



THE UNIVERSITY OF NORTH CAROLINA SYSTEM

**UNIVERSITY OF NORTH CAROLINA
RESEARCH AND SPONSORED PROGRAMS
REPORT TO THE PRESIDENT
Fiscal Year 2018**

March 21, 2019

University of North Carolina System
Chapel Hill, North Carolina

2018 RESEARCH AND SPONSORED PROGRAMS

Introduction

Research, coupled with economic development, is an essential component of the University of North Carolina System's three-part mission of teaching, research, and public service. In addition to leading to new discoveries and innovations, the UNC System institutions' engagement in research and its related activities supports student success by providing a platform to train graduate students, attract external funding to the constituent universities, contribute to North Carolina's business climate and reputation, and enhance recruitment and retention of talented faculty and students. The bullets below describe a few key elements of research:

- Research is an integral part of the UNC System of the mission and takes place at all UNC System institutions.
- Faculty are essential in executing the research mission of the UNC System institutions.
- Participation in research enhances student success at both the graduate and undergraduate level.
- Research and scholarship enhance instruction for students and engagement with the community.
- Research requires and generates resources.
- Research benefits society by creating pharmaceutical treatments, medical procedures, products, jobs, and new knowledge.

Highlights from UNC System Institutions, FY2018

- **Appalachian State University**

In FY2018 Appalachian State University received a \$100,000 award from the National Endowment for the Arts to support Black and global banjo roots concerts, workshops and documentation for arts engagement. These efforts will transform Boone, Carrboro and Chapel Hill, NC, into more supportive homeplaces for underserved mountain, African American Piedmont, and other diverse communities. Appalachian also received its largest single year award from the Health Resources and Services Administration: \$433,381 to enhance the availability of culturally sensitive behavioral health services for at-risk children, adolescents, and transitional-age youth in the Appalachian region. In addition, Appalachian received its first Alfred P. Sloan Foundation Award greater than \$100,000. The award package, which also includes funding the New River Light and Power Company, totals \$213,254 and will be used to investigate the impact of electronic notification on energy efficiency programs.

- **East Carolina University**

FY2018 East Carolina University research expenditures, as reported to National Science Foundation in FY2018, total more than \$39M, resulting in a 50% increase over FY 2017. The \$230M total requested in 636 proposals far exceeds the prior four-year average of \$161M.

- **Elizabeth City State University**

Elizabeth City State University received an award from the National Science Foundation (NSF) totaling more than \$2 million, to increase graduate education and workforce development. This award will help the university to increase the number of STEM (Science Technology Engineering Math) majors at ECSU by 25 percent.

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- **Fayetteville State University**

Fayetteville State University continued its strategic partnership with the Department of Defense (DoD) to enhance underrepresented minority participation in STEM education and DOD related research. In April 2018, FSU hosted the “Taking the Pentagon to the People” conference, in with a focus on increasing HBCU/MSIs participation in federally-sponsored program. FSU developed a partnership with the Fort Bragg Research Institute (FBRI), a center designed to support the ongoing research interests of Womack Army Medical Center (WAMC) and Fort Bragg scientists and clinicians and to enhance the operational readiness of soldiers on the military base. In addition, FSU entered into a research partnership agreement with the US Army Research Laboratory (ARL) to continue its advancement as a growing research institution and to develop coordinated effort in research education programming that will train pre-college and undergraduate students in science research skills that are critical to the US government and the defense industry.

- **North Carolina A&T State University**

North Carolina A&T State University increased sponsored program funding by 22% over the past five fiscal years, reaching a total of \$64.3M in FY2018. Included in this record-setting achievement is funding for five research centers totaling \$11.3M. Two of the centers are housed in the College of Agriculture and Environmental Sciences (\$4.9M), two in the College of Engineering (\$5.0M), and one in the College of Business and Economics (\$1.4M).

- **North Carolina Central University**

North Carolina Central University FY2018 awards increased by 20.1% over FY2017. The increase was due to a significant increase in cancer, health disparity, and drug discovery related research awards, along with various STEM related research areas awards from federal agencies including the National Cancer Institute, the National Institutes of Health, the National Science Foundation, and the US Department of Education.

- **North Carolina State University**

North Carolina State University’s research expenditures surpassed \$500 million for the second year in a row, and total research awards have increased by 63% in the past ten years. NC State University’s strength in industry collaboration and research commercialization continue to be differentiators for the university. This year the Information Technology and Innovation Foundation (ITIF) reported that NC State University ranked fourth in the nation for share of university research supported by industry. In FY2018, NC State University also saw a record-breaking 20 startups form based on NC State University intellectual property. The Association of University Technology Managers (AUTM) ranks NC State University second for licenses and options executed, 5th for invention disclosures, and 5th for startups launched among all US universities without medical schools.

- **University of North Carolina at Asheville**

The North Carolina Center for Health and Wellness (NCCHW) at the University of North Carolina at Asheville received \$599,755 in funding from the DHHS Administration for Community Living (ACL) for “Sustainable Evidence-Based Falls Prevention Programs in Western North Carolina: A Model of Embedding Programs into an ACO and Clinical Delivery Systems,” led by principal investigator Nicolle Miller, NCCHW Director of State and Community Collaboration. The project will inform other communities in North Carolina on how to integrate clinical and community-based systems of care through NCCHW’s Healthy Aging NC (www.healthyagingnc.com) initiative.

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- **University of North Carolina at Chapel Hill**

In FY2018, the University of North Carolina at Chapel Hill surpassed, for the first time, \$1 billion in annual research expenditures, according to the nation's annual Higher Education Research and Development (HERD) survey. This continues UNC-Chapel Hill's decade-long rise as one of the world's top universities for sponsored research.

- **University of North Carolina at Charlotte**

In FY2018, the University of North Carolina at Charlotte expanded engagement with defense-related industries and government agencies, including a recently signed Cooperative Research and Development Agreement (CRADA) with the U.S. Special Operations Command's (USSOCOM) Joint Special Operations Command (JSOC) at Fort Bragg, NC. This partnership will combine academic, public, and private-sector experts for events such as a cyberhack-a-thon to test security assumptions; a drone challenge to explore emerging technology; and a study on military operations within "smart cities" of the future."

- **University of North Carolina at Greensboro**

In FY2018, the University of North Carolina at Greensboro's sponsored program awards increased more than 13% over FY2017. The increase was due, in part, to a significant increase in health-related awards such as funding from the National Science Foundation for the project "3i Nano – A Point-of-Care Biosensor for Disease Diagnostics and Analysis" to assess the commercial viability of a biosensor capable of rapidly diagnosing cardiovascular disease at an early stage or before acute attack.

- **University of North Carolina Wilmington**

In FY2018, the University of North Carolina Wilmington continued to grow its research activities, with particular success in its core research area of coastal and marine science. Examples of this success include National Science Foundation awards totaling more than \$2.0M to investigate the role of icebergs in the climate system and to investigate how natural forces, economic decisions, and public policy interact to influence the response of coupled human and natural systems to rising seas. UNC Wilmington researchers also served the state by investigating GenX and other potentially toxic PFAS chemical compounds in the Cape Fear River, sediment, local rainfall, and oysters.

- **Western Carolina University**

Western Carolina University's funded research awards increased more than 10.5% in FY 2018 as compared to FY 2017. Federal funding agencies remain the top source of funding accounting for 75% of awarded grants. Part of the growth is due to a combination of the Western Carolina Provost Internal Grant System and an increase in new externally funded research projects.

- **Winston-Salem State University**

In FY2018, Winston-Salem State University received a \$3 million grant launch to the Center for the Study of Economic Mobility (CSEM). CSEM will study the barriers to economic mobility in East Winston-Salem and Forsyth County and serve as a hub for faculty research, undergraduate student research scholarship, and community outreach. The grant is funded by the Thurgood Marshall College Fund's Center for Advancing Opportunity, an initiative supported by The Charles Koch Foundation and Koch Industries.

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FY2018 Sponsored Program Funding for UNC

UNC System institutions generated \$1,514,354,574 in sponsored program funding in FY2018. Taking into account subawards (i.e. inter-institutional awards distributed among UNC System institutions, totaling \$21,448,812) the FY2018 adjusted total is \$1,492,906,362 of external awards. Table 1 contains detailed FY2018 sponsored program funding data for each UNC System institution.

Table 1. Sponsored Program Activity

Institution	Total Proposal Dollars '000	Adjusted Total Award Dollars '000 (less inter-institutional awards)				
		2018	2017	2016	2015	2014
Doctoral Granting Institutions						
ECU ^{1, 2}	230,854,000	37,295,000	39,355,000	96,903,000	38,297,000	36,739,000
N.C. A&T	229,682,000	63,194,000	60,988,000	59,251,000	52,053,000	51,640,000
NCSU	1,151,559,000	329,303,000	398,116,000	338,945,000	303,725,000	303,503,000
UNC-CH	3,802,633,000	879,059,000	893,671,000	842,649,000	791,650,000	789,230,000
UNCC	214,444,000	49,357,000	48,418,000	38,107,000	43,237,000	33,887,000
UNCG	148,335,000	35,744,000	31,376,000	29,588,000	29,494,000	28,664,000
Masters Institutions						
ASU	25,970,000	13,556,000	13,223,000	15,780,000	12,095,000	10,352,000
ECSU	26,089,000	3,892,000	7,335,000	8,284,000	6,097,000	11,269,000
FSU	28,892,000	11,172,000	12,835,000	10,931,000	10,920,000	11,063,000
NCCU	88,033,000	26,437,000	21,729,000	19,611,000	19,527,000	20,753,000
UNCP	9,473,000	3,563,000	5,170,000	3,849,000	3,568,000	4,839,000
UNCW	39,864,000	8,526,000	10,486,000	8,257,000	12,309,000	5,796,000
WCU	13,705,000	4,813,000	4,323,000	5,538,000	5,190,000	5,151,000
WSSU	50,477,000	10,931,000	10,183,000	10,514,000	10,519,000	8,423,000
Baccalaureate Institutions						
UNCA	13,412,000	1,973,000	2,415,000	2,951,000	2,787,000	946,000
Special-Focus Institutions						
NCSSM	661,000	252,000	614,000	514,000	134,000	167,000
UNCSA	162,000	155,000	197,000	98,000	1,358,000	37,000
System Office						
UNC System	21,128,000	13,684,000	11,632,000	14,361,000	14,866,000	21,044,000
Totals	6,095,373,000	1,492,906,000	1,572,066,000	1,506,131,000	1,357,826,000	1,343,503,000

¹ECU Total in FY 2016 includes \$53M in contracts to East Carolina University Physicians (ECUP) for clinical services. Starting in FY2016, contracts to ECUP were recorded to provide a more complete accounting of extramural funding to ECU.

²ECSU began offering Masters Degrees in 2016.

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Trends in Sponsored Program Activity (Funding, Proposal Submission, Awards) FY1997-2018

From FY1998 to FY2018, UNC System-sponsored program activity has increased 164%. A significant factor in this sustained growth is the targeted use of facilities and administrative (F&A) receipts to help institutions cover the costs of supporting the research enterprise. UNC System institutions utilize F&A receipts to maintain and upgrade research infrastructure; invest in new research through matching funds, to fund seed grants and “start-up” packages for new faculty; to support library holdings; to provide cost share funding needed to attract new research projects and jobs to the state; and to ensure compliance with federal and other regulations.

Proposal Submissions and Quality

The average number of proposals submitted over the past five fiscal years is 12,042. A record number of 12,432 were submitted in FY2017. The submission total of 11,973 in FY2018 is 0.6% below the five-year average. Proposal submissions have grown 8.43% since FY2013, the end of the American Recovery and Reinvestment Act era. In FY2018, UNC System investigators requested a record \$8.1M in submitted proposals, a 17.8% increase over the FY17 total of \$6.6M. The average amount requested increased from \$452,915 in FY2013 to \$676,632 in FY2018.

From FY2013 to FY2018, the percentage of submitted proposals funded by fiscal year are as follows: 76% (FY13), 81% (FY14), 70% (FY15), 71% (FY16), 83% (FY17), and 88% (FY18), evidence that UNC System researchers submitted increasingly higher quality and more successful proposals over the past five fiscal years.

FY2018 Sponsors

In the highly competitive sponsored programs area, the UNC System’s research portfolio is approximately two-thirds (64.7%) federal funding. The other significant sources of sponsored programs funding are Foundations/Non-profits (11.26%), Education/Research Institutes (8.16%) and the North Carolina state government and other non-North Carolina state governments (7.65%). The distribution of funds by source is detailed in Tables 2 and 3.

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Table 2. FY 2018 Award Amounts, US Federal Government

United States Federal Government	Dollar Award Amount '000	Percent of Total Federal Awards
National Aeronautics and Space Administration (NASA)	4,879,000	0.5%
National Foundation for the Arts and Humanities (NFAH)	982,000	0.1%
National Science Foundation (NSF)	136,496,000	13.9%
US Small Business Administration (SBA)	3,670,000	0.4%
US Department of Agriculture (USDA)	45,937,000	4.7%
Department of Commerce (DOC)	9,614,000	1.0%
Department of Defense (DOD)	46,922,000	4.8%
US Department of Education (DOED)	80,705,000	8.2%
Department of Energy (DOE)	23,342,000	2.4%
Department of Health and Human Services (DHHS)	45,004,000	4.6%
National Institutes of Health (NIH)	482,373,000	49.2%
Department of Homeland Security (DHS)	6,836,000	0.7%
Department of Housing and Urban Development (HUD)	312,000	0.0%
US Department of the Interior (DOI)	5,527,000	0.6%
US Department of Justice (DOJ)	911,000	0.1%
Department of Labor (DOL)	150,000	0.0%
US Department of State (DOS)	1,843,000	0.2%
US Department of Transportation (DOT)	8,951,000	0.9%
Department of Veterans Affairs (VA)	1,168,000	0.1%
United States Environmental Protection Agency (EPA)	8,034,000	0.8%
Agency for International Development (USAID)	60,485,000	6.2%
Corporation for National and Community Service (CNCS)	756,000	0.1%
All Other Federal Agencies	1,844,000	0.2%
Confidential	3,074,000	0.3%
United States Government Federal Government	979,815,000	100.0%

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Table 3. FY 2018 Award Amounts, Non-Federal Government

Non-Federal Government Sponsors	Dollar Award Amount '000			Percent of Total Non-Federal Awards
	NC	All other states	Total	
NPOs	27,448,000	30,507,000	57,955,000	10.8%
Foundations	38,444,000	74,141,000	112,585,000	21.1%
Associations	2,409,000	9,225,000	11,634,000	2.2%
Educational & Research Organizations	34,045,000	89,583,000	123,628,000	23.1%
Business and Industry	24,930,000	76,779,000	101,709,000	19.0%
Individuals	4,000	0	4,000	0.0%
Local Governments	6,666,000	76,000	6,742,000	1.3%
State Governments	110,670,000	5,238,000	115,908,000	21.7%
Federal (non-US)	25,000	3,235,000	3,260,000	0.6%
Other Sponsors	397,000	676,000	1,073,000	0.2%
Non-Federal Government	245,038,000	289,460,000	534,498,000	100.0%
Total Awards			1,514,313,000	

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FY2018 Commercial Activity

UNC System institutions possess a wide array of existing and emerging strengths in research and related commercial activities. Institutional investments supporting these activities include strategic faculty hiring, sponsored awards, and entrepreneurship programs. In addition, institutions seek to maximize research and commercial activity with existing resources. UNC System institutions with the largest research programs estimate that approximately 10% of their faculty is engaged in research with commercial potential.

The Association of University Technology Managers (AUTM) Annual Licensing Survey is a leading source of information on university commercial activity. A subset of UNC System doctoral granting institutions participates in the annual AUTM survey. The six metrics reported by members to AUTM were requested from all UNC System institutions to create a more robust and timely data set for FY2018. Table 4 summarizes FY2018 UNC System commercial activity (invention disclosures, U.S. patents issued, licenses or options executed, new start-up companies, and license income). In FY2018, there were a total of 563 invention disclosures, 148 patents issued, 221 licenses or options executed, 29 start-ups created, and more than \$12M generated in license income. Table 5 provides comparison data for FY2012 through FY2018. Over the FY2012 – FY2018 timeframe, translation of invention disclosures into patents increased significantly. This trend bodes well for increased number of patents, licenses/options, start-ups, and license income in future years as researchers become more proficient in translating intellectual property from the laboratory into the economy.

Table 4. FY2018 UNC Commercialization metrics

Institution	Invention Disclosures	US Patents Issued	Licenses or Options Executed	Start Ups	License Income in Dollars
Doctoral Granting Institutions					
ECU	34	4	7	2	21,000
N.C. A&T	18	4	1	0	28,000
NCSU	275	44	141	20	5,300,000
UNC-CH	184	68	66	5	7,400,000
UNCC	40	28	6	2	51,000
UNCG	6	0	0	0	38,000

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Table 5. UNC System Commercialization metrics (FY2012 – FY2018)

Fiscal Year	Invention Disclosures	US Patents Issued	Licenses or Options Executed	Start Ups	License Income in Dollars
2018 Totals	568	148	229	31	12,989,000
2017 Totals	525	133	275	31	9,645,000
2016 Totals	584	136	237	31	8,218,000
2015 Totals	581	90	218	31	10,886,000
2014 Totals	467	97	212	31	15,928,000
2013 Totals	449	85	197	30	10,736,000
2012 Totals	532	91	149	7	8,977,000

North Carolina Research Campus

Seven UNC System institution-led research centers at the North Carolina Research Campus (NCRC) share the goal of “empowering human health through nutrition.” The UNC System NCRC centers are significant contributors to the sponsored programs activity. The centers are part of a collaborative community that focuses on the science of safer, more nutritious crops, healthier foods, and precision nutrition. The centers collaborate with other academic and industry partners on and off the NCRC campus. Thus, their impact extends far beyond the laboratory to reach families, farmers, people with chronic diseases, soldiers, athletes, food companies, undergraduate and graduate students, scientists, doctors, and nutritionists around the globe.

The seven UNC System research centers at NCRC include:

- Human Performance Laboratory: Appalachian State University
- Nutrition Research Program: North Carolina Central University
- Plants for Human Health Institute: North Carolina State University
- Center for Excellence in Post-Harvest Technologies: North Carolina A&T State University
- Nutrition Research Institute: University of North Carolina at Chapel Hill
- Bioinformatics Research Services: University of North Carolina Charlotte
- Center for Translational Biomedical Research: University of North Carolina at Greensboro

The seven UNC System research centers at NCRC generated more than \$12M in sponsored programs funding in FY2018 (see Table 6).

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Table 6. UNC System NCRC FY2018 Sponsored Program Funding by institution

Institution	FY 2018 Total Award Dollars	FY 2008-2018 Total Award Dollars
App State	191,000	4,947,000
N.C. A&T	1,736,000	8,735,000
NCCU	408,000	994,000
NCSU	4,124,000	33,005,000
UNC-CH	3,088,000	42,009,000
UNCC	705,000	10,772,000
UNCG	2,493,000	12,167,000
Totals	12,745,000	112,629,000

NCRC funding included in respective campus totals

The University of North Carolina System Office

The UNC System Office supports research through the administration of three strategic research development initiatives. First, the UNC System Research Opportunities Initiative (ROI), funded by the North Carolina General Assembly, promotes innovative and potentially game-changing research projects within the UNC System. Awards are designed to build capacity in the following strategic research areas: pharmacoengineering, advanced manufacturing, energy, data science, marine sciences and military and other security-related issues. ROI awards are typically three years in duration, and, therefore, funding available for new awards depends on continuing commitments. Second, the Inter-institutional Planning Grant (IPG) initiative promotes collaboration between larger and smaller UNC System institutions across disciplinary boundaries. The goal of the two stage IPG (Stage I and Stage II) initiative is to incentivize innovative and productive relationships within the UNC System and to increase the System's competitiveness in attracting external funds. Third, the Undergraduate Research Program Award (URPA) provides funding to universities or consortia of universities within the UNC System to support undergraduate research. Undergraduate research provides students with intensive, high impact learning opportunities and supports the University's teaching mission to pursue multiple approaches to student learning while allowing students and faculty to undertake scholarly activities of the highest intellectual caliber. Awardees for each of the initiatives are chosen through a highly competitive proposal solicitation and review process. The competition is held in the fiscal year prior to the fiscal year of funding (i.e., the competition for FY2019 funding is held in FY2018).