of engineering:

- For each additional 2+2 program with another college or university, \$100,000 in recurring support is required for onsite advising and program support.
- Each additional BS Engineering on another campus requires \$440,000 in one-time funding and \$300,000 in recurring funding.

## Responsibility

Depending on the discipline, individual college deans will be responsible for developing the expanded interactions with UNC institutions and community colleges. Distance Education and Learning Technology Applications, and Enrollment Management and Services will facilitate their development and delivery.

## Assessment

Student application, admission, enrollment, retention and graduation statistics will be used to assess the performance of collaborative initiatives.

## ***Access and Affordability of Undergraduate Education***

**UNC-T recommendation:** 4.2, 4.4

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

The constitutional mandate establishing the University of North Carolina dictates that "the benefits of ... public institutions of higher education, as far as practicable, be extended to the people of the state free of expense." NC State is committed to keeping its education as accessible and affordable as possible. This initiative will address access and affordability of an undergraduate NC State education for underserved populations, including African Americans, Hispanics, rural populations, and returning veterans. The initiative has three components.

**Pathway to Knowledge:** Pathway to Knowledge is a pre-college extension and engagement service that will provide easy access to college preparation and pre-college academic enhancement programs offered by UNC institutions, North Carolina, the federal government, and private foundations. Expansion of our current efforts will involve establishing an Office of Pre-College Extension Services similar to our industrial and agricultural extension offices. The Office of Pre-College Extension Services will serve as the main point of contact for parents, students, teachers, public schools, and other agencies seeking information and access to NC State and other UNC schools and to state, federal, and private pre-college programs and services. Among other services, the office will develop and implement a strategic information, communication, and marketing strategy expanding on NC State's pre-college program website; hire and assign pre-college education extension agents to the various regions of the state operating from Gateway locations, Cooperative Extension offices, UNC campuses and community colleges; and develop a system for tracking the academic pre-college experiences of students to create a "pathway to knowledge" that facilitates, motivates and rewards students' pre-college academic achievement and success.

**Pack Promise:** More than just a financial aid program, Pack Promise is a set of principles designed to minimize the loan burden for needy students, encourage first-generation college student attendance, promote access and academic success for students from low income families, and connect faculty with students to enhance the student's academic experience through undergraduate research opportunities. Beginning with the incoming freshman class of 2006-07, Pack Promise has guaranteed that NC State's neediest students, those whose family incomes are at or below 150 percent of the federal poverty level, will have 100 percent of their financial need met through a combination of scholarships, grants, federal work-study employment, and a minimal amount of need-based loan support for up to nine semesters of enrollment. The financial aid component of Pack Promise is only the beginning. In addition to financial aid, the university takes steps to ensure the academic success of these students by providing more focused academic advising, coaching, and mentoring. In addition, the research work-study component provides an opportunity for the student to directly engage in undergraduate research opportunities with faculty. Under this initiative, we propose to expand Pack Promise to include students whose family incomes are at or below 200 percent of the federal poverty level, and to offer Pack Promise funding to incoming transfer students from North Carolina community colleges.

**The Ben Ruffin Scholars Program:** This program will increase educational access and affordability by granting tuition and fee scholarships; will promote personal empowerment and lifelong learning by requiring educational and developmental activities related to social justice, public service, and economic empowerment; and will encourage diversity and internationalization through community service and international experiences. The program will prepare its students to become effective change agents in the world. A unique dimension of the program is the cooperative participation of multiple campuses of the UNC system. Initially, Ben Ruffin scholars will be selected from four UNC campuses: NC Central University, Fayetteville State University, UNC Pembroke, and NC State. The thematic focus of the Ben Ruffin scholars program will be enhanced by the unique history and special attributes of these four universities. NC State proposes to be the administrative home of the Ben Ruffin Scholars Program.

## Partnerships

Pathway to Knowledge will partner with the public schools and with UNC, state, federal, and private agencies that offer pre-college programs and services. The Ben Ruffin Scholars Program for Social Justice and Public Service creates a partnership between NC State and three other UNC campuses, Fayetteville State University, NC Central University and UNC Pembroke.

## Implementation

### Pathway to Knowledge

- Develop the purpose, vision and mission for the Office of Pre-College Extension Services.
- Secure funding for the establishment of the Office of Pre-College extension services.
- Integrate pre-college extension services into the framework for existing land-grant extension and engagement services (agricultural, industrial, educational, etc.).
- Partner with other universities, and state, federal, and private pre-college agencies
- Develop a system for tracking the academic pre-college experiences of students to create a "pathway to knowledge" that facilitates, motivates, and rewards students' pre-college academic achievement and success.

### Pack Promise

- Expand Pack Promise to include entering freshmen whose family incomes are at or below 200 percent of the federal poverty level (expansion from 150 percent currently). This will increase the number of eligible students by approximately 300 per year. (2009-2010)
- Expand Pack Promise to entering transfer students. This will add approximately 300 students per year. (2009-2010)

### The Ben Ruffin Scholars Program for Social Justice and Public Service

- In collaboration with partner institutions, more fully develop the scholarship and programmatic elements of the Ben Ruffin Scholars Program. (2009)
- Secure funding for establishment of the Ben Ruffin Scholars Program. (2010)
- Recruit and enroll the first class of Ben Ruffin Scholars (2011)
- Implement the programmatic elements of the Ben Ruffin Scholars Program (2011-2012)

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$0.5 million	\$3.8 million	40%	20%		5%		35%

## Responsibility

The Pack Promise is the responsibility of the Office of Scholarships and Financial Aid. An office for the Ben Ruffin Scholars Program will be created and housed in the Division of Undergraduate Academic Programs. The NC State Disability Services Offices oversees programs for returning veterans.

## Assessment

Each responsible office will develop a program assessment plan that will include outcomes and measurements of student participation and achievement in each component of this initiative.



## ***Access and Affordability of Graduate Education***

**UNC-T recommendation:** 4.2, 4.4

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

Education is the real engine of economic development in North Carolina and the nation. Graduate education, in particular, offers the citizens of North Carolina rich opportunities to advance their own careers and contribute to the economic transformation of their communities. This initiative takes a four-pronged approach to ensure that graduate education at NC State remains both accessible and affordable.

**Graduate Certificate Programs:** Graduate certificate programs, which provide a credential after 12 to 15 credits of regular graduate-level academic courses, are designed for postbaccalaureate students and/or current degree-program students who may not need an entire master's or doctoral degree but would like to enhance their credentials or transition into a new field. NC State currently has eleven GCPs, five of which can be taken via distance education. Some offer a mixture of face-to-face and distance education courses to allow students to mix and match courses that reflect their interests, location, and learning styles. Under this initiative, NC State will add many graduate certificate programs over the next several years. As advanced education is increasingly needed, these programs provide focused graduate education without requiring students to uproot for an extensive period of time. Workers with graduate certificate credentials enhance the state's competitiveness in the global marketplace by providing skills targeted to emerging industries and markets.

**Distance Graduate Degrees:** NC State has a long history of providing access to quality, well-rounded educational opportunities for a diverse student population across the state through distance education. We currently offer over twenty master's degrees, several doctoral degrees, and five graduate certificates in a wide variety of academic disciplines. Some programs are offered completely online, some at offsite locations, and some have blended delivery systems. Under this initiative, the Graduate School at NC State will work with the UNC General Administration to identify areas of greatest need for advanced degrees and certificates throughout the state of North Carolina, and then work with academic programs and the university's distance education office to increase the number of offerings and locations by tapping into appropriate modes of distance delivery.

**Pipeline Programs:** NC State currently administers a number of comprehensive programs that are integrated in order to create a better pathway to the Ph.D. for students from underrepresented minority groups. Among them are NC-OPT-ED\* Alliance Day, Visit NC State Day, Bridging Experiences, Start-Up Assistantships, and Crosstalks. While these programs are currently funded by NSF and NIH, those agencies expect that the programs will be continued after federal support has ended. Institutionalization of the programs will allow us to broaden them to include more disciplines, reach more students, and increase our chances of getting future grants. In addition, we seek funding to expand our Recruiting Proposal program, which provides grants to graduate programs to meet their unique recruiting needs.

**Graduate Student Support Plan:** The GSSP is a support package implemented in 1997 to improve NC State's competitiveness in recruiting a diverse group of the best graduate students in the state, region, nation and world, regardless of background. NC State recognizes that effective recruitment requires full financial support, consisting of a stipend to cover living costs, tuition (in-state and out-of-state), and health insurance. The GSSP provides the tuition and health insurance portion of that package. But even with very conservative guidelines for providing GSSP funding, the funds allocated from the state for tuition remission are not adequate to cover our true need. Of the 6,500 degree-seeking graduate students who enrolled at NC State in fall 2007, only 39 percent were supported on graduate assistantships or fellowships and eligible to receive GSSP support. To achieve our enrollment growth targets of 12,000 graduate students by 2017 and provide GSSP to 50 percent of degree-seeking students, we plan to initiate a major fund-raising campaign for graduate fellowships and will require a substantial increase in GSSP funding.

## Partnerships

The NC State Graduate School will build partnerships with citizens and employers to target fields where there is greatest need for advanced training and education. These partnerships will involve both NC State faculty and UNC GA staff. NC State will also work with community colleges and other venues to develop the best venues for off-campus and blended delivery and with other UNC institutions to co-develop programs as appropriate. We implement pipeline programs through the North Carolina Alliance to Create Opportunity for Education, which is a partnership between NC State, UNC-Chapel Hill and NC A&T. The GSSP is a partnership between the state, NC State, and the faculty through research grant support.

## Implementation

- Strengthen the depth and quality of graduate distance education degrees and certificates (ongoing).
- Establish outreach to and partnerships with employers, other universities, and UNC-GA to identify areas of greatest need (ongoing).
- Expand and develop additional programs as information on need is available (2009–ongoing).
- Develop a business model for providing increased operating funds for growing programs (2009).
- Develop new distance education facilities, including increased numbers of distance education classrooms on campus and make arrangements for off-campus delivery sites (as funds are available).
- Apply for state and federal funding of diversity pipeline programs, which are funded only through 2010 (2009–ongoing).
- Request a legislative appropriation to the UNC system will be requested for the tuition remission required attract the best graduate students as our enrollment grows (2009).
- Mount a universitywide fundraising campaign directed at increasing the number of endowed graduate fellowships in each of the colleges as soon as additional GSSP resources are available to use as "match." (2010–ongoing)
- Alternatively, request legislation to allow tuition waivers rather than tuition remission, which would result in much more efficient use of available resources (2009).

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$1 million	\$29 million	35%	25%	35%	5%		

## Responsibility

The Graduate School in collaboration with academic programs and DELTA for distance graduate programs and certificates. OPT-ED Day and the Crosstalk program are implemented by the NC State Graduate School and partners at UNC-CH and NC A&T. The bridging, visitation, assistantship, and recruiting proposal programs are managed by the Graduate School.

## Assessment

The Graduate School has an elaborate assessment process for determining the quality and effectiveness of all graduate programs. Each academic unit will continue to document process, outcome, and impact data and use these data to support and improve existing programs (including strong student/alumni testimony). Another measure is student and community demand. The effectiveness of the diversity pipeline programs is assessed annually using both quantitative outcomes, as well as more qualitative information provided by program participants and other stakeholders.

## ***The NC State Hispanic Initiative***

**UNC-T recommendation:** 4.2, 4.1, 4.4, 4.7

**Type:** New programs and expansion of existing programs.

### **Description**

The NC State Hispanic Initiative is a set of recommendations that emerged from a two-year task force study of NC State's preparation to anticipate and respond to the needs of the growing Hispanic/Latino population in North Carolina. The initiative addresses our need to promote academic preparation (pre-K-12), access, affordability, and the academic success of Hispanic students throughout North Carolina. The result of this initiative will be a substantial increase in Hispanic student access to higher education and increased education attainment of Hispanic students at NC State and other UNC institutions. The initiative has four components:

**Preparation for college:** The Hispanic Initiative will focus NC State's efforts to deliver a full array of pre-college academic enhancement and college preparatory services to the Hispanic population throughout North Carolina. The initiative will tap into NC State's Pathway to Knowledge initiative, which establishes pre-college extension and engagement services modeled after NC State's successful agricultural and industrial extension services. Through Pathway to Knowledge, Hispanic students, parents, and community organizations will have increased access to a broad range of NC State (and other UNC) pre-college programs, in addition to college preparation and pre-college programs offered by state, federal, and private organizations. The initiative will also enlist the help of the College of Education (which will enhance its existing crosscultural training of new teachers) and the College of Humanities and Social Sciences (which will expand its English as a Second Language program).

**Access to college:** The second component of the initiative will increase outreach, recruitment, and college affordability for Hispanic students throughout North Carolina. The needs of Hispanic students will be considered in both of the access and affordability initiatives NC State is proposing in its response to the UNC Tomorrow report. To ensure that Hispanic students are strong candidates for admission, the Hispanic Initiative will seek partnerships with Learn and Earn Early Colleges throughout the state to promote academic achievement in science, technology, engineering, and mathematics. The admissions office has added a Hispanic admissions officer, expanded its recruitment efforts targeting Hispanic students, parents, and their communities. These targeted efforts include community and school recruitment fairs in areas with large Hispanic populations, open houses, and campus visits to NC State for Hispanic students, summer transition, and new student orientation programs. NC State will also seek to add a bilingual resource in its Visitors Center. Finally, NC State will continue to foster its long-term commitment to host the Hispanic Education Summit (for Hispanic students) and the Hispanic Achievement Conference (for NC Educators) in partnership with the NC Society of Hispanic Professionals.

**Success in college:** To ensure the success of Hispanic students at NC State, the initiative will expand existing student academic and social support programs. The provost and the Office of Student Affairs will establish a new student support position, assistant director for Hispanic student affairs. Enhancing ongoing efforts to increase the number of Hispanic faculty and staff at NC State will also promote student success. NC State will also continue to explore the establishment of a Hispanic/Latino studies degree and foster campuswide curricular attention to Hispanic issues and themes.

**Life after college:** To prepare Hispanic students for success after college, we will expand our Minority Career Fair and our partnerships with minority-owned businesses. Through the College of Education we are proposing an Education Extension Service that will provide lifelong continuing education and professional development programs. This Education Extension Service will reach out to Hispanic and all other populations with continuing education and professional certificate programs, especially through online distance education. In addition, a Hispanic Alumni affinity group will keep Hispanic graduates connected and engaged with NC State.

## Partnerships

The broad range of programs described above will require partnerships with other UNC campuses, NC community colleges, the NC Department of Public Instruction, community-based groups, as well as state and federal government agencies.

## Implementation

### Phase One (2008–2010)

- Increase Hispanic student enrollment.
- Implement the NC State Pathway to Knowledge Initiative in six regional offices.
- Implement the NC State Education Extension Services Initiative in six regional offices.
- Implement the NC State undergraduate and graduate affordability initiatives.
- Hire an assistant director for Hispanic affairs in the Office of Multicultural Student Affairs.
- Hire a bilingual resource for the Visitors Center.
- Increase Hispanic faculty and staff.
- Establish a Hispanic Alumni Society.

### Phase Two (2010–2012)

- Continue to increase Hispanic student enrollment.
- Implement the NC State Pathway to Knowledge Initiative in an additional thirty counties.
- Implement the NC State Education Extension Services Initiative in six regional offices.
- Continue to implement the NC State undergraduate and graduate affordability initiatives.
- Continue to increase Hispanic faculty and staff.
- Establish a Latino/Hispanic studies program.

### Phase Three (2012–2014)

- Continue to increase Hispanic student enrollment.
- Implement the NC State Pathway to Knowledge Initiative in the remaining counties.
- Implement the NC State Education Extension Services Initiative in the remaining counties.
- Continue to implement the NC State undergraduate and graduate affordability initiatives.
- Continue to increase Hispanic faculty and staff.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$400,000		70%	20%	10%		

## Responsibility

Responsibility for the Hispanic Initiative involves numerous offices across campus including the Office of Admissions, Office of Pre-college Programs, Undergraduate Academic Programs, Multicultural Student Affairs, Office for Diversity and African American Affairs, Alumni Affairs, and many others.

## Assessment

Each responsible office will develop a program assessment plan that will include outcomes and measurements of student participation and achievement in each component of this initiative. The success of the Hispanic Initiative will be measured by the increase in enrollment and academic success of Hispanic students, increased number of Hispanic faculty and staff, and by the positive perceptions county residents have of NC State’s efforts to reach out to every region of the state to serve its citizens.

## 4.3 Our Children and Their Future: Improving Public Education

*UNC should be more actively involved in solving North Carolina's public education challenges.*

The United States lags behind other developed nations in the education of scientists, technologists, engineers, and mathematicians (the STEM disciplines). Because this is a systemic problem, beginning in elementary school and continuing through the college years, solutions must also be systemic. From the earliest grades, schoolchildren must learn STEM materials in ways that are both engaging and challenging. In college the STEM disciplines must be the site of exceptional teaching, both to stimulate and challenge students majoring in these fields and to build scientific literacy among non-majors.

By mission and history, NC State is a national leader in STEM education. Our STEM science departments are among the best in the nation, and we have highly regarded STEM programs in our College of Education. NC State provides STEM assistance along the learning continuum. The MSEN Pre-College Program steers hundreds of middle grade and high school students toward careers in STEM and teaching. High-level STEM work that directly benefits teachers and students is carried out across the state by The Science House, the Kenan Fellows program, and a host of camps and workshops.

NC State's College of Education is the largest producer of mathematics and science teachers in the UNC system. In response to UNC Tomorrow's 4.3 directive, NC State's College of Education will launch an ambitious initiative to increase the number of initial-licensure teachers we prepare in STEM disciplines by 50 percent within three years. We will extend the reach of the programs by placing our teachers in more rural and underserved areas of the state, and will target candidates from groups under-represented in the teaching profession, including Hispanics, African-Americans, Native-Americans, and males. To increase access to our programs, we will explore innovative new methods of course delivery, including online and distance education.

As we increase our numbers, we will also strengthen the quality of STEM teachers by ensuring that they are prepared with both the latest STEM content knowledge and effective, up-to-date, pedagogical approaches. At the college level, we will establish a new Center for Excellence in STEM Education, and we will expand our Kenan Fellows program. To encourage cutting-edge, ongoing work in educational research, we will expand the activities of the William and Ida Friday Institute for Educational Innovation.

Finally, to offer consistent support to K-12 teachers in the field, we will launch a new Education Extension Service, based on NC State's proven Cooperative Extension model. Operating from Gateway locations, Cooperative Extension offices, or The Science House regional offices, the NC State Education Extension Service will link the resident expertise at NC State to local needs and help recruit and retain teachers in areas of critical need. The Education Extension Service will serve as the main point of contact for public schools and other agencies seeking NC State expertise. Partnerships with school districts, other UNC campuses, and the NC Community College System will also be part of this accelerated and broad-based statewide effort.



## **Education Extension Service**

**UNC-T recommendation:** 4.3, 4.4, 4.7

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

NC State offers a wide variety of activities that interface directly with public schools across North Carolina, including the degree and professional development programs of the Colleges of Education, Agriculture and Life Sciences, and Humanities and Social Sciences, the Science House, Kenan Fellows, Cooperative Extension Service (including 4-H), and many others. Nearly every college on campus offers programs, camps, and the occasional research and direct service projects that involve public schools. Other units such as the Industrial Extension Service, Center for Urban Affairs, and the McKimmon Center for Extension and Continuing Education provide public education programs from time to time.

Results from recent stakeholder focus groups conducted by NC State and the College of Education indicate that NC State's historic contributions and commitment to public education are greatly valued and should be expanded. In the future, stakeholders would like us to direct our expertise toward helping teachers and administrators create classrooms that are more engaging and relevant, with a clear focus on 21st century knowledge and skills. They would also like us to give greater attention to the shifting demographics of the school population and provide greater assistance in teacher retention and new teacher induction.

Despite NC State's already extensive involvement and investment in extension services to the public schools, two problems hamper our effectiveness and overall impact:

1. Unless they are directly involved, many people in public schools, as well as the legislature and the public at large, are not aware of NC State's resources or how to access them.
2. Internally, NC State's extension efforts in education are not well integrated with its overall research, teaching, and outreach missions.

To respond to these problems and to meet the changing educational needs of North Carolina, NC State will create the Education Extension Service. Under the joint leadership of the vice chancellor for extension, engagement, and economic development and the dean of education, the Education Extension Service will organize and lead a campuswide effort to provide targeted, measurable services to public schools statewide. We will undertake the following actions:

- develop a unified education communication and dissemination strategy through a dedicated website, publications, and possibly a TV program for teachers;
- serve as the main point of contact for public schools and other agencies seeking NC State expertise;
- convene a council of cooperating school districts and associations from across the state for quarterly meetings;
- partner with school districts, the colleges, the business community, DPI, and the Emerging Issues Forum to host an annual conference on emerging issues in K-12 education;
- develop a community needs assessment toolkit focused on K-12 public education that is coupled to strategic planning and offered as a service to public school systems;
- hire and assign education extension specialists to the various regions of the state operating from Gateway locations, Cooperative Extension Service offices, or Science House regional offices—their job is to link the resident expertise on campus to local needs and help recruit teachers and students to NC State programs, pre-college through postgraduate;
- organize and advertise NC State's extensive education-related degree, nondegree, and continuing education credit-bearing programs (existing and to be created)—including assistance to develop more extensive online, summer session, weekend programs, and the noncredit offerings of the McKimmon Center.

On the NC State campus, the Education Extension Service director and staff will

- create an internal coordinating council composed of deans and directors with significant responsibility for ongoing activity in public schools;
- develop a strategic plan based on data from formal statewide education needs assessment with measurable outcomes focused on encouraging innovative and scalable solutions;
- work with the Department of Public Instruction to encourage the use of NC State faculty, from both education and content-area specialties, in the development of curricular standards and other matters;
- require all NC State agencies, faculty, and staff to report their public education-related activities annually in order to increase the accuracy and comprehensiveness of the federally mandated school services component of the Institution of Higher Education Performance Report;
- require that major initiatives involve the EES director’s office during the planning stages in order to ensure that linkages are made to ongoing teaching, research, and outreach activities and eliminate gaps in service;
- have budget and staff sufficient to carry out these activities and to give colleges and their faculty and staff across the campus incentives to conduct work with K-12 education.

## Partnerships

High Five Triangle Partnership, Association of School Administrators, NC DPI, Cooperative Extension, Science House, other UNC campuses, and NC community colleges.

## Implementation

We will begin planning immediately by convening an advisory group from across the state to develop an incisive understanding of the education needs of various regions of the state and devise a strategic plan for accomplishing a clear set of goals and objectives.

## Funding

*Planning phase:* \$200,000

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$3 million	80%		20%			

## Responsibility

The vice chancellor for extension, engagement and economic development, and the dean of the college of education will share the responsibility for establishing the Education Extension Service. They will appoint a director and hire education specialists.

## Assessment

We will adapt formats for assessment from Cooperative Extension and Industrial Extension to the needs of the Education Extension Service. We will review the director and specialists annually and conduct a full review of effectiveness and efficiency at five years.



## ***Expanding STEM Teacher Education***

**UNC-T recommendation: 4.3**

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

Along with having a top-ranked Ph.D. degree program in math education, NC State's College of Education is the leading producer of mathematics teachers in the UNC system, preparing an average of 45 teachers per year since 2005, with a high of 67 in 2008. Our highly regarded science education program produces an average of 25 teachers per year and another 14 math/science dual majors; and technology education produces 10 to 12 teachers per year. In 2007-2008, through our NC Teach Program, we also prepared 39 lateral-entry teachers across all of these fields. Strong collaboration with faculty in the sciences, mathematics, and engineering at NC State exists in all these programs as well as with school districts where interns are placed and our graduates hired.

Under this initiative, NC State's College of Education will increase the number of initial-licensure teachers we prepare in STEM disciplines by 50 percent within three years. This will increase the total number of teachers (both traditional and alternative licensure) from approximately 165 to 250 per year. In addition to recruiting and preparing 50 percent more STEM teachers, we will extend the reach of the programs by placing our teachers in more rural and underserved areas of the state. We will also target candidates from under-represented groups in the teaching profession, including Hispanics, African-Americans, Native Americans, and males. Finally, we will conduct a program designed to increase retention of all our beginning teachers.

To accommodate this increase in capacity, we will redesign current, traditional on-campus programs with new formats and approaches. We have already begun this process by developing a new MAT degree program, involving both face-to-face and online formats, that will begin in 2009. And we will explore additional strategies, including possibly locating NC Teach programs at an NC State Gateway location and/or at community colleges in a 2+2 format, and increasing our online course offerings.

If we are to meet the ambitious goal of this initiative, we will need additional resources, including additional regular and clinical faculty, office space and classroom facilities, funds for cooperating teachers, supervisor support (including travel), recruitment materials, and operating support. We must expand scholarship and loan opportunities, lift the current cap of 45 Teaching Fellows, and expand or introduce other mentored scholarship/loan programs that offer incentives to students both during their degree preparation and as salary increases after entering teaching. For example, we will explore extending the Burroughs Wellcome Fund Science Scholarship Program beyond the three-year time frame originally planned. Finally, we will increase our work with beginning teachers and the schools where they are employed through a unique service for data gathering and information sharing, leading to increased new teacher satisfaction and retention.

### **Partnerships**

We have nurtured several partnerships to recruit interested teachers, including 4-H After-School programs, which encourage student achievement; our MSEN Pre-College program, which is designed to encourage college attendance in STEM fields and teaching for middle and high school students; and our Leadership Institute for Future Teachers (LIFT) Camp for rising seniors, which points them toward college attendance and financial aid opportunities geared to teaching careers. We also have partnerships with The Science House and Kenan Fellows program, both of which directly support in-service teachers. The Friday Institute is exploring various technology-enabled teaching and learning approaches that can be incorporated into teacher preparation, and we will explore partnerships with NC community colleges.

### **Implementation**

Assuming full funding, the following activities can begin immediately and will require approximately three years to reach full capacity.

- **Recruitment of students:** To recruit an additional 85-100 STEM teacher candidates per year we must develop special recruiting brochures and other communications with teachers, guidance counselors, and current NC State students. Continuation and expansion of programs such as the Teaching Fellows and the Burroughs Wellcome Fund scholarships will help with recruiting, but will involve higher program costs. We will launch special efforts to attract students from diverse backgrounds through the use of a recruitment coordinator and a variety of media.
- **Academic program:** We will enhance MAT degree development and dissemination activities to include locations outside of Raleigh. We will develop courses for online formats and multipoint video conferencing capability.
- **Personnel and operating expenses:** We will recruit additional faculty, including clinical supervisors. Estimates of needs for additional faculty are: math education 3.0 FTE, science education 2.0 FTE, and technology education 1.5 FTE. Collateral faculty in other courses tied to these majors in both the STEM departments and in other education courses and advising brings the number to 12.0 FTE, plus 2 clerical support staff. Placement in rural areas will require additional resources for travel, materials, and possibly arrangements for housing and travel for students as well. We will increase stipends for cooperating teachers, and begin to implement the Beginning Teacher Success Protocol and Retention Program to approximately 25-30 partnering school districts.
- **Space:** Poe Hall, the home of the STEM education programs, is currently at capacity. Two classrooms are being renovated to better reflect high school math and science standards, but we must build more classrooms, and equip them appropriately equipped for STEM teaching. We must also acquire more office space for our larger faculty, most of which should be located near current faculty and advisers to ensure communication and efficiency.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$0.5 million	\$3 million	80%	20%				

## Responsibility

The College of Education, particularly the Department of Mathematics, Science, and Technology Education, will have the lead. Collaborations will involve other units within NC State, such as relevant colleges and departments, the financial aid office, and admissions. A recruitment coordinator has recently been hired to assist with the overall effort.

## Assessment

Academic programs such as the new MAT degree are evaluated by the Graduate School. In addition, all programs leading to licensure for teachers are evaluated by the NC-DPI. All professional programs for educators must be included in the procedures of the national accrediting body, NCATE, as well as the accreditor of the university, SACS. The dean of the College of Education is required to monitor quality of all academic programs and staff under the purview of the college annually.

## ***William and Ida Friday Institute for Educational Innovation***

**UNC-T recommendation:** 4.3, 4.1

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

In response to the demands of the 21st century workplace, the North Carolina State Board of Education has adopted goals and priorities that emphasize the need for globally competitive academic programs, technologically savvy and globally aware students and teachers, and appropriate infrastructures and systems. In its action plan, the board defined four essential elements for public schools:

1. Delivery of 21st century curriculum, instruction, assessments and accountability
2. Presence of technology tools in the classrooms
3. Widely accessible and relevant professional development for teachers and administrators
4. High bandwidth connectivity and scalable networks for all schools,

NC State's Friday Institute for Educational Innovation is playing a lead role in addressing all four of these essential elements, working in close collaboration with key partners. Some examples of our growing body of work include:

- FI leads the NC School Connectivity Initiative, for which NC House Bill 1473 provides \$12 million annually for "broadband access, equipment, and support services that create, improve, and sustain equity of access for instructional opportunities for public school students and educators." MCNC, NCDPI, NC ITS, the e-NC Authority, Cisco, AT&T, Embarq, Time Warner Cable, and all school districts throughout the state are partners in this effort.
- In collaboration with NCDPI, the GoldenLEAF Foundation, the New Schools Project, and SAS, FI staff serve on the steering committee for the NC 1-1 Computing Pilot Initiative, through which all students and teachers in eleven schools have received laptop computers.
- In collaboration with NCDPI and the NC Business Committee for Education, FI provides both face-to-face and online professional development for teachers and administrators interested in how the technology-related literacies can be integrated into K-12 schools and has organized the New Literacies Collaborative to extend this effort.
- FI's evaluation team has contracts to conduct evaluations of the NC 1-1 Learning pilot program, the North Carolina Public Virtual School, and the series of IMPACT projects, which focus on effective implementations of technology to enhance teaching and learning in K-12 schools.
- FI staff and affiliated College of Education faculty have been working for the past two years with high-need rural districts in the northeast region of NC. We have submitted proposals to both NSF and the Wachovia Foundation seeking funding to expand this work.
- Funded by grants from the National Science Foundation, FI staff and faculty associates are developing new resources for the 21st century classroom including a high school math curriculum; educational games that incorporate artificial intelligence language processing technologies; curriculum materials that use visualization to enhance science education; materials to make concepts of nanoscale accessible to young students; and new approaches to formative evaluation to inform instructional decisions.
- FI is contributing to the next round of state policies and programs, and plays a central role convening and facilitating meetings of key state decision makers and educational leaders.
- FI is making teaching improvement available to rural and underserved school districts through the partnership of MCNC and the NC State Virtual Computing Environment.

The Friday Institute has built a highly qualified group of investigators, consisting of NC State faculty, postdoctoral fellows, and graduate students, along with a core professional staff. We have been expanding our capacity rapidly: State leaders have come to rely heavily upon our expertise, we have many strong partnerships, and our portfolio of NSF-funded work continues to grow. In order to continue to meet the demands for our work and to address new opportunities and challenges, we will need additional core operating resources. This initiative proposes increasing the annual operations budget of the Friday Institute from \$1.9M to \$2.9 million. This increased funding will enable us to accomplish the following:

- Position the Friday Institute as a national leader in developing educational resources for "1-1" schools in which every student and teacher has a computer;
- Build a body of work on the application of analytics in education to inform decision-making by teachers, administrators, and policymakers;
- Further work we have begun, in collaboration with Computer Science, on the potential role of virtual computing in the K-12 context;
- Expand our work developing and facilitating online professional learning communities to support teachers and administrators;
- Expand our work developing education resources that engage Hispanic and African-American students in STEM areas from the elementary levels into the later grades;
- In collaboration with PAMS, CALS, COE, and other colleges, become a national leader in developing resources to bring up-to-date science and engineering topics into the classroom;
- Increase our collaborations with educators in China and other countries to develop approaches to increasing students' readiness for global collaborations;
- Provide innovations that will enhance the work of Education Extension, teacher preparation programs, and the proposed Center for Excellence in STEM Education.

## Partnerships

We partner with many state agencies and public and private organizations, as described above. These partnerships are critical to our success and we expect to extend them as our work proceeds.

## Implementation

- Increase the capacity of the Friday Institute to develop strong proposals and prototypes that can lead to additional external funding, by providing support for faculty from Education, PAMS, and other colleges; as well provide support for additional post-doctoral fellows, professional staff, graduate students, and consultants who bring the expertise critical for the expansion of our work;
- Maintain the Friday Institute as a state-of-the-art facility for educational research, distance learning, and conferences. This requires updating equipment, such as that in our videorecording classroom and eye-tracking research facilities;
- Increase the Friday Institute staff to provide the level of financial management, communications, and technical support required to sustain the increased scale of our work and maximize its impact and visibility.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$1 million	100%					

## Responsibility

The executive director of the Friday Institute, and its faculty and staff will be responsible for this initiative.

## Assessment

The Friday Institute has a national advisory board, consisting of leaders that represent academic, business, and national organizations; government agencies, and school districts. In each of our projects, we obtain frequent feedback from our funders, partners, and the clients we serve, in order to continuously improve our work. In addition, the Friday Institute Leadership Team is in the process of developing a Balanced Scorecard approach to assessing our own progress, combining elements of funding, impact, visibility, and internal capacity development.

## **Supporting K-12 STEM Teachers**

### **UNC-T recommendation 4.3**

**Type:** Expansion of an existing program

### **Description**

Our state and our nation face a crisis. We have a severe shortage of qualified K-12 science and mathematics teachers. These shortages jeopardize our economy, our security, and our leadership in discovery and innovation. We must attract and prepare enough students in STEM disciplines to fill current and future workforce needs, and produce and retain STEM teachers at much higher rates.

To address this crisis, NC State has developed two highly successful STEM teacher-support services. The student-centered methods and teaching technologies advanced through these outreach programs are designed to fire students' natural curiosity and inspire their interest in science, in higher education in STEM disciplines, and in choosing science-related careers. Under this initiative, NC State will expand both of its existing services to improve their impact on recruiting, supporting, and retaining K-12 STEM teachers.

**The Kenan Fellows Program for Curriculum and Leadership Development:** Kenan Fellows are public school teachers selected through a competitive process to participate in a prestigious two-year fellowship—all while remaining active in their classrooms. Under the auspices of the Kenan Fellows program, Fellows interact with university researchers in a collaborative effort to translate cutting-edge research into relevant K-12 curriculum, both for the classroom and on the web.

**The Science House:** By enhancing teacher content knowledge and training teachers to use effective, hands-on inquiry-based learning techniques and modern, computer-based technologies in the classroom, The Science House improves teacher retention and encourages teachers to serve as role models and change agents within their schools and school systems. The Science House is a proven outreach program that annually reaches more than 3,500 teachers and 28,000 students in all 100 counties of North Carolina, through teacher training, content courses, school-based assistance, curriculum materials and student science activities. Strategically located in Lenoir, Edenton, Fayetteville, Jacksonville, Asheville, and Raleigh, The Science House offices serve many of the most resource-poor school systems in the state.

### **Partnerships**

Partnerships are an essential component of both the Kenan Fellows program and of The Science House. The Kenan Fellows program recruits mentors for Fellows from across all UNC's seventeen institutions. In addition, the program works closely with The Science House, 4-H, the Friday Institute, and other STEM initiatives across the NC State campus as well as those at other UNC system universities. The current Kenan Fellows class of 2010 includes teachers from thirteen North Carolina school systems and the North Carolina School of Science and Mathematics.

The Science House also partners with universities and school districts across the state. It is currently developing a pilot program in partnership with the North Carolina School of Science and Mathematics to train teacher leaders through intensive multiweek content-focused summer workshops held in the Raleigh/Durham area.

### **Implementation**

This initiative will enable the Kenan Fellows program to expand across the state of North Carolina in partnership with other UNC system universities. A detailed business plan for expansion has been developed and corporate leaders along with the chancellor are currently working together to ensure that the plans are implemented. The strategic thrust for the upcoming years is to increase the number of Fellows for the class of 2011 to bring the total number of Fellows to fifty. Program staff will target regions outside of the Triangle to recruit 2011 Fellows. Additionally, the staff will work to improve the quality of the program of studies for the Summer Institute to be more aligned, intentional, and purposeful.

This initiative will enable The Science House to continue its current programming in teacher training, content courses, school-based assistance, curriculum materials, and student science activities. Significant The Science House funding was obtained through federal earmarks that have now ended. State support is imperative to sustain and enhance this model of K-12 STEM outreach to teachers and students throughout North Carolina.

## Funding

*Current funding:* The Kenan Fellows Program is funded at \$1 million from state and private sources and from grants and contracts. Federal earmarks for The Science House have ended, and new state support is sought at the level of \$1.5 million.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$3.3 million	70%		15%	15%		

## Responsibility

The Kenan Fellows program is led by the Kenan Institute for Engineering, Technology and Science at NC State. The director of The Science House is responsible for The Science House, and reports to the dean of the College of Physical and Mathematical Sciences.

## Assessment

An advisory board for the Kenan Fellows program assures that the program is held to the highest of standards. The advisory board comprises leaders in both the public and private sector from across North Carolina in academia, industry, government and education. In addition, there are formative assessments embedded in the program’s delivery systems that allow course correction of the overall plan. The Kenan Fellows program staff is responsible for executing the Kenan Fellows program's accountability system. Programmatic web-based curriculum is the legacy product of the Kenan Fellows program. Staff are currently developing and executing a quality assurance process that will vet current websites and delete those that do not mean high quality standards.

The Science House will measure the impacts of its program by evaluating teacher retention rates at schools where the program is provided, and by measures of increasing student interest in science disciplines.

## **Center for Excellence in STEM Education**

**UNC-T recommendation: 4.3**

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

The United States lags behind other developed nations in the education of scientists, technologists, engineers, and mathematicians (the STEM disciplines). Because this is a systemic problem, beginning in elementary school and continuing through the college years, solutions must also be systemic. From the earliest grades, schoolchildren must learn STEM materials in ways that are both engaging and challenging. In college the STEM disciplines must be the site of exceptional teaching, both to both stimulate and challenge students majoring in these fields and to build scientific literacy among non-majors. Correcting our STEM deficiencies will require teachers who are proficient in the STEM disciplines and who possess exceptional teaching skills.

By mission and history, NC State is a national leader in STEM education. Our STEM science departments are among the best in the nation, and we have highly regarded STEM education programs in our College of Education. NC State provides STEM assistance along the learning continuum. The MSEN Pre-College Program steers hundreds of middle grade and high school students toward careers in STEM and teaching. High-level STEM work that directly benefits teachers and students is carried out across the state by the Science House, the Kenan Fellows program, and a host of camps and workshops. However, NC State's ability to meet the demand for creative, sustained work in STEM requires increased investment. Too much of our work (approximately 80 percent) depends on grants, contracts, and fees charged to student or teacher participants. Facilities that foster innovative teaching and outreach are inadequate to meet demand.

To improve the impact of its programs on K-20 STEM education, NC State will develop a Center for Excellence in STEM Education. The center will be a public/private partnership, within which the state of North Carolina will match long-term investments by a set of foundations and private enterprises with recurring state funds. The center will serve as a focal point for collaborative work by faculty in traditional STEM fields, staff in the Science House, the Kenan Fellows Program, the K-12 Initiative in Engineering, and the 4-H After-School Program. Faculty, staff, and master teachers associated with the College of Education will also be involved. Within the collaborative framework of the center, NC State will enlist the networks of its STEM partners and offer linked opportunities to synchronize expertise for greater impact and scalability.

### **Partnerships**

Internal partners will include colleges with faculty in STEM disciplines, including the Colleges of Physical and Mathematical Sciences, Agriculture and Life Sciences, Education, Engineering, and Natural Resources. External partners will include various state science museums and aquaria; foundations and corporations with STEM interests such as GSK, BWF, Progress Energy, and IBM, as well as linkages to other UNC campuses such as NCSSM, and to national STEM focused entities such as NSF and NASA.

### **Implementation**

Increased funding will allow us to continue and expand our efforts to improve college-level STEM instruction, not only at NC State, but nationally. We will conduct research into how students learn, develop and pilot test innovative instruction based on our findings, and then systematically institutionalize the most effective means of STEM instruction.

We foresee a multi-pronged, ongoing effort to accomplish our goals.

1. Complete searches and hire six new STEM faculty to conduct research on teaching and learning. We hope to complete this within one calendar year.
2. Recruit graduate students to work in these areas. We have been able to provide one graduate fellowship to support high-quality research on learning. We would like to expand this substantially within the next two or three years.
3. Extend our development and testing of new teaching technologies to all STEM areas. Timing for this effort will depend on the patterns of new faculty hirings. We will have new researchers in two STEM areas by next fall.
4. Gather and disseminate information on current efforts by NC State faculty to improve STEM learning. Some data has been collected and a website will be online within six months.
5. Promote and support additional instructional innovations by NC State faculty. This will involve ongoing effort to provide release time, purchase instructional technologies, and assist with procurement of external funding.
6. Serve as a national focus for scholarly communication on STEM teaching innovations. We already house the leading journal in physics education research. We plan to sponsor national conferences that will bring leaders together to focus on problems in STEM education. We already have a proposal submitted for a Gordon Conference. We want to also bring in national leaders in STEM education for a continuing series of talks.
7. Collaborate with the Friday Institute, College of Education, and the proposed Education Extension Service to adapt, test, and move new teaching approaches and technologies from the college environment to the K-12 STEM classroom.
8. Increase the staff to provide the support needed to sustain our additional research efforts, classroom implementations, and communication to others interested in our findings.

## Funding

*Current funding:* \$350,000 annually in university allocations.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$2 million	40%	10%	50%			

This investment will allow us to expand our efforts to secure additional external funding from NSF, the Department of Education, and partners in the technology industries.

## Responsibility

Dr. Robert Beichner in NC State's Department of Physics is a nationally renowned STEM educator. He has been heading an initiative at NC State focused on discipline-based education research and application. Representatives involved in this initiative have included the Science House, the Kenan Fellows Program, the K-12 initiative in Engineering, Cooperative Extension's 4-H program, and the College of Education and its Friday Institute for Educational Innovation.

## Assessment

We are establishing an advisory board consisting of leaders in the STEM areas, the College of Education, 4-H extension services, the K-12 initiative in Engineering, and the Science House. All our externally supported work requires non-project evaluators who can provide unbiased feedback for program improvement. The research and implementation projects continually incorporate formative and summative evaluations of student learning to assess impact.



## 4.4 Our Communities and Economic Transformation

*UNC should be more actively engaged in enhancing the economic transformation and community development of North Carolina's regions and the state as a whole.*

True to its roots as a land-grant institution, NC State has always been a leader in forging links between activities in the academy and economic progress in our region, state, nation, and world. NC State is UNC's unparalleled leader in the delivery of extension and outreach programs. Our responsibility for extension and outreach extends statewide. We have Cooperative Extension offices in all 100 counties of North Carolina and on the Qualla boundary of the Eastern Tribe of the Cherokee Indians. By measures of industry-sponsored research, technology transfer, and licenses and patents granted, NC State is a leader in the state and nation. We can count more than \$450 million annually in economic impact to the state in our Cooperative Extension, Industrial Extension, and North Carolina Small Business and Technology Development Center alone.

To build on this impressive base, NC State must pay attention to basics. According to many economists, the most important determinant of U.S. economic growth is progress in science and technology—fields in which NC State has unique strengths. Our prominence in science and technology is a potent force that drives innovation and economic development locally, statewide, and nationally. Industry comes to North Carolina to tap into its educated workforce, but also for easy, collaborative access to the best research minds. Accordingly, an important component of NC State's UNC Tomorrow response to 4.4 is to strengthen our faculty, our facilities, and our research base in our College of Engineering so that we can regain our status as a premier College of Engineering and a driver of economic and community development in North Carolina.

The new engineering infrastructure we have built and continue to build is housed on NC State's Centennial Campus, a twenty-first century "technopolis" consisting of multi-disciplinary R&D neighborhoods with university, corporate, and government facilities intertwined. The Centennial Campus concept defines NC State's vision for collaborative transformation of our university into an active participant in innovative economic transformation and community development.

To extend the benefits of our attention to the College of Engineering, we will improve the effectiveness of our Industrial Extension Service, expanding it in geographical coverage, breadth, and depth. Under UNC Tomorrow, IES will partner with UNC institutions not known for extension programs, help transform economic development by focusing on important community-based business and industry issues, and offer degree and certificate options to students and adult learners.

Finally, we will leverage our leadership role in extension and engagement statewide to support entrepreneurship development across North Carolina. Under this UNC Tomorrow initiative, NC State and its partners will cooperate to create significant growth statewide in targeted industry clusters by supporting startups, by generating technological innovation and new products, and by partnering with the Department of Commerce in efforts to recruit and retain firms.



## ***Building a Premier College of Engineering***

**UNC-T recommendation:** 4.4, 4.1, 4.5, 4.6

**Type:** Expansion of an existing program

### **Description**

Engineering education and research is a potent catalyst for economic development. NC State's engineering faculty, students, and staff have played an important role in moving North Carolina from an agricultural economy to a high-technology locus renowned throughout the nation and the world.

But engineering education in North Carolina has been under considerable stress. Fifteen years ago the accomplishments and reputation of the College of Engineering at NC State were on a par with the very best colleges of engineering in the world. At that time the COE at NC State was ranked by US News and World Report as 21st among all private and public research colleges of engineering and 13th among all public research colleges of engineering. Unfortunately, while the COE has continued to progress in many areas of engineering research and education, this progress has not kept pace with some of its peer colleges of engineering. By 2007, NC State had dropped to 34th among all private and public research colleges of engineering and 20th among public research colleges of engineering.

Returning NC State's College of Engineering to a position of global leadership in technological research and development will require a substantial investment. With the assistance of the NC legislature, we have already begun to take steps to reverse the erosion of our stature. To shore up our research and educational infrastructure, we are investing in a move and expansion of NC State's College of Engineering to Centennial Campus, and we are committed to keeping those facilities state of the art. Facilities, however, are only buildings and labs unless we populate them with a critical mass of cutting-edge engineering faculty, students, and staff to conduct research, make discoveries, and transfer this knowledge to the commercial sector.

To move NC State's College of Engineering to premier status, NC State has requested a series of funding investments, over a four-year period, from the North Carolina Legislature. We are grateful to the legislature for funding the first phase of our recovery plan. In 2007-08, NC State Engineering hired twenty-four new COE faculty and broke ground on the third engineering building on Centennial Campus. While many factors need to be considered in any recovery effort, there is no doubt that this recent investment in engineering education and research has played an important part in the COE's move up to 30th in the 2008 US News and World Report ranking.

Under this initiative, we will make important strides in our drive to make NC State's College of Engineering a premier engine of economic development for North Carolina and a source of pride for every North Carolinian.

### **Partnerships**

Successful partnerships both within NC State and with external groups are an absolute requirement for the COE to achieve significant increases in research funding. Examples of successful centers include the Semiconductor Power Electronics Center, Advanced Computing and Communication, and the Integrated Manufacturing Systems Engineering Institute. Most recently, activities of the Institute for Maintenance Science and Technology have led to the development of partnerships with the Naval Air Depot at Cherry Point and the U.S. Coast Guard Station in Elizabeth City in support of military bases in North Carolina. Partnerships provide an opportunity for faculty to work across departmental lines and capitalize on their collective strength for a common purpose to solve challenging problems that are not unique to one discipline.

## Implementation

Provided that we receive the requisite funding, we will phase in the following investments over the next four years.

1. Investments to increase the number of research active faculty: The current number of tenure and tenure-track faculty in the College of Engineering at NC State is 250. In order to reach a faculty size comparable to preeminent colleges of engineering, NC State must hire an additional 100 faculty. A faculty of 350 will provide NC State's COE with sufficient critical mass to attain a level of annual research expenditures commensurate with a premier college of engineering. The college will add faculty across interdisciplinary areas that respond to state and national needs as well as worldwide challenges in bioengineering, nanotechnology, information and communication technologies, critical infrastructure and security, energy and environmental systems, advanced materials and manufacturing, robotics and sensors technologies, and engineering services such as health care, transportation and financial systems.
2. Investments to increase graduate enrollment, particularly at the Ph.D. level: While a major part of the funding for this investment will come from increased grant and contract activity, a proportional investment in recurring funding will be applied to graduate student support through tuition remission, internal fellowships, and related stipends.
3. Investments in facilities/infrastructure needed to sustain a research enterprise of this size: The construction of Engineering Building III and the funding for and eventual construction of EB IV and EB V on Centennial Campus will create a set of world-class research and educational facilities that will position the college very well for achieving prominence on a par with the very best colleges of engineering in the world.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$25 million	100%					

## Responsibility

The dean of the College of Engineering.

## Assessment

The long-term goal of the NC State's College of Engineering is to become and be perceived as a leading public college of engineering in the United States. While funding beyond the four-year horizon will be necessary to achieve this goal, a reasonable expectation is that this investment will result in a "top 10" college of engineering with a ten-year horizon, a status that will clearly mark NC State as a premier college of engineering.

## **Expanding the Industrial Extension Service**

**UNC-T recommendation:** 4.4, 4.7

**Type:** Expansion of an existing program

### **Description**

The Industrial Extension Service is the outreach branch of NC State's College of Engineering. IES currently has 90 FTE, an annual budget of approximately \$12.7 million, and sixteen regional offices around the state. IES helps new businesses grow and good businesses get better. It works with industries from the coast to the mountains, from 1,000 feet underground to 30,000 feet up, and delivers results in quality, productivity, safety, environmental protection, energy management, and innovation.

IES is the North Carolina hub for the nationwide Manufacturing Extension Partnership, a program of the National Institute for Science and Technology. MEP provides resources and training to strengthen small- and medium-sized businesses. IES currently works annually with about 400 companies out of the 11,000+ manufacturers in the state, plus about 200 nonmanufacturing entities.

To improve the effectiveness of IES, this initiative expands IES in geographical coverage, breadth, and depth. IES has identified the southeast coast, northeast coast, and mountains as the top three priorities for physical expansion. Under this initiative, IES will also expand to UNC institutions not known for extension programs, help transform economic development by focusing on important community-based business and industry issues, and offer degree and certificate options to students and adult learners.

### **Partnerships**

Current IES partners include the Research Triangle Regional Partnership, the Piedmont Triad Partnership, the North Carolina Hospital Association, the Occupational Safety and Health Administration, the Small Business and Technology Development Center, and the Gateway Technology Center in Rocky Mount. Expanding IES will involve developing and maintaining many more partnerships (e.g., throughout the larger UNC system).

### **Implementation**

Expansion of IES services will require office space, equipment, and personnel. Procedures for expansion are as follows:

- Place a branch office on nearly every campus in the UNC system. IES plans to start by establishing partnerships for operating locations at Appalachian State University, Eastern Carolina University, Elizabeth City State University, UNC-Wilmington, and Western Carolina University. Additional partnerships will be developed with NC A&T State University and UNC Charlotte. Staffing will require 1 FTE at each location except ECSU (envisioned as a 50-50 joint assignment). Each office would require six months to open: three months to negotiate the agreement plus three months to hire staff and equip the office. IES could open two offices simultaneously, and then stagger the office openings in three-month intervals, so that all seven offices could open within fifteen months of authorization.
- Place a full-time service provider (1 FTE) at the Gateway Technology Center in Rocky Mount within 6 months of authorization.
- Establish a graduate engineering practicum to add a practical education opportunity specifically for graduate engineering students. This practicum will be analogous to the undergraduate opportunities afforded by Cooperative Education, the IES Student on Demand program, and various internships (e.g., through the Integrated Manufacturing Systems Engineering Institute, or Operations Research). The practicum will be offered at all graduate engineering programs in the state: NCSU, NC A&T State University, and UNC Charlotte. Staffing will require 3 FTE to administer the program, with the first position filled in 2008 and the two subsequent positions filled in 2009.

- Establish business innovation specialist positions in every economic development region in the state, following the model piloted at the Piedmont Triad Partnership. Staffing business innovation specialists in each economic region, including 0.5 FTE for centralized administrative support, will require 7.5 FTE, but regional cost sharing could reduce the NC State burden to as low as 4 FTE.
- Increase staffing for the Lean Healthcare program, a partnership with the North Carolina Hospital Association that tailors the principles of lean operations to the healthcare industry cluster. IES will have to hire at least 1 FTE by July 2008 to keep up with current demand, and demand is expected to grow to require a dedicated Lean Healthcare expert in each economic region. Staffing Lean Healthcare personnel in each region, including 0.5 FTE for centralized support, will require 7.5 FTE, but regional cost sharing could reduce the NC State burden to as low as 4 FTE.
- Staff the Southeastern OSHA Training Institute Education Center. NC State was recently named the lead agency for center, and the University of Tennessee is a consortium partner. Staffing for curriculum development, class scheduling, and course delivery will require 2 FTE to be hired within six months.
- Add 1 FTE by the end of 2008 to expand the Environmental Management Systems effort to develop an EMS for the NC State campus (which will be the first such university effort in the area); develop a program related to ISO 26000, Social Responsibility, and additional standards on sustainability; and implement a Clean and Lean assistance program for NC businesses.
- Add 1.5 FTE by the end of 2008 to the Emergency Response and Disaster Response effort to assist communities statewide with preparing to handle natural or manmade disasters by offering a disaster site worker (16-hour course) and train-the-trainer for disaster site worker courses.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$3.5 million	15%		25%		60%	

## Responsibility

Implementing this initiative will be the responsibility of the vice chancellor for extension, engagement, and economic development, and the executive director of IES.

## Assessment

IES effectiveness is assessed by third-party surveys of IES clients. NIST conducts these surveys of manufacturing clients under the MEP. IES is developing surveys to assess impact on nonmanufacturing clients, as well as clients of the Minerals Research Laboratory and other outreach activities, which are not surveyed by NIST. Since the beginning of 2000, the cumulative IES economic impact reported on NIST surveys is over \$980 million.

## ***Entrepreneurship, Industry Clusters, and Economic Development***

**UNC-T recommendation:** 4.4, 4.7

**Type:** New emphasis on academic programs in entrepreneurship and statewide expansion of an existing economic development outreach program.

### **Description**

NC State has a number of programs and initiatives built either directly or indirectly on the concept of entrepreneurship. On campus, the NC State Entrepreneurship Program is a new initiative that will coordinate entrepreneurship activities across campus. The new program builds on our Engineering Entrepreneurship Program, which has been active for over twenty years, and on more recent programming in our College of Management. It will encourage incorporation of entrepreneurial principles of creativity and risk-taking into the fabric of the undergraduate student experience. Off campus, NC State is launching a statewide extension effort to support entrepreneurs, small businesses, and priority industry clusters. This initiative will coordinate NC State's activities in support of entrepreneurship, both on campus and off.

NC State's leadership role in extension and engagement statewide provides a unique platform for supporting entrepreneurship development across North Carolina. Our leadership of the Small Business and Technology Development Center activities at all of the UNC constituent institutions provides connectivity for ongoing interaction and engagement with all campus entrepreneurship programs. Our Cooperative Extension program, in collaboration with the SBTDC, gives NC State the opportunity to increase access to entrepreneurship education and support services in small town and rural areas statewide.

Increased entrepreneurial activity can mitigate and offset job loss in legacy production sectors by encouraging burgeoning industry clusters, thereby increasing the reemployment prospects of dislocated workers. Under this initiative, NC State and its partners will cooperate to create significant growth statewide in targeted industry clusters by supporting startups, by generating technological innovation and new products, and by partnering with the Department of Commerce in efforts to recruit and retain firms. The industry clusters now receiving highest priority include nonwovens and other advanced textiles; medical devices and advanced medical technology; advanced manufacturing in aerospace; automotive; marine sciences; biotechnology, and photonics sectors; value-added agricultural, aquacultural and natural products; marine trades and boat building; and serious gaming/simulations and advanced learning technologies. NC State and its partners will build local and statewide industry-cluster networks; create strategic and marketing plans; contribute to industry trade shows; create and provide training and technical assistance programs; hold innovation summits, workshops, and conferences; and create databases, marketing materials, and websites.

This initiative builds on NC State's very successful collaborations with Precision Marketing initiative of Wake County and the Research Triangle Regional Partnership. The firms expanded under these initiatives (e.g. Spuntech nonwoven textile manufacturing in Person County, Vescom in Vance County, and Freudenberg Nonwovens in Durham County) have added high-paying jobs and brought in investment capital. The initiative also draws on the assets of our Centennial Campus. With twenty-six incubator firms and forty-five other partners, government agencies, and private firms, Centennial Campus was named Top Research Science Park in 2007. MeadWestvaco cited the access to talented people and effective programs at NC State as a key factor in their locating on Centennial Campus.

### **Partnerships**

This initiative establishes and strengthens partnerships with economic developers across the state, with the North Carolina Biotechnology Center, and with other UNC universities (in particular East Carolina University, Western Carolina University, and UNC Charlotte), and NC community colleges.

Responsibilities of each partner include identifying industry sectors with significant growth potential, identifying assets at NC State (programs and researchers) and in the private sector that can contribute to

industry clusters. Deliverables might include background research by university scholars, and the development of marketing materials by private-sector firms. NC State can also play an integral role in helping economic developers intervene at critical strategic points to help stabilize firms that are experiencing trade-related and market-driven pressures. In such instances, the partnership can contribute to retaining and preserving good jobs.

## Implementation

We will begin the implementation strategy immediately with an alignment and increased interaction of NC State research and extension faculty with entrepreneurs; the accelerated commercialization of new university innovations and technologies by the private sector; educational programs; training and technical assistance to businesses in high-priority clusters; and participation in corporate prospect and site selection, consultant presentations, and related technical assistance to industrial recruiters. These are personnel-intensive activities requiring new faculty on campus and in the field. The Economic Development Partnership will be responsible for the growth in this program.

## Funding

*Current funding:* Entrepreneurship programs are currently funded (at approximately \$1.0 million) with a blend of state-appropriated funds, grant and partnership funds, and fee-for-service activities.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$4 million	75%		15%			10%

## Responsibility

The Provost's Office will be responsible for the academic programming. The Division of Extension, Engagement and Economic Development (and its Economic Development Partnership and Small Business Technology and Development Center) will be responsible for the statewide extension initiative and cluster based economic development activities.

## Assessment

We will assess effectiveness by tracking the development of new technologies, the commercialization of these technologies in the private sector, and the creation of jobs and additional investment in jobs by the private sector in regions of the state and targeted priority clusters.



## 4.5 Our Health

*UNC should lead in improving the health and wellness of all people and communities in our state.*

In recent years, some of the most significant scientific advances in medicine and health have occurred at the interfaces of the biological sciences with the physical, mathematical, computational, and engineering sciences. NC State is emerging as a national model among universities without schools of human medicine for high-impact research and education that contribute to the advancement of human health. To reach this stature, the university has built on its historical strengths in the core sciences and engineering, an internationally prominent College of Veterinary Medicine, and existing partnerships with leading medical research programs in universities, federal agencies, and industries.

Research advances in health require an interdisciplinary approach and a global perspective. It is an acknowledged truth that human, animal, and plant health are inextricably linked. In the last thirty years, approximately 70 percent of new human diseases have been "zoonoses" (diseases that spread from animals to people). Thus, the prevention of disease in the human population depends on our understanding of disease in animals, a field in which NC State has a unique resource in North Carolina in its College of Veterinary Medicine.

NC State currently has over \$160 million in life science research grants, most of which impact human health. NC State faculty, staff and student teams are making contributions to medical research and practice across a broad range of areas including biomechanics, biomedical imaging, drug discovery, diagnostic biomarker identification, targeted drug delivery systems, treatment strategy design, nutrition and food safety, infectious diseases and tissue engineering. They are also advancing our understanding of underlying biological phenomena such as protein structure and blood flow and developing new research tools as in functional genomics and bioinformatics. Research contributions to human health developed at NC State include the world's first synthetic aorta, the prototype for an artificial retina, a blood cholesterol test that more accurately measures the risk of heart disease, statistical models that will aid in designing new treatment strategies for HIV patients, and a permanent nanocoating that, when exposed to light, kills or inactivates bacteria.

In response to UNC Tomorrow 4.5, NC State will build on its strength in research science and engineering to establish interdisciplinary consortia that advance human health by fostering integration of the core science and engineering disciplines for research, workforce development, and public education. Within the consortium structure, we will be able to facilitate discovery that will position North Carolina as a center of excellence in health science and technology. We will focus our efforts on areas of critical health need in which we have special expertise, including ensuring a healthy food supply from both plant and animal sources, tapping into lessons from the social sciences to inform public policy decisions, and investigating technological solutions to health care problems.

Finally, NC State is proud of our record in providing our graduates with solid preparation in majors that give them a preprofessional foundation to enter health care fields. In the future, we would like to explore building partnerships with other UNC institutions to ease our students' transition into professional academic programs in health.



## ***Science and Technology to Advance Human Health***

**UNC-T recommendation:** 4.5, 4.1, 4.4

**Type:** Expansion, integration of existing programs and partnerships and establishment of new consortia

### **Description**

In recent years, some of the most significant scientific advances in medicine have occurred at the interfaces of the biological sciences with the physical, mathematical, computational, and engineering sciences. For example, lessons from biological systems at the molecular and nanoscale levels inspire new engineering paradigms and accelerate our fundamental understanding of those systems, leading to new medical devices and therapies. A partnership between NC State plant pathologists and chemists has produced a process to pump therapeutic agents against cancer or sickle-cell anemia into the internal cavity of a genetically modified plant virus to create a Trojan horse-like drug delivery system.

NC State is emerging as a national model among universities without schools of human medicine for high-impact research and education that contribute to the advancement of human health. To reach this stature, the university has built on its historical strengths in the core sciences and engineering, an internationally prominent College of Veterinary Medicine, and existing partnerships with leading medical research programs in universities, federal agencies, and industries. NC State faculty, staff and student teams are making contributions to medical research and practice across a broad range of areas including biomechanics, biomedical imaging, drug discovery, diagnostic biomarker identification, targeted drug delivery systems, treatment strategy design, nutrition and food safety, infectious diseases and tissue engineering. They are also advancing our understanding of underlying biological phenomena such as protein structure and blood flow and developing new research tools as in functional genomics and bioinformatics. Research contributions to human health developed at NC State include the world's first synthetic aorta, the prototype for an artificial retina, a blood cholesterol test that more accurately measures the risk of heart disease, statistical models that will aid in designing new treatment strategies for HIV patients, and a permanent nanocoating that, when exposed to light, kills or inactivates bacteria.

Scientific solutions to problems in health require interdisciplinary approaches. This initiative proposes to enhance current and establish additional interdisciplinary consortia that advance human health by fostering integration of the core science and engineering disciplines for research, workforce development, and public education. Within the consortium structure, we will be able to facilitate discovery that will place North Carolina as a center of excellence in health science and technology and focus undergraduate and graduate education in real-world research that prepares them for careers that advance human health.

Some collaborative NC State efforts are already in place:

- The Center for Comparative Medicine and Translational Research encourages sharing new discoveries and core facilities among more than 100 faculty in sixteen departments in four colleges to improve health care for all species.
- The Center for Quantitative Sciences in Biomedicine serves as a new model for research extensive universities without schools of human medicine to foster collaborations between the quantitative and biological sciences addressing high-impact problems in biomedicine. It is headed by two established leaders at NC State and a third at Harvard Medical School who already have developed a strong collaborative program, and it draws heavily on other NC State collaborators in the life sciences and veterinary medicine and with medical schools in the region.
- The newly established Cancer Therapeutic Training Program will bring new students at all levels (higher school, undergraduate, graduate and postdoctoral) into the cancer arena, expose them to a diverse array of approaches and ideas in cancer drug design, and train them and encourage them to make cancer research their careers by exposing them to the enormous amount of cancer research going on at NC State.

## Partnerships

NC State has many powerful partners in health-related research and training, including pharmaceutical corporations, nonprofits, federal agencies and other universities in the region and across the world. Some of the more notable of these include:

- NC State's College of Engineering and the School of Medicine at UNC-Chapel Hill offer an innovative new graduate certificate in medical devices that will prepare students for careers in the burgeoning medical device industry.
- NC State's Department of Statistics and the Duke Clinical Research Institute collaborate in cardiovascular research, and have won two joint grants from NHLBI to train undergraduate and graduate students to meet the serious shortage of biostatisticians in the United States.
- The College of Engineering and the College of Textiles collaborate on groundbreaking research in tissue engineering, scaffold, and bioreactor development.

## Implementation

Enhance existing interdisciplinary consortia, including but not limited to the following:

- Expand the established Center for Robotics and Intelligent Machines, which has strong links to the UNC-School of Medicine as well as internationally recognized efforts in applications such as automated cell in-vitro fertilization, robotic-based stroke rehabilitation, microrobotic solutions for minimally invasive surgery, and, biomimetically-inspired robot designs. Support for the growth is envisioned from DARPA, NTC, NIH, and the Naval Research Laboratory.

Initiate new consortia in cutting-edge areas of health sciences research and technology.

- Create a Center for Noninvasive Imaging to address the interrelated issues of hardware, software, "wetware" (chemical and biological technologies), systems integration, and application development across multiple industries. The initial leadership for the initiative will be from biomedical engineering and nuclear engineering. Equipment required includes a commercial high-resolution microCT obtaining 10 micron and below resolution.
- Create an Institute of Molecular and Life Sciences to make fundamental advances in biology and medicine to improve human health. Work will include engineering cells by modifying parts of their metabolic machinery to create cellular factories that produce pharmaceutical products, and "virtual" screening that uses molecular structures to identify compounds as worthy of follow-up study for pharmaceutical activity.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$3 million	\$13 million	50%	20%	20%	10%		

## Responsibility

The vice chancellor for research and graduate studies in collaboration with the provost and the deans of all colleges.

## Assessment

External program review procedures already in place provide periodic expert assessment of the quality and impact of research and education programs. External advisory boards and review teams provide broader perspective on impact. Evidence of impact includes growth in external funding levels, growth in size and quality of graduate programs and numbers of graduates, numbers of patents and spin-off companies, and awards and honors to faculty and students. The ultimate indicators are contributions to the solution of society's most pressing health-related problems that are attributable to the work of NC State faculty, staff, and students.

## **Global Health Initiatives**

**UNC-T recommendation: 4.5, 4.1**

**Type:** Mix of existing and new programs

### **Description**

Human, animal, and plant health are inextricably linked, and these linkages reach across the globe. Understanding the intertwined factors impacting global health requires cooperation and an interdisciplinary approach. In addition to building partnerships within North Carolina, we need stronger partnerships in health-related research, education (training and capacity building), and extension/engagement (diagnostics, surveillance and prevention, training measures) with international universities and their governmental agencies. To integrate, expand, and strengthen NC State's current activities and partnerships in global health, we propose three major initiatives:

1. To provide dedicated, focused, long-term coordination of NC State's global health initiatives across different disciplines, colleges, and domestic and international partners, NC State will create a new position of director of global health initiatives/associate vice-provost, who will report to the vice provost of international affairs. Among other duties, the director of global health initiatives will identify expertise and areas for collaboration related to global health; catalog and publicize NC State's strengths and activities in global health; identify funding agencies and potential partners; facilitate proposal development; expand opportunities for students, faculty, and staff in education, research, training and engagement activities in global health; develop and organize thematic, interdisciplinary and/or research meetings, symposiums, and workshops; and participate ex officio on Research Operations Council, Extension Operations Council and Graduate Operations Council to enhance global programming endeavors.
2. To promote a more global perspective on public health, NC State will develop a new educational program, the Educated Citizen and Public Health, which will provide education in fundamental principles of health and well-being and make its students more competitive for careers and training as health professionals. The program will include new courses in general education for underclassmen and a public health minor for upperclassmen. A working group of NC State faculty (representing the Colleges of Agriculture and Life Science, Humanities and Social Science, and Veterinary Medicine) are developing this program. The courses will emphasize classroom learning, service learning, and other educational experiences in North Carolina as well beyond our state boundaries. One interdisciplinary course will link global warming, the environment, and health and will include learning experiences at NC State and at partner institutions in India and Chile.
3. Under a new framework called One Medicine/One Health, NC State will strengthen its existing collaborative research centers in global health and develop several new ones. Examples of existing centers at NC State include Center for Comparative Medicine and Translational Research, Center for Universal Design, and Center for Quantitative Sciences in Biomedicine. New centers under consideration for development include Cooperative Interagency Center for Biopreparedness, Bioprotection and Emergency Management; and Translational Research Biounit. NC State will develop its faculty by recruiting researchers with strong potential in global health, providing them with appropriate startup funds and the necessary facilities to conduct top-level research. Finally, we will expand and improve our academic programs in the life sciences, increasing student enrollment in the DVM program, strengthening the ties between our MVPH degree and the School of Public Health at UNC-CH, and strengthening the successful collaborative biomedical engineering program between NC State and UNC-Chapel Hill.

## Partnerships

NC State has a strong foundation of ongoing global health activities and partnerships with institutions including UNC-CH’s School of Public Health, Duke University, RTI International, and the USDA. Under this initiative, we will strengthen these partnerships and build new ones, statewide and around the globe.

## Implementation

- Establish a cross-college faculty working group to develop undergraduate public health minor and foundation courses. Modify existing courses and develop new ones.
- Catalog and publicize NC State's activities in global public health.
- Pursue strategic initiatives with UNC and regional partners that align with university goals and mission and facilitate proposal development for extramural support.
- Expand opportunities for undergraduate and graduate students, faculty and staff in education, research, training and engagement activities in global health, both abroad, locally, and on campus.
- Organize thematic, interdisciplinary symposiums and workshops in collaboration with partner institutions to enhance partnerships.
- Increase student enrollment in the DVM program from 80 to 100 students per class with capacity to grow to 125 by 2030. Estimated timeline of four years.
- Strengthen ties between the MVPH program and the School of Public Health at UNC-CH by improving technology to link the campuses, increasing the number of graduate tuition remission slots and stipends, and forging interinstitutional agreements to accept course credit.
- Strengthen the collaborative Biomedical Engineering program between NC State and UNC-CH.
- Recruit additional graduate students to programs in social work.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$5 million	\$13 million	30%	20%	40%	10%		

## Assessment:

We will assess increases in student and faculty involvement, intercollege and intercampus interactions, international partnerships, and recognition of NC State’s contributions to improving health and well-being of the citizens of North Carolina. Assessment of research efforts will be by standard measures of peer-review processes, including review of potential publications and faculty review for promotion and tenure; grants received; patents obtained; new startups based on research findings; citation of publications; ability to attract top candidates for faculty positions; and receipt of national research awards. Assessment of educational programs will be by accreditation by national agencies, placement of graduates, acceptance of undergraduates in biomedical professional (MD, DDS, DVM) or doctoral (Ph.D.) programs. Measures for DVM programs include acceptance rates into graduate and specialty training (internships and residencies) programs, and highly selective clinical positions. To assess success in addressing critical shortages, we will track employment of new DVMs in agricultural production, food safety, and public health.

## ***Sustainable and Healthy Food Supply***

**UNC-T recommendation:** 4.5, 4.1, 4.4, 4.7

**Type:** Expansion and enhancement of existing programs

### **Description**

As a land-grant institution with deep roots in agricultural and applied scientific research, NC State has long been a research leader in improving the quality, quantity, and the efficiency of food production. In spite of significant advances, the need for research in building a sustainable and healthy food supply is greater than ever. Many factors stress the food supply: The world's population continues to grow; the amount of arable land has diminished because of competing uses; climatic and seasonal weather variations have put whole harvests in jeopardy; the cost of fresh water and fuel (both inputs in food production and processing) has risen; and political conditions threaten to disrupt global commerce. As a result, the world is constantly at risk of having insufficient or contaminated food.

Under this initiative, NC State's Colleges of Agriculture and Life Sciences, Veterinary Medicine, and Engineering will join forces to investigate research advances that will further the security, safety and nutritional value of foodstuffs in North Carolina and the world. Specifically, we will expand our work in developing new varieties of crops, increasing efficiency in crop and livestock production, and developing technologies that enhance the final food product.

**New crops:** The genetic improvement of crops through traditional plant breeding and molecular enhancement produces higher yield without increasing inputs. These crops are nutritionally superior and may have targeted nutritional or medicinal aspects. They can resist disease, insects, or drought conditions to ensure yield under a variety of environmental conditions. NC State's Plant Transformation Laboratory has supported our ability to understand genetic and molecular development of food crops and their nutritional value. The Specialty Crops Program has expanded the profitable production of a number of horticultural crops, and has been instrumental in developing and marketing of new crops. A promising area of research is the development of plant species that can be significant sources of biofuels, thus reducing the competition for corn and soybeans.

**Improved production techniques:** Gains in yield and quality of major food crops over the last forty years have largely been a result of improved cultivation practices and technological innovation. Particularly useful have been techniques that promote efficient use of fertilizers, pesticides, and energy to reduce costs and environmental impacts. The Center for Environmental Farming Systems project and the Breeze Family Farm Agricultural Extension and Research Center are developing local-based food systems that create direct links between producers and consumers. The development of livestock with improved meat quality and yield are significant for providing protein demands. The dairy industry is transitioning to a more diversified production opportunity with pasture-based dairies and on-farm processing of value added products. On the North Carolina research campus at Kannapolis, which is a multi-institutional partnership with Dole Foods, Inc., NC State conducts research and outreach to improve the nutritional value of fruit and vegetable crops and to seek new crops and production methods to further the nutritional quality of food and improve human health.

**The improved processing and packaging of foods.** To lengthen the shelf life of food, maintain quality and nutritive value, and reduce wasted raw and processed product and water, we need more efficient red-meat and poultry processing techniques. NC State's past successes have involved the development of innovative seafood products, enhanced value eggs, and extended shelf-life and unrefrigerated dairy products. Recent developments in microwave processing that allow sterilization and stabilization of food products have been incorporated into a sweet potato processing plant that has implications for the broader distribution and use of some food crops. The adoption of HACCP (Hazard Analysis and Critical Control Point) and related practices in the grain, vegetable, fruit and seafood, poultry and livestock industries prevent not only inadvertent contamination, but also can reduce the possibility of intentional introduction of human pathogens or toxic substances.

## Partnerships

Nearly all departments in the College of Agriculture and Life Sciences, the College of Veterinary Medicine, and parts of the College of Engineering address issues of food production and processing. We have also built strong partnerships with the School of Agriculture and Environmental Sciences at NC A&T State University in programs related to local food production and marketing, sustainable agriculture, and food safety.

## Implementation

Under this initiative, NC State's Colleges of Agriculture and Life Sciences, Veterinary Medicine, and Engineering will join forces to investigate research advances that will further the security, safety and nutritional value of foodstuffs in North Carolina and the world. Specifically, we will expand our work in developing new varieties of crops, increasing efficiency in crop and livestock production, and developing technologies that enhance the final food product.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$12.4 million	\$5.1 million	80%	10%	10%			

## Responsibility

Deans of Agriculture and Life Sciences and Veterinary Medicine, director of Agricultural Research Service, director of Cooperative Extension Service, and director of Industrial Extension.

## Assessment

Success of our investments in research in a sustainable and healthy food supply will be measured by the development of documented new or improved food crops and livestock, an increase in income for producers with value added products, and documented adoption of production technologies.



## ***Health, Well-being, and Safety Programs for North Carolinians***

**UNC-T recommendation:** 4.5, 4.7

**Type:** Combination of expansion of existing programs and new program

### **Description**

Educational extension programs in health, well-being, and safety help North Carolinians enjoy a high quality of life and contribute to saving limited resources. NC State is a recognized leader in the development and delivery of in health, well-being, and safety programs. Programs delivered through Cooperative Extension educate North Carolinians in appropriate eating habits, food shopping skills, consumer food safety practices, adequate physical activity, and preventing injury, accidental poisonings, and infection.

To address the epidemic of obesity, NC State has developed a community of practice in eXtension to gather the best research-based information on obesity prevention and treatment and make it available on the web. NC State's Expanded Food and Nutrition Education Program and the Food Stamp Nutrition Education program focus on audiences with limited resources or knowledge regarding effective nutritional strategies. NC State also has programs to promote the design and implementation of outdoor child and adult activity areas. The NC State Natural Learning Initiative in the College of Design and the Investigating Places for Active Recreation in Communities program conduct research and outreach on the value and design of outdoor facilities to maintain healthy activities. To address the challenges of an aging population, NC State is developing collaborative academic, research, and extension programs that will address the many issues of older citizens.

To prevent food-borne illness, NC State has programs to promote food safety in the home and in restaurants. ServSafe is a nationally recognized certification program that brings important skills to food handlers and servers, and is delivered in every county. However, programs must be developed to meet the challenge of educating consumers on safe handling of food in the home, particularly North Carolinians of limited means.

NC State has programs to reduce the negative impacts of accidents, disasters, and other emergencies—including financial stress, physiological and mental stress, and compromised living environments. Through the Extension Disaster Education Network and the communities of practice in eXtension, NC State makes information and training available to citizens and educators on mitigation, preparation, response, and recovery from several disaster situations. To equip North Carolina to be fully prepared, we must expand training and educational opportunities in partnership with UNC institutions. In emergency and disaster situations, first responders are frequently placed in dangerous circumstances, faced with fire, hostile individuals, or infectious organisms. NC State offers research, education, and extension programs to provide first responders with clothing, equipment and personal skills to protect themselves, reduce the danger to others, and resolve the circumstances with the least possible impact. The proposed elevation of the Public Safety Leadership Initiative to the Public Safety Leadership Center will expand the offerings from law enforcement officers to include first responders, and will equip them with skills to be more effective in their job and to be safer in their circumstances.

To reduce the risks to North Carolinians involved in farming, fishing or forestry, the North Carolina Agromedicine Research Institute conducts education and extension programs related to issues ranging from heat stress and excessive skin exposure to safe equipment use and facilities maintenance. We are planning to create a Certified Safe Farms program that will recognize farmers for conducting healthy and safe practices personally and on the farm—and possibly reduce their insurance premiums.

Under this initiative, NC State proposes to expand its programs in health, well-being, and safety to improve access to health information and promote health and wellness in North Carolina.

## Partnerships

This initiative requires the partnership of all relevant colleges and units at NC State. It also requires the development of partnerships with NC A&T State University to deliver programs to limited resource individuals. NC State, NC A&T, and East Carolina University will partner to enhance North Carolina Agromedicine Institute. NC State and UNC-Greensboro will partner in conducting research in human nutrition. Under the initiative, we will explore building further external partnerships with other institutions in the UNC system as well as the state agencies of Agriculture and Consumer Services, Crime Control and Public Safety, and Health and Human Services.

## Implementation

Beginning in July 2008, we will form a task force representing various colleges and units to identify the highest priorities of North Carolina communities. Task force members will be appointed by the deans of all colleges. By December 2008, we will develop and implement a strategy for raising external funds. We will begin to enhance existing programs when funds are available.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$0.7 million	\$1.5 million	60%	10%	30%			

## Responsibility

Responsibility for the primary outreach to individuals, families, and farms rests with North Carolina Cooperative Extension. Cooperative Extension also has responsibility for family, farm and community disaster education, while businesses addressing disaster preparation and safety are served by the Industrial Extension Service. Healthy outdoor living environments, outdoor activity, and Senior Games are programs administered by different colleges, and will be the responsibility of the leaders of the outreach units working under the leadership of the Office of Extension, Engagement and Economic Development.

## Assessment

We will assess the success of our programs in health, well-being, and safety by documenting evidence of the successful adoption of recommended best practices, and subsequently by the decrease in chronic disease and the reduction in negative economic, physical, or medical impacts on individuals following emergencies and disasters.

## **Behavioral Health Institute**

**UNC-T recommendation:** 4.5, 4.1, 4.7

**Type:** Mix of new and existing programs

### **Description**

Nine of the top ten causes of death for 15-44 year olds in North Carolina are behavioral in origin—either directly (e.g., suicide, homicide, unintentional injury) or indirectly (e.g., HIV, complications associated with smoking and obesity). Consequently, the most effective forms of prevention and treatment are social and behavioral. For example, recent advances in recent HIV and cancer treatment have come primarily through behavioral approaches (e.g., promoting healthy lifestyles) rather than through traditional microbiological approaches to disease. Even diseases with effective pharmacological or technical treatments are affected by behavioral factors. For example, treatment adherence (e.g., taking appropriate medications at the correct time) is poorly understood and difficult to influence. Meanwhile, sustaining the health of an aging population demands better social, behavioral, and technical support. Clearly, the social sciences are an important partner in maintaining North Carolinians' health and well-being.

NC State is uniquely positioned to provide leadership in four areas of behavioral health science:

1. scientific analysis of health care systems to guide public policy
2. development of contextually relevant supports for aging individuals
3. training mental health professionals
4. applying quantitative and communication sciences to reduce infectious diseases.

Data-driven analytical models to support decisions at different levels of health care is an area in which social scientists can partner with industrial and system engineers to make major contributions. In this initiative, faculty from the departments of social work, psychology, statistics, and industrial and systems engineering; the School of Public and International Affairs; the College of Management; and the Center for Quantitative Science in Biomedicine will form the Behavioral Health Institute. They will develop models of best practices for mental, behavioral, and physical health care in North Carolina, and develop recommended public policies to ensure benefits are provided to all citizens. They will establish programs for public policy makers to share results of continuing research. They will apply social science analysis to systems of physical, mental, and behavioral health care to inform and improve delivery of health care to North Carolina's citizens.

With funding from the Center for State and Local Government Excellence, a team from the School of Public and International Affairs and the College of Management at NC State are already working together to assess the status of state and local government retiree health care benefits, alternative plans and approaches, and cost and estimated future liabilities. This effort will be expanded to include faculty from the departments of statistics and industrial and systems engineering to develop models of best practices for mental, behavioral, and physical health care in North Carolina, and to develop effective health policies to ensure benefits are provided to all citizens.

Another promising interdisciplinary initiative is the Center for Aging in Context. This center leverages current NIH-funded research to respond to North Carolina's aging demographics with a three-pronged approach: (1) basic and applied research that determines the specific perceptual and cognitive challenges faced by older adults; (2) understanding the factors that are responsible for retaining and enhancing people's ability to function in later life; and (3) developing and evaluating programs and technologies that promote independent, high levels of functioning by older adults. In the center, social and behavioral scientists partner with colleagues from the Colleges of Engineering and Design to create, adapt, and apply technologies to accommodate age-related changes in older adults. Improving everyday-life functions, particularly with respect to usability of medical and information technologies, improves older adults' quality of life, physical and mental health, and provides research and development for the economic development of medical technologies.

Existing undergraduate (social work) and graduate (masters in social work, psychology Ph.D.) programs produce license-eligible mental health professionals. These programs enjoy large and competitive applicant pools and could increase their output with additional faculty, space, and student support. Expanding these programs leverages existing assets such as the Psychoeducational Clinic, the Center for Family and Community Engagement, home-school programs with Wake County, and other evidence-based mental health efforts currently serving thousands of students in every North Carolina county. Likewise, development of an advanced standing for current BSW students could reduce by one year the time needed to earn an MSW, and increase MSW enrollment by 33 percent.

Finally, the Center for Quantitative Science in Biomedicine will continue its joint grant with Massachusetts General Hospital to use mathematical-statistical modeling of HIV dynamics at the individual and population level to develop treatment strategies for HIV infection and to design clinical trials. This effort is complemented by research in the Departments of Communication and Sociology on communications strategies used in HIV public information campaigns in the United States, Africa, and elsewhere.

## Partnerships

NC State has established partnerships with numerous state and national entities in conducting research in behavioral health. The Edward P. Fitts Department of Industrial and Systems Engineering is a member of the Health Care Engineering Alliance, a multi-university consortium. In the field of aging, NC State partners with Georgia Institute of Technology, University of Illinois at Urbana-Champaign, University of Texas-Dallas, University of Michigan, Duke University, University of Michigan, and Florida State University. We have industry partners including Dell Computers, Microsoft/Microsoft Research, WebMD, Hewlett-Packard, Google, RTI, and IBM. Within government, we team with the National Institutes of Health, National Institutes of Aging, National Science Foundation, Department of Defense; and North Carolina Departments of Public Instruction, Health and Human Services, Juvenile Justice, and every county in the state. Finally, the Center for Quantitative Science in Biomedicine has a joint grant with Massachusetts General Hospital.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$1.4 million	55%	15%	30%			

We will seek federal grant funding (NIH, NSF, DOD) for many of the programs.

## Responsibility

The deans of the Colleges of Engineering, Humanities and Social Science, Management, and Physical and Mathematical Science will be responsible for launching this initiative.

## Assessment

We will assess the effectiveness of the institute by its success in winning contracts with public and private entities for health care policy research, program evaluation, training, and direct service delivery to centers and clinics. We will also look at grants won for research on health care policy, practices, aging, and evidence-based behavioral health practices; and at successful technology transfers for adapting and designing technologies for aging users. We will track enrollments in and graduates of social work and psychology programs, and count the numbers of individuals served via the Psychoeducational Clinic and the Center for Family and Community Engagement, and of collaborative interventions between NC State researchers and North Carolina communities.

## 4.6 Our Environment

*UNC should assume a leadership role in addressing the state's energy and environmental challenges.*

To provide for a profitable and sustainable economy while enhancing and conserving the environment, North Carolina must develop strategies to manage the impact of environmental change on its agricultural, forestry, freshwater, urban, estuarine, coastal, and marine systems. Within the UNC system, only NC State has the combined expertise to relate the intertwined factors embedded in all these systems with practices and programs affecting North Carolina. Environmental issues are addressed in all ten colleges and in many of NC State's relationships with private, government, and nonprofit entities on Centennial Campus.

NC State is committed to energy development, use, and conservation. Our research faculty have been pioneers in nuclear engineering, and solar and wind power. They are committed to exploring ways to refine the use of traditional energy sources in effective and efficient ways, and to help the state and nation become less dependent on nonrenewable sources of energy. We promote new energy practices throughout the state through our extension services and the NC Solar Center.

At NC State, we believe that finding effective solutions to the increasingly complex issues of environmental resources and energy will require an interdisciplinary approach. Under UNC Tomorrow 4.5, we will capitalize on our current strengths and relationships by investing in collaborations and partnerships to enhance communication and collaboration, infrastructure support, and expansion of intellectual capacity. Our new Academy for the Environment will develop instructional, research, and outreach and extension programs that address environmental, natural resource, and energy issues in North Carolina and the world. It will link NC State's academic environmental programs to new initiatives in research and outreach, engagement, and economic development. We will also build partnerships that focus on sustainable land and water management, and will pay particular attention to problems that confront North Carolina's various and variable bio-regions.

NC State recognizes that environmental responsibility begins at home. We are a leader in embracing principles of environmental sustainability as a core value. Under UNC Tomorrow, we will expand our Center for Universal Design and establish the American Home @ NC State, a showcase of sustainable development that will be constructed at the NC State Centennial Campus, where it will be used for research, education, and outreach.

Finally, we believe that best way for NC State to foster an ethos of environmental stewardship among our graduates is to expose them to a campus environment that models exemplary principles of environmental sustainability. Under UNC Tomorrow we will continue our ongoing efforts to achieve environmental sustainability and will improve our efforts to increase campus awareness of environmental issues. We hope that our on-campus efforts will serve as a model for other universities and state agencies.



## ***Energy and Environment: Research and Extension***

**UNC-T recommendation:** 4.6, 4.1, 4.4, 4.7

**Type:** Expansion and enhancement of existing program

### **Description**

To provide for a profitable and sustainable economy while enhancing and conserving the environment, North Carolina must develop strategies to manage the impact of environmental change on its agricultural, forestry, freshwater, urban, estuarine, coastal, and marine systems. Within the UNC system, only NC State has the combined expertise to relate the intertwined factors embedded in all these systems with practices and programs affecting North Carolina. Environmental issues are addressed in all ten colleges and in many of NC State's relationships with private, government, and nonprofit entities on Centennial Campus.

In energy research, NC State was a pioneer in nuclear engineering, and has an internationally recognized faculty in developing biomass-based energy. Our faculty conduct a broad spectrum of research in solar and wind energy as well as energy conservation practices applicable to the environments in North Carolina's diverse physiographic regions. They explore ways to refine the use of traditional energy sources in effective and efficient ways. We promote new energy practices throughout the state through our extension services and the NC Solar Center. In 2007 the Emerging Issues Forum focused on energy.

On broader environmental topics, NC State provides national leadership in addressing water-related scientific issues and policies for consumers, communities and industries. We have won international recognition for ecosystem research, including work on both wild and cultured plant and animal systems. Our faculty address various aspects of understanding, managing, and conserving the coastal environment and its ecosystem services, and respond to critical concerns related to air and water quality, and the use, persistence, and impact of chemicals in the environment.

This initiative will capitalize on NC State's current strengths and relationships by investing in four partnerships to enhance communication and collaboration, infrastructure support, and expansion of intellectual capacity.

**NC State Consortium on Energy:** Led by a senior faculty member, this multi-college consortium will develop a strategic plan to address energy issues into the future, promote collaboration in research and extension, and seek opportunities for external funding. Initially, emphasis will be placed on the area of biofuels by enhancing infrastructure support for the biofuels pilot plant at University Field Labs and Williamsdale Biofuels Research Facility. Enhanced support for the Solar House, Industrial Extension Service, and the Cooperative Extension Service will help us address the use and conservation of energy in homes, businesses and industries. Through the Advanced Transportation Energy Center, we will develop new understanding and ideas for managing the electric power grid and developing improved batteries needed for electric vehicles

**Partnership for the Coast:** A partnership of NC State's existing research and extension programs addressing coastal issues will bring significant attention to pressing issues and opportunities. This partnership will support the infrastructure and personnel needs of NC Sea Grant, CMAST, Southeast Consortium for the Coast, and individual faculty initiatives. It will create a framework in which science, policy, and application can work together, and will further its impact by building additional partnerships with coastal science components of other UNC institutions, and state and federal agencies.

**Clean Water:** Water quality and quantity is and will continue to be a critical issue for North Carolina. Current programs address issues of consumer, community, and industrial demands for water, as well as hydrology, modeling, and management of water quality and quantity. NC State is home to the North Carolina Water Resources Research Institute, a UNC system collaborative on water research. NC State will also be home to the first EPA Center of Excellence for Watershed Management. A consortium of these entities can provide leadership at NC State in addressing water-related issues.

**Sustainable Land Management:** The Center for Environmental Farming Systems, the Southern Center for Sustainable Forestry, and the Center for Earth Observation are all actively involved in research and outreach on the management of agricultural and forest lands. These centers actively partner with other UNC and private universities and state and federal agencies. Under this initiative, they will expand their reach and capacity to allow for the development of appropriate partnerships and the acquisition of external funds. NC State will and will develop a consortium of these centers, expand their faculty, and enhance their infrastructures.

**Partnerships**

Although NC State has numerous partners in its energy and environmental programs, many are on a short-term or limited basis. Under this initiative, we will develop additional partnerships with other UNC institutions, including UNC’s developing Coastal Studies Institute, and state and federal agencies, and will leverage our research and extension expertise to assume a leadership role in addressing the state’s energy and environmental challenges.

**Implementation**

Each consortium will be initiated by the deans of all participating colleges, who will create a core faculty and tap a faculty leader. Together, consortium faculty will develop strategic goals for research and extension related to pressing issues of energy and North Carolina’s environment. As soon as funds are available, the consortia will begin to improve the infrastructure and develop new, multi-college positions and projects.

**Funding**

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$19 million	\$6 million	60%	20%	10%	0		

After a few years we expect this investment to provide a substantial return on investment through new grant and contract funding.

**Responsibility**

The deans of the participating colleges will be responsible for establishing the consortia or partnerships and ensuring cooperation and collaboration. Following establishment, the named leadership will be responsible for ongoing programs.

**Assessment**

We will measure the success of the proposed initiatives by documenting the development and implementation of successful technologies and practices. We will track the impact of our educational programs by tracking the economic and environmental outcomes of the practices we have developed and promoted. We will also measure success by our ability to attract extramural funding for the core areas of effort.



## ***Sustainable Campus***

**UNC-T recommendation:** 4.6, 4.1

**Type:** Expansion, integration of existing programs and partnerships

### **Description**

The best way for NC State to foster an ethos of environmental stewardship among its graduates is to expose them to a campus environment that models exemplary principles of environmental sustainability.

NC State is already engaged in programs and partnerships to create a physical place and community that operates in a sustainable way. Our combined efforts make us a national role model in environmental stewardship.

- In 2006 a team made up of a wide range of campus constituencies conducted the NC State Campus Environmental Sustainability Assessment, a thorough evaluation of NC State's current status in achieving sustainability.
- The 2007 campus master plan update set aside Lake Raleigh Woods on Centennial Campus as an ecological preserve.
- In 2008 the chancellor signed the American University Presidents' Commitment to the Environment, a commitment to achieve carbon neutrality on campus.
- In 2008 the chancellor announced that all new buildings at NC State must be certified as LEED Silver or better in accordance with the U.S. Green Building Council criteria.
- The chancellor declared 2008 the NC State Year of Energy.
- On Earth Day 2008 NC State was declared the first LED university in the United States. This was in response to NC State's collaborative work with CREE to install demonstration projects testing applications of highly efficient LED lighting, a technology that has research roots in our institution.
- In 2008, NC State joined the U.S. EnergyStar program as a partner university.
- In March 2008, the Facilities Division at NC State established the Office of Sustainability, achieving a long-anticipated elevation of our sustainability aspirations into a unified program.

This initiative continues NC State's ongoing efforts to achieve environmental sustainability and improves efforts to increase community awareness of environmental issues. It proposes a capital-intensive energy-savings project to transform our physical plant. The energy-savings project will serve as a pilot for other universities and state agencies. In the long run, however, the cost of the capital investments proposed in this initiative can be paid back from savings in utility costs.

### **Partnerships**

This initiative will be a partnership within the campus community. If NC State is to achieve environmental sustainability, conservation efforts must become commonplace. Members of the campus community must habitually think about how their actions can influence finite resources.

### **Implementation**

- Secure authority to proceed with \$53 million in capital investments (to be reimbursed from energy savings) during the 2008 short session and proceed with implementation to be constructed by 2012. Repayment will take place over 19 years from utilities savings.
- Solicit requests for proposals for the first in a series of \$10 million energy-performance contracts that will introduce utility saving modifications to ten buildings in the spring of 2008.
- Determine the campus carbon footprint in 2008 and in 2009 map out a plan to reach neutrality. Strategies will include:
  - Use operating maintenance budgets to continue campus reforestation efforts, planting two trees for every tree lost and introducing landscapes that capture and treat water runoff.
  - Design buildings adhering to a USGBC LEED Silver minimum certification.

- Encourage design professionals in Facilities Division to become LEED accredited. Goal is 50 percent accreditation by the end of 2008.
- Continue program of performance contracting and building retro-commissioning.
- Implement the requirements of SB 668 to establish energy-saving design goals, life-cycle costing, energy modeling, and building commissioning.
- Continue to apportion substantial components of annual Repair and Renovation (R&R) appropriations toward energy-savings projects. Use increases in the R&R budget to make greater energy-savings investments.
- Expand on existing programs of recycling, waste reduction, green purchasing, reforestation, and water and energy conservation.
- Continue cooperation with local transportation providers to increase the use of mass transit, biking, walking, and alternative transportation.
- Strive for more pedestrian-centered circulation, reducing dependencies on vehicles and encouraging greater use of internal mass transportation.
- Explore strategies that increase use of existing facilities to minimize building material and energy consumption for construction as well as reducing consumption of resources for building operation.
- Transition the NC State vehicle fleet to smaller, higher efficiency, alternative fuel, and hybrid vehicles. Change driving and operating habits to comply with the Petroleum Reduction program goals.
- Implement a student sustainability fee in the fall 2009 semester.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$0.5 million		100%				

## Responsibility

Campus collaborators, along with strong leadership from the Campus Environmental Sustainability Team.

## Assessment

Existing measures of environmental impact include energy and water consumed per square foot, energy and water consumed per student FTE, and tons recycled. New measures will include total carbon output, miles traveled per day per employee in a single occupancy vehicle, in a carpool, and on mass transit. The CEST will compile these data and evaluate progress in achieving a higher level of environmental sustainability.

## **Healthy Built Environment**

**UNC-T recommendation:** 4.6, 4.1, 4.4, 4.5, 4.7

**Type:** Enhancement and expansion of an existing program

### **Description**

The environment in which we live and work has a profound influence on our health and well-being. Critical issues include indoor air quality, construction design and materials, energy and water infrastructure, outdoor environmental conditions, and accessibility. NC State is poised to address these issues and contribute to raising the quality of life of North Carolinians. By bringing together several existing components of NC State, the Healthy Built Environment initiative will develop a comprehensive approach to addressing quality of life in places where North Carolinians work and live.

A key component of the Healthy Built Environment initiative is the Center for Universal Design—a national research, information, and technical assistance center that evaluates, develops, and promotes accessible and universal design in housing, buildings, outdoor and urban environments and related products. This unit of the College of Design contends that all new environments and products, to the greatest extent possible, should be usable by everyone regardless of their age, ability, or circumstance.

As part of this initiative, we will establish the American Home @ NC State, an initiative of the College of Natural Resources with partners including most NC State colleges. Designed to be a showcase of sustainable development, the buildings constructed under this initiative will use construction techniques and materials that address not only sustainability and environmental quality, but also disaster resistance, reduced maintenance, smart technologies, high-performance materials and 21<sup>st</sup> century construction techniques. The facilities will be constructed at the NC State Centennial Campus, where they will be used for research, education, and outreach.

Other NC State programs that can contribute to the Healthy Built Environment collaboration include research, teaching and extension and outreach programs in the Colleges of Engineering, Natural Resources, Physical and Mathematical Sciences, and Agriculture and Life Sciences. Of particular note are technical programs in landscape architecture, urban horticulture, urban forestry, stormwater management, traffic management, and air-quality management that are addressed through various entities of the Cooperative Extension Service, the Industrial Extension Service, the Solar House and others.

Although many of these programs and initiatives already exist, at least in part, they often lack the kind of strong collaboration needed to magnify their impact for North Carolina and the nation. Interdisciplinary collaboration is the best way to ensure that graduates of NC State, the future professional practitioners in North Carolina, have the breadth to address issues of the built environment in all its complexity. Effective collaboration must cross all disciplines; have the strong support of the deans of all NC State's colleges; and marshal NC State's expertise in research, teaching, and outreach to address both science and policy issues.

### **Partnerships**

Although the existing programs involve numerous partners, many partnerships are on a short-term or limited basis due to funding constraints. Under the collaborative initiative, we will develop additional partnerships with other UNC institutions and state and federal agencies. Assurance of stable, sustained funding is a necessary requirement for the American Home @ NC State to secure millions of dollars of contributed facilities on a sustained basis. We will also pursue partnerships with private entities that support research and demonstration facilities for the creation of sustainable and livable environment.

## Implementation

As many of these programs already have some presence, the primary strategy to implement a more substantial and coordinated program is to provide recurring funding for faculty and support positions. With these in place, we will develop interdisciplinary teams, coordinated and administered jointly by deans of the involved colleges, and seek joint research and outreach funding.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$10 million	\$4.5 million	50%	20%	15%	15%		

## Responsibility

The deans of the colleges in the various programs will be responsible for this initiative.

## Assessment

We will measure the success of this initiative by documenting the impact created by the educational programs through practices adopted by builders, designers, communities and individuals. Additional success or indicators of preeminence will be in the successful attraction of grants, partners, and program recognition, and the employability of students who have participated in the interdisciplinary collaborative.

## ***Academy for the Environment***

**UNC-T recommendation:** 4.6, 4.1

**Type:** New program

### **Description**

NC State's historical strength in the sciences gives it a solid foundation on which to develop teaching, research, and outreach/extension programming in the environmental sciences. The university has programs across nearly all of its colleges that are relevant to issues of improving environmental quality, conserving energy, and developing alternative forms of energy. To coordinate and expand these efforts, NC State will develop a new unit, the Academy for the Environment. The academy will develop instructional, research, and outreach and extension programs that address environmental, natural resource, and energy issues in North Carolina and the world.

By coordinating and administering degrees, concentrations, and courses that relate to the environment, the academy will centralize and simplify administration of interdisciplinary programs and encourage new dimensions of interdisciplinary scholarship. It will link NC State's academic environmental programs to new initiatives in research and outreach, engagement, and economic development. Its interdisciplinary approach will facilitate study of the increasingly complex issues of environmental resources and energy. The academy and its faculty will identify and promote best practices that lead to the sustainable use of the environment, natural resources, and energy.

By creating new, accessible activities that integrate concepts from natural sciences, social sciences, and the humanities, the academy will promote the environmental literacy of all NC State students. It will attract new students and faculty members who seek interdisciplinary programs dealing with environmental resources and energy, and will connect to public awareness and concerns about these issues. The academy and its faculty will work with others at NC State to identify and promote practices that lead to the sustainable use of the environment, natural resources, and energy on our campus.

The members of the academy will revise existing curricula and coursework and lead the development of new undergraduate and graduate degrees and curricula. The academy will provide advising for students in environmental sciences and in natural resources academic programs.

### **Partnerships**

Initially, partnerships will be internal to NC State, consisting of collaborative relationships among faculty in all of NC State's colleges. As the academy develops, partnerships are likely to form with other UNC institutions, state and federal agencies, NGOs, and businesses.

### **Implementation**

We will form the Academy for the Environment by uniting faculty in various disciplines into an interdisciplinary environmental sciences and natural resources faculty. The provost will implement the academy and be responsible for leadership. The academy will include an office, the environmental sciences and natural resources faculty, and an external advisory board. Academy goals for environmental sciences and natural resources programs include:

- Raising the national and international visibility of NC State's environmental programs;
- Strengthening current environmental sciences and natural resources academic programs;
- Engaging colleges and departments not currently involved;
- Providing a "front door" to environmental resources and activities;
- Providing environmental and natural resource students with a sense of identity;
- Linking sustainable energy use to the environment;
- Recruiting students for environmental sciences and natural resources degrees;
- Creating an environmental sciences graduate program;
- Coordinating and creating new, interdisciplinary courses and curricula;

- Promoting interdisciplinary, environmental research for undergraduate students;
- Promoting best sustainable practices through service learning, and extension and engagement activities;
- Engaging a global context with international, environmental initiatives;
- Participating in the existing Campus Environmental Sustainability Team;
- Establishing Village Green, an environment-focused sustainable living and learning village for students in a residence hall
- Defining, mapping, and planning for a Centennial Campus Environmental Preserve to serve as a resource for teaching, research, and ecosystem services, and to provide habitat for wildlife.

## Timeline

Year 1 – Complete academy design, establish the office, and develop the environmental sciences and natural resources faculty.

Year 2 – Revise existing courses and curricula, and design new courses and curricula.

Year 3 – Continue revising existing courses and curricula, begin new courses and curricula.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
\$0.25 million	\$1 million		75%	15%	10%		

## Assessment

The academy will appoint an outside review board to provide guidance for program development and assessment. Program assessment will involve setting benchmarks linked to the academy's goals, and include measures for involving faculty members from all colleges, for recruiting students, for linking students to research and projects, and for connecting programs to those throughout North Carolina. A graduate student will be supported to document academy outcomes, and to produce original research on assessments of academy programs.

## 4.7 Our University's Outreach and Engagement

*UNC should become more directly engaged with and connected to the people of North Carolina, its regions, and our state as a whole.*

For one hundred and twenty years, NC State has stayed true to its roots in its traditional land-grant mix of basic and applied programs and in its commitment to outreach and engagement. The Carnegie Foundation has recognized NC State for its engagement of faculty and students through its curriculum, outreach and partnerships, and NC State is UNC's unparalleled leader in the delivery of extension and outreach programs.

NC State's responsibility for extension and outreach extends statewide. We have Cooperative Extension offices in all 100 counties of North Carolina and on the Qualla boundary of the Eastern Tribe of the Cherokee Indians. Our extensive county-based research and extension emanates from the College of Agriculture and Life Sciences, with the support of a few other colleges, but research and extension is a part of the mission of all of our colleges and an integral part of every faculty appointment. We have active, formal college-based programs in the Colleges of Design, Humanities and Social Sciences, Textiles, Natural Resources, Management, and Physical and Mathematical Sciences. In each case, the colleges' outreach activities have been driven by the demands and recognition of aspirations and needs from the public.

One way that NC State keeps its economic development and public service missions current is through the work of the Institute for Emerging Issues. IEI is a public policy, think-and-do tank that convenes leaders from business, nonprofit organizations, government, and higher education to tackle some of the biggest issues facing North Carolina's future growth and prosperity. Through research, ideas, debate, and action, IEI prepares leaders to address North Carolina's future challenges and opportunities. Current focus areas include the important areas of health care, education, energy and the environment, economic development, and tax and finance modernization.

But NC State is not resting on its laurels. In the 1990s, we launched an innovative new concept in academic/industry/government partnerships, our Centennial Campus. Centennial Campus is a twenty-first century "technopolis" consisting of multi-disciplinary R&D neighborhoods with university, corporate, and government facilities intertwined. The Centennial Campus is a concrete (and brick) manifestation of NC State's innovative vision of new twenty-first century model for creating and extending applied research and scholarship for the betterment of North Carolina, the nation, and the world.

NC State's commitment to outreach and engagement permeates every section of our response to UNC Tomorrow. We have proposed initiatives to extend our expertise in the visual and performing arts, engineering, science, education, health, and the environment. In this section, we build on the structure of the successful North Carolina Gateway Counties Project to partner with the county offices of Cooperative Extension in launching new program initiatives that establish, connect, and bolster outreach programs from every one of NC State's colleges. We will also expand on the work of the IEI, and build on our strength in science and technology by establishing an interdisciplinary institute to apply science, technology, and engineering expertise to public policy issues dealing with energy and the environment, security, and STEM education.





## ***Universitywide Extension and Engagement***

**UNC-T recommendation 4.7, 4.4**

**Type:** Expansion, coordination, and integration of existing programs

### **Description:**

The Carnegie Foundation recently recognized NC State University for its engagement of faculty and students through its curriculum, outreach and partnerships. Nevertheless, significant areas of university extension remain underdeveloped. Traditionally, extension programs have focused on five areas: agriculture and forestry, natural resources, community and rural development, 4-H youth development, and family and consumer sciences. With its Cooperative Extension presence in all of North Carolina's counties, NC State has unique standing to launch still more ambitious programming in extension and engagement.

NC State's extensive county-based research and extension emanates from the College of Agriculture and Life Sciences, with the support of a few other colleges, but research and extension is a part of the mission of all of our colleges and an integral part of every faculty appointment. We have active, formal college-based programs in the Colleges of Design, Engineering, Humanities and Social Sciences, Textiles, Natural Resources, Management, and Physical and Mathematical Sciences. In each case, the colleges' outreach activities have been driven by the demands and recognition of aspirations and needs from the public. This initiative will expand NC State's extension efforts, establishing, connecting, and bolstering outreach programs from all colleges. The initiative has three major components.

**Expanded Gateway Counties Program and 21st Century Cooperative Extension Initiatives.** Building on the structure of the successful North Carolina Gateway Counties Project, we will partner with the county offices of Cooperative Extension to launch new program initiatives in human health, well-being, and educational growth; economic development; energy and environmental stewardship; and community engagement. The Gateway Counties Project taps into the relationships established by Cooperative Extension county directors through their advisory systems and collaborations. The Gateway concept provides the process and conduit for marketing and connecting university resources and programming from all of NC State's colleges to local communities and counties. The county offices are the front door to the university for students interested in applications to the campus, access to distance education programs, and access to university outreach programs.

**Urban Extension.** Grounded in community conversations and partnerships with local residents and organizations, this initiative will use the research, teaching, and outreach resources of NC State's colleges and centers to enhance the learning and earning capacities of urban residents in metropolitan anchor counties across the state. We envision this initiative as a "middle-class express" that will propel families and communities with limited resources into economic viability, allowing them to participate fully in North Carolina's social, civic, and economic prosperity. We will begin our efforts in our home county, Wake County, in partnership with the Division of Human Resources.

**Center for Democracy and Civic Engagement.** This center will integrate co-learning, co-leading, civic engagement, and democratic practice internally across colleges and campuses, and externally with engaged community partners. By promoting authentic civic engagement, deliberative democracy, and engagement practices, the center will ensure that faculty and community members are prepared to address high-priority community-based, regional, and statewide issues while developing the scholarship of engagement. The center will conduct research to enrich theory and identify best practices, and will create a web-based portal to increase access to formal and informal education and resources available to communities and the public. It will encourage communities of practice to address complex issues, create new knowledge, and lead new initiatives of value to North Carolina communities.

## Partnerships

This initiative will involve the collaboration of all NC State units through the Extension Operations Council, which includes leadership of every college and the large and significant outreach units of the campus. It will also require close cooperation with other UNC campuses, especially NC A&T State University, community colleges, local county offices, and local leaders.

## Implementation

- Develop a strategic networking system and network support by the Office of Extension, Engagement and Economic Development. (Year 1)
- Hire a statewide Gateway coordinator and support staff. (Year 1 and continuing)
- Implement the Urban Extension/Human Capital Development alliance in collaboration with Human Services. (Year 1 and continuing)
- Develop a marketing plan for the university as an engaged institution. (Year 1)
- Reinforce expectations for engagement for all faculty, campus and field alike. (Year 1, on-going)
- Establish the Center for Democracy and Civic Engagement. (Year 1 and continuing)
- Broaden the value of outreach scholarship to reflect the engagement ideal. (Year 1, ongoing)
- Develop partnerships with other UNC campuses to ensure that expertise in their region is made available to the local communities. (Year 2)
- Develop new programmatic and resource partnerships. (Year 1 and continuing)
- Develop business plans for matching funds/joint partnerships, fee-for-service with sliding scales, and contractual services.
- Collaborate with new NC State Education Extension Service.
- Initiate 10-15 joint new or expanded community and university programs in 9-24 months.
- Prepare legislative expansion budget request for the 2009-2011 biennium.

## Funding

*Current funding:* Current funding of approximately \$1.0 million is a blend of appropriated state support, federal and county funds, grants and contracts, gifts, and fee-for-service.

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$8 million	40%	20%	25%	5%		10%

## Responsibility

The Office of Extension, Engagement and Economic Development and NC State Cooperative Extension will be responsible for the implementation of this initiative, in partnership with the Extension Operations Council and deans and directors of outreach programs in the colleges and other units.

## Assessment

We will inventory our success in establishing community-based programs, issue analysis, courses, seminars, workshops, service-learning opportunities, and symposiums offered across North Carolina. We will evaluate each program to determine extramural support (cost), learning reported, changes in practice of participants, and societal impacts such as social, economic, political, and environmental impact. We will survey learners, partners, community members, volunteers, and key stakeholders. We will monitor learner satisfaction for each program or activity, and conduct a formal review of the quality of the program/curriculum with regard to relevancy, research-based support, and appropriateness of activities every three years. We will also measure community adoption of ideas, changes that occur as a result of the programs, and the satisfaction of the local partners with the programs. We will continue to assess these impacts in both monetary and nonmonetary ways.

## ***Institute for Science and Technology – Engaged Public Policy***

**UNC-T recommendation:** 4.7, 4.1, 4.4, 4.6

**Type:** New Program

### **Description**

To provide knowledge-based research and intellectual leadership that serves the state, nation, and world by applying science, technology, and engineering to public policy, NC State will establish an Institute of Science and Technology - Engaged Public Policy. InSTEPP is a new initiative that will engage faculty and students in scholarly research, education, and outreach on public policy issues dealing with energy and the environment, security, and STEM education. InSTEPP's academic program will focus on public policy studies.

An inventory of public policy work at NC State reveals particular strength in teaching and research in public policy; research and outreach in energy, the environment, and environmental engineering; and research in computer and bio-security. Work in these three research areas spans several colleges, uniquely positioning InSTEPP to engage in multi-disciplinary and interdisciplinary work, thereby broadening its impact. Faculty in eight colleges and two institutes are actively engaged in public policy work on energy and the environment. Also, numerous faculty are actively engaged in security public policy work (e.g. College of Engineering, College of Humanities and Social Science, College of Veterinary Medicine, and College of Management).

Other areas in which NC State is positioned to contribute to public policy through its research and extension include analysis and recommendations on social, economic, and behavioral aspects of aging, family and social welfare issues, and education policies for youth.

InSTEPP's extension and outreach program will tap into existing programs including the Institute for Emerging Issues, Solar Center, Institute for Non-Profits, Natural Research Leadership Institute, and the proposed Center for Democracy and Civic Engagement. In educational extension, the institute will build on NC State's historical commitment to STEM education of students and the workforce. It will seek to understand and propose public policy actions that strengthen STEM education.

InSTEPP's educational outreach will seek to transfer the results of research conducted within the institute by developing dynamic educational materials and creating new multi-disciplinary degree programs. For example, to support the security focus, we will propose to establish a joint J.D./Ph.D. program between the UNC Law School and the NC State College of Engineering. Although there is interest in such a degree program, NC State currently has no means of supporting it in a way that is typical in an M.D./Ph.D. program. As a model for this new program we will look to the program currently co-sponsored by Emory University's Medical School and Georgia Tech's College of Engineering. Such a program will address critical workforce shortages in security engineering and information technology.

### **Partnerships**

InSTEPP will seek to partner with UNC-CH's Applied Public Policy Center, the UNC School of Law, and other UNC campuses. In addition, it will seek to partner with the North Carolina EPA and Emergency Management Homeland Security Branch. Finally, we will partner with universities across the nation in collaborative projects, with federal and state agencies, and with industry.

## Implementation

The NC State Public Policy Task Force is currently developing a strategic plan and implementation plan for InSTEPP. Elements of the management structure will include an academic advisory board, a government and industry advisory board, and a scientific advisory board. The task force will also develop a three-year timeline to engage the colleges and departments, and establish key performance indicators for evaluation and reporting. The report of the task force will be finalized in June 2008.

The task force will charge InSTEPP with meeting these objectives:

- Proactively identify and analyze emerging public policy needs.
- Be flexible and responsive to societal needs.
- Produce an annual report, noting impacts of NC State's public policy research and engagement.
- Create two new domain-specific degree programs in environmental/security and engineering public policy/law.
- Create communication mechanisms for wide dissemination.
- Translate research for public and governmental policy and decision makers.
- Provide a clearinghouse for legislature, media, industry, and the public.
- Obtain external funding.

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$3 million	40%	20%	25%	15%		

## Responsibility

The NC State Public Policy Task Force will be responsible for launching this initiative. The Office of Extension, Engagement, and Economic Development will provide support to the task force. The Office of the Provost, the vice chancellor for research, and the Graduate School will be involved in establishing and approving the institute.

## Assessment

We will track public policy initiatives and evaluate them to determine accomplishment and impact at local, regional, state, national, and global levels. We will measure outcomes and assess societal impact. To demonstrate societal impact of our education and engagement efforts, we will track linkages to educational programs and specific public policy efforts throughout the state. We will publish our results and report them to key stakeholders.

## ***Expanding the Institute for Emerging Issues***

**UNC-T recommendation:** 4.7, 4.1, 4.4, 4.5, 4.6

**Type:** Expansion of an existing program

### **Description**

The Institute for Emerging Issues is a public policy, think-and-do tank that convenes leaders from business, nonprofit organizations, government, and higher education to tackle some of the biggest issues facing North Carolina's future growth and prosperity. Through research, ideas, debate, and action, IEI prepares leaders to address North Carolina's future challenges and opportunities. Current focus areas include the important areas of health care, education, energy and the environment, economic development, and tax and finance modernization. By providing North Carolina's leaders with tools critical to effect policy change in these important areas, IEI helps NC State fulfill its economic development and public service missions.

Under this initiative, the IEI will expand so that it can more effectively tackle the most pressing issues facing North Carolina. In general, the IEI tackles public policy reform by employing four core strategies:

- **Ideas:** Build public understanding of the issues and support for responsive strategies.
- **Research:** Extend the intellectual capital of our institutions of higher learning to yield credible proposals for resolving North Carolina's biggest challenges, and collect and organize information indicating whether the state is responding successfully.
- **Debate:** Convene diverse stakeholder groups to determine, through a consensus agenda, policy priorities within the various possible strategies.
- **Action:** Support leaders across the state as they implement ideas.

Under this initiative, IEI will expand its activities by engaging in annual polling for more systematic issue identification; broadening its base of research and expert opinion to better connect faculty and student expertise to public decision making; determining a more effective information dissemination strategy; convening leaders earlier in the process to improve engagement; capitalizing on new technologies for a broader electronic communication/engagement effort; increasing the number of regional and community level forums across the state; and tracking and highlighting the state's progress on the issues IEI tackles.

### **Partnerships**

IEI partners with numerous organizations and individuals across the state. Our partners include:

- **Health care:** State Employees Health Plan, NC Health and Wellness Trust Fund, BCBS NC, NC Department of Health and Human Resources, NC Institute of Medicine
- **Tax and Finance:** NC Association of County Commissioners, Z. Smith Reynolds Foundation
- **Higher Education:** UNC Tomorrow Commission, NC Community College System, NC business leaders, NC Private and Independent Colleges and Universities
- **Energy:** NC Association of County Commissioners, NC League of Municipalities, numerous businesses, nonprofit and government leaders.

### **Implementation**

#### **Ideas**

In order to build public understanding, IEI must be at the center of wide-ranging and creative discussions about our state's future. To reach greater numbers and more diverse groups of our core audience of leaders in business, government, higher education, and nonprofits, IEI must improve its targeted communications, both online and in print.

- Expand and maintain technology-driven tools for community engagement
- Build a digital atlas and database that provides intuitive, online, interactive information on the social and economic indicators that apply to its work on NC policy matters
- Increase staff support for paper and web-based publication
- Hire a communication and website staff

## Research

Public understanding, informed debate and good decisions must be informed by rigorous, timely and useful research. IEI requires resources to mobilize and apply the expertise of faculty and graduate research and to collect and synthesize data.

- Offer annually a graduate fellowship (fees and stipend) to a Ph.D. student working on an interdisciplinary degree with a public policy component
- Support the efforts of faculty across the UNC system seeking to engage in the state's public policy and public engagement. This work would occur in collaboration with a multi-campus, applied public policy institute, if one is formed
- Conduct and publicize a large-scale, annual emerging issues poll.

## Debate

IEI is home to the Emerging Issues Forum, which brings national and international prominence to North Carolina and places critical issues firmly onto the public agenda. The forum builds on a model working group process that identifies and refines ideas for action.

- Secure a dedicated line of support so that the Forum can continue to deliver world-class content while remaining generally accessible to all North Carolinians.
- Professional facilitation and regional engagement is required to enlarge and improve IEI's working group process

## Action

IEI's work is complete only when state and local leaders understand and pursue ideas for change that prepare our state for the future. In particular, IEI must build on its established history of engagement with business and local government as they implement proposals generated by IEI's programs.

- Support business committees in each area of IEI's work
- Support regional events that take the debate and the ideas showcased at the Emerging Issues Forum across the state
- Expand staff to develop a sustained, comprehensive partnership with other organizations with statewide missions, including North Carolina Association of County Commissioners, North Carolina League of Municipalities, Cooperative Extension, and Industrial Extension
- Expand staff to develop and implement program initiatives

## Funding

*Future costs:*

One-time costs	New recurring costs	New state appropriations	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
	\$1.0 million	100%					

## Responsibility

The director of the IEI.

## Assessment

IEI tracks and assesses the outcomes of its impact on moving policy change forward and on North Carolina's overall progress within the areas of health care, education, energy and the environment, economic development, and tax and finance modernization. This includes establishing, tracking and reporting internal benchmarks throughout the course of a policy program, polling to determine public and leader opinion on outcomes, and synthesizing indicators that provide a framework for considering North Carolina's overall progress.

## 5.7 Encouraging and facilitating inter-institutional and interdisciplinary collaboration

To expand the horizons of knowledge of our students and faculty, NC State is committed to academic collaboration, both inter-institutional and interdisciplinary. Currently we share joint or 2+2 programs with UNC-Chapel Hill, NC A&T State University, UNC-Asheville, UNC-Greensboro, UNC-Wilmington, and with several community colleges. Serious discussions are underway about several more collaborative programs, as noted in the UNC Tomorrow initiative related to inter-institutional collaboration in 4.2.

We have an impressive base for interdisciplinary research and teaching in our Centennial Campus, recognized as a drawing card for university partnerships with business, industry, government, and other external organizations. The R&D neighborhoods of Centennial Campus cluster cutting-edge research and teaching programs in interdisciplinary precincts including information and communications technologies, biosciences and biotechnology, and education.

### ***Encouraging Interinstitutional Collaboration***

We respectfully offer two suggestions for policy changes that will encourage multi-campus programming.

1. **Change the reporting structure for retention and graduation accountability.** Some campuses may hesitate to develop feeder programs that facilitate students' transfer to other campuses because they do not want to risk negative perceptions in accountability reporting. We suggest that the originating institution receive appropriate credit for hosting the first two years of such programs, including recognition in reported retention and graduation rates.
2. **Establish consistent standards and guidelines for financial practices and data reporting.** Negotiations for new joint programs involve decisions about the institution of record for reporting headcount and credit hours, and for depositing and allocating appropriations, tuition, and fees. Standardization will improve efficiency and eliminate disincentives for collaborative work.

### ***Facilitating Interdisciplinary Collaboration***

As the UNC Tomorrow Commission has illustrated, the university system has many opportunities to help North Carolina citizens address complex economic and social challenges. As a state system of higher education, UNC has met many of these challenges largely because of the individual strengths of its constituent universities.

We respectfully suggest that demonstrated need, however important, is properly only one consideration in academic program development. An equally important consideration is building the quality of individual institutions. The overall quality of an institution attracts a faculty that can provide the best education, useful research, and committed outreach to North Carolinians.

NC State's mission commits us to pursuing excellence in a comprehensive range of academic disciplines. Interdisciplinary approaches require strength across all fields. We are proud of our historical strengths in agriculture, science, and engineering, but we believe that disciplinary breadth is an indispensable component of building the best and most innovative learning environment for our students, and the *sine qua non* of effective interdisciplinary consortia. Where joint programs with another university will not meet our needs, NC State will propose its own social science and humanities programs that complement our strengths in the STEM disciplines. The pursuit of overall excellence is the best way for NC State to fulfill our fundamental mission of promoting economic and social development for North Carolina.

At the campus level, an NC State task force recently drafted a new framework that would encourage academic programs shared by two or more academic departments. In addition, we have been exploring new ways to bridge the curriculum and co-curriculum as a way to give students globally competitive skills through service learning, leadership experience, and study abroad.



## Resources

The NC State community generated many ideas in response to UNC Tomorrow recommendations, and we look forward to working with the UNC Tomorrow Commission, UNC leadership, and sister institutions to add details to some and adapt or replace others.

The next page is a summary of best available estimated costs and funding sources for each of the initiatives included in our response. Although capital costs have been excluded, some non-recurring costs for equipment purchase and facility renovation have been included. Each estimate will require adjustments as specific plans are developed.

Cost projections represent the sum of a five-year implementation period during which many of the initiatives would be phased in. Recurring costs represent the total annual recurring funding that would be needed by the end of the implementation period. By the end of this period, we project that state and university investments will begin to draw additional grant and contract income well above the levels suggested in this summary.

Funding is distributed among six categories of sources. "New state appropriation" refers to expansion budget items. "Campus (re)allocation" refers to redirection of existing funds within the core programs of the university (e.g., shift of the purpose of a faculty position to a new area when the position becomes vacant), redirection of existing funds from enabling to core functions (i.e., PACE), and new funds available through enrollment change and tuition increase. "Grants and contracts" refers to external funding received through sponsored programs, but only the portion that might be available for core needs or from facilities and administration funds. "Gifts" refers to private gifts; in the case of endowments, the amount considers only the spendable earnings on an annual basis. "Receipts" refers to a variety of opportunities, including offering products and services to non-university clients. "Other" refers to a variety of additional sources, such as federal loans and grants as part of financial aid.

The total cost of all initiatives is \$256 million. Fifty-five percent (\$141 million) will be financed by NC State through allocation or reallocation of its own funds, grants and contracts, gifts, receipts, or other sources; forty-five percent (\$115 million) is requested from the expansion budget over five years (i.e., an average of \$23 million per year). Twenty-three percent is non-recurring.



## Resource spreadsheet

	Costs (\$ million)			Funding sources (%)					
	Section total costs	One-time costs	New recurring costs	New state appropriation	Campus (re)allocation	Grants & contracts	Gifts	Receipts	Other
<b>4 Global Readiness</b>	<b>66.055</b>								
Science in Support of our Economy		5.000	40.000	70	10	10	10		
Transforming Graduate Education			0.880	30	30	35	5		
Global Network		1.000	1.250		35	25	25	15	
Communication across Disciplines			2.800		55	35	10		
Every Student a Leader			1.750		40	20	40		
Comprehensive Range of Disciplines			11.000		45	45	10		
Expanded Visual and Performing Arts			2.000		85	5	5	5	
Faculty and Staff Development		0.075	0.300		80	15		5	
<b>4 Access to Higher Education</b>	<b>36.300</b>								
Interinstitutional Collaboration		0.400	1.200	100					
Access/Affordability for Undergraduates		0.500	3.800	40	20		5		35
Access/Affordability for Graduate Ed		1.000	29.000	35	25	35	5		
NC State Hispanic initiative			0.400		70	20	10		
<b>4 Improving Public Education</b>	<b>12.800</b>								
Education Extension Service			3.000	80		20			
Expanding STEM Teacher Education		0.500	3.000	80	20				
Friday Institute for Educational Innovation			1.000	100					
Supporting K-12 STEM Teachers			3.300	70		15	15		
Center for Excellence in STEM Teaching			2.000	40	10	50			
<b>4 Community and Economic Transformation</b>	<b>32.500</b>								
Building a Premier College of Engineering			25.000	100					
Industrial Extension Service			3.500	15		25		60	
Entrepreneurship/Economic Development			4.000	75		15			10
<b>5 Our Health</b>	<b>55.100</b>								
Science, Technology for Human Health		3.000	13.000	50	20	20	10		
Global Health Initiatives		5.00	13.00	30	20	40	10		
Sustainable and Healthy Food Supply		12.400	5.100	80	10	10			
Health, Well-being, and Safety Programs		0.700	1.500	60	10	30			
Behavioral Health Institute			1.400	55	15	30			
<b>5 Our Environment</b>	<b>41.250</b>								
Energy and Environment		19.000	6.000	60	20	10	10		
Sustainable Campus			0.500		100				
Healthy Built Environment		10.000	4.500	50	20	15	15		
Academy for the Environment		0.250	1.000		75	15	10		
<b>5 Outreach and Engagement</b>	<b>12.000</b>								
Universitywide Extension and Engagement			8.000	40	20	25	5		10
InSTEPP			3.000	40	20	25	15		
Institute for Emerging Issues			1.000	100					
<b>Total</b>	<b>256.005</b>	<b>58.825</b>	<b>197.180</b>						

