

# RESULTS

RESEARCH AND GRADUATE STUDIES AT NORTH CAROLINA STATE UNIVERSITY

FALL 2004

## 2003-04 A BANNER YEAR FOR NC STATE RESEARCH AND GRADUATE STUDIES

Faculty at NC State set a new record in 2003-04 by earning \$208 million in external support for research and sponsored programs, an increase of over 20% from the previous year. In addition, faculty took the initiative to develop and submit proposals for an additional 19% (\$96.5 million) in funding this year. These increases are especially significant since most federal research funding sources for universities without medical schools have seen little or no increase in their budgets.

Research success stories continue to prove the faculty's strengths in information technology, nanotechnology and advanced materials, genomics and biotechnology, environmental technologies, and pre-college education. Homeland security projects have also advanced to the forefront, reflecting national needs and demonstrating the vigor of our cutting-edge textiles and food safety research.



Despite the slowdown in the economy, we have been successful in the past year in licensing 60 of our technologies to commercial companies and in spinning out four new start-up companies. The *MIT Technology Review* recently ranked NC State 12th in the U.S. (up from 22nd in 1997) for the technological strength and relevance of its patent portfolio. To date, commercialization of NC State faculty and student inventions has led to the creation of over 50 companies and 12,000 jobs.

Advancing toward the UNC System's goal of increasing graduate student population by 35% by 2012, our

### SUMMARY OF 2003-04 SPONSORED RESEARCH ACTIVITY

PROPOSALS SUBMITTED	2,818
AWARDS RECEIVED	1,829
GRANT AND CONTRACT DOLLARS REQUESTED	\$965.1 M
GRANT AND CONTRACT DOLLARS AWARDED	\$208.6 M
TOTAL RESEARCH EXPENDITURES	\$286.0 M
RECOVERED INDIRECT COST EXPENDITURES	\$27.3 M

graduate enrollment increased 3.8% this year. The number of students supported as research assistants in our laboratories has increased by 11%. We are also particularly proud of our rapidly expanding program of undergraduate research.

Finally, our Centennial Campus has become a showcase for all aspects of the economic development impact of NC State's research enterprise. It features academic degree programs, research laboratories and centers, 57 industry and government partners, and a business incubator facility where many of our spin-out companies are making their starts. Including the eight new buildings under construction in the past year, the campus now provides 2.5 million square feet of space for university, industry, and government collaboration.

NC State University is arguably *the* economic development success story in the UNC system. Our highly relevant research is at the heart of that success. I congratulate our faculty and students for their pursuit of excellence and their relentless drive toward discovery and innovation.

John G. Gilligan  
Vice Chancellor for Research and Graduate Studies

# AWARDS BY SPONSOR

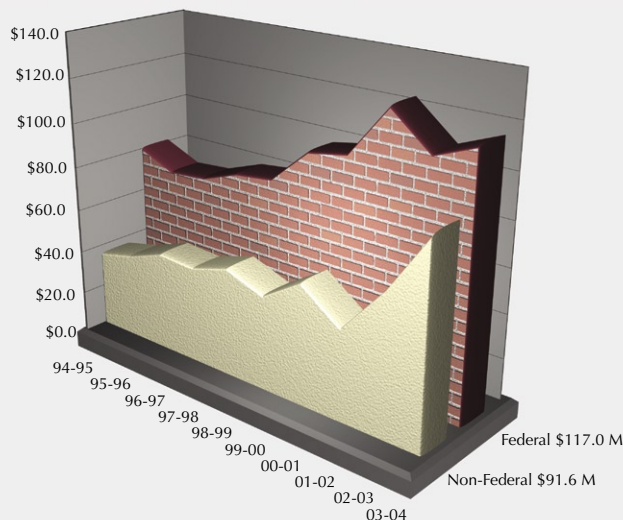


1	FEDERAL GOVERNMENT	\$117.0 M	55%
2	PRIVATE FOUNDATIONS	\$41.0 M	20%
3	STATE GOVERNMENT	\$28.4 M	14%
4	INDUSTRY	\$18.4 M	9%
5	OTHER	\$3.9 M	2%
	<b>TOTAL</b>	<b>\$208.6 M</b>	<b>100%</b>

## FEDERAL AWARDS BY AGENCY

Agency	Amount (M)
NATIONAL SCIENCE FOUNDATION	\$37.4
DEPARTMENT OF AGRICULTURE	\$18.9
DEPARTMENT OF HEALTH & HUMAN SERVICES	\$15.4
DEPARTMENT OF DEFENSE	\$14.3
DEPARTMENT OF ENERGY	\$9.7
DEPARTMENT OF COMMERCE	\$6.7
NATIONAL AERONAUTICS & SPACE AGENCY	\$4.0
DEPARTMENT OF EDUCATION	\$3.4
DEPARTMENT OF THE INTERIOR	\$2.7
ENVIRONMENTAL PROTECTION AGENCY	\$1.9
DEPARTMENT OF HOMELAND SECURITY	\$0.8
OTHER	\$1.8
<b>TOTAL</b>	<b>\$117.0</b>

## FEDERAL/ NON-FEDERAL AWARDS TEN-YEAR COMPARISON



### RESEARCH HIGHLIGHTS

OUR FACULTY AND STUDENTS ARE WORKING ON THOUSANDS OF PROJECTS THAT WILL ULTIMATELY BENEFIT NORTH CAROLINA AND THE NATION. TO THE RIGHT ARE JUST A FEW EXAMPLES OF CUTTING-EDGE RESEARCH RESULTS FROM THE PAST YEAR.

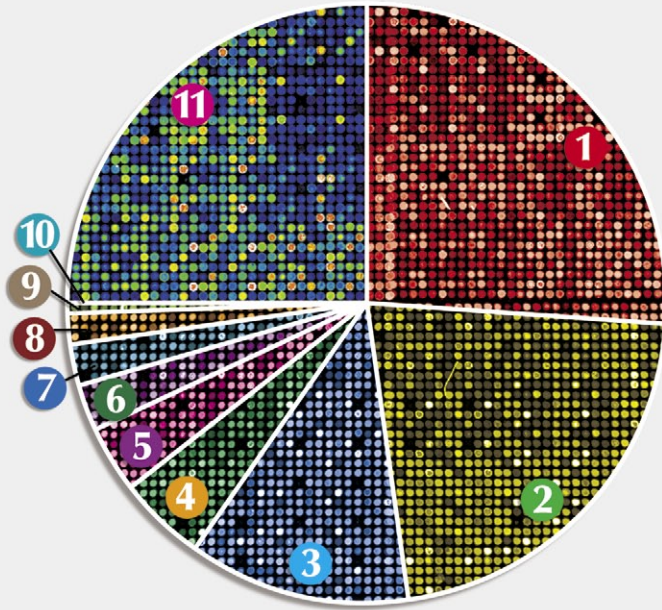


Dr. Michael Purugganan's laboratory has succeeded in identifying genes that control natural variation in flowering time, helping scientists and crop breeders understand how plants respond to global climate change and adjust harvest times.

2003 NSF Presidential Young Investigator awardee Dr. Carla Mattos and her biochemistry research group have developed innovative procedures to study the binding surface of proteins, facilitating the development of drugs targeted preferentially to cancer cells.



# AWARDS BY ACADEMIC UNIT



RESEARCH AWARDS BY UNIT		TOTAL \$208.6 M	
①	AGRICULTURE & LIFE SCIENCES	\$54.5 M	26%
②	ENGINEERING	\$45.3 M	22%
③	PHYSICAL & MATHEMATICAL SCIENCES	\$25.2 M	12%
④	VETERINARY MEDICINE	\$9.9 M	5%
⑤	NATURAL RESOURCES	\$7.1 M	3%
⑥	EDUCATION	\$5.7 M	3%
⑦	TEXTILES	\$4.2 M	2%
⑧	HUMANITIES & SOCIAL SCIENCES	\$3.8 M	2%
⑨	DESIGN	\$0.8 M	0.4%
⑩	MANAGEMENT	\$0.1 M	0.05%
⑪	ALL OTHER UNITS	\$52.0 M	25%

ALL OTHER UNITS	TOTAL \$52.0 M
PROVOST	\$34.0 M
RESEARCH & GRADUATE STUDIES	\$10.4 M
EXTENSION & ENGAGEMENT	\$5.7 M
CHANCELLOR	\$0.9 M
STUDENT AFFAIRS	\$0.9 M
FINANCE & BUSINESS	\$0.08 M

## COLLEGE OF ENGINEERING

The Rehabilitation Engineering Research Center on Universal Design and the Built Environment, under a grant from the U.S. Department of Education, is working with builders and manufacturers to develop new design solutions to improve accessibility and usability of homes, public buildings, and communities for the widest diversity of users.



Distinguished professors Joseph DeSimone and Ruben Carbonell have established the one-of-a-kind Triangle National Lithography Center with its showcase 193-nanometer lithography stepper—a \$12 million state-of-the-art tool for fabricating computer chips, molecular electronics devices, and opto-electronics devices.



Dr. Christine Grant, associate professor of chemical engineering, has received the 2003 NSF Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring in recognition of her efforts to enhance the participation of underrepresented groups.



## COLLEGE OF DESIGN

# AWARDS BY ACADEMIC UNIT

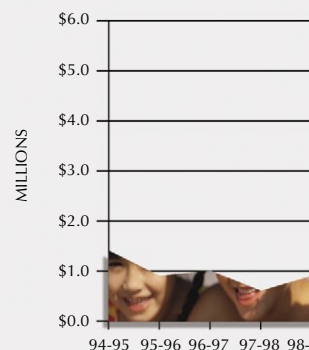
## AGRICULTURE & LIFE SCIENCES



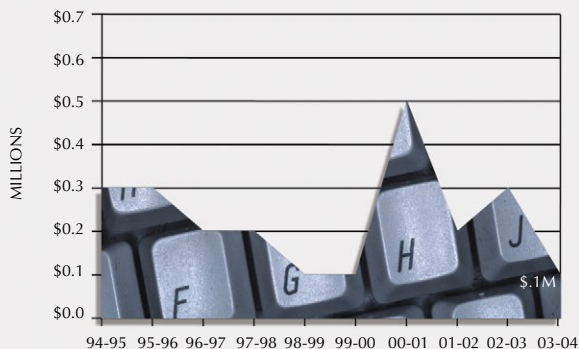
## DESIGN



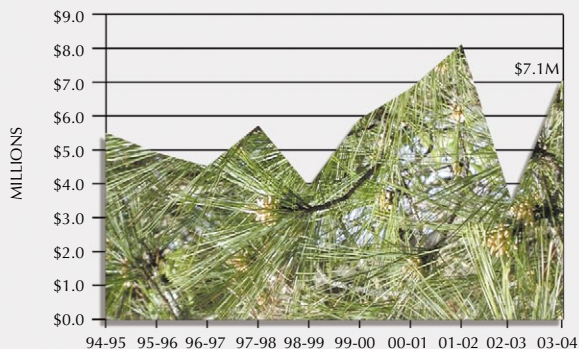
## EDUCATION



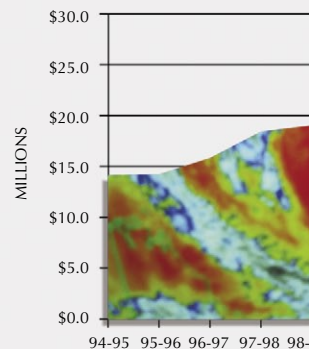
## MANAGEMENT



## NATURAL RESOURCES



## PHYSICAL & M



## COLLEGE OF EDUCATION

RESEARCH HIGHLIGHTS

Through the “Nurturing Mathematics Dreamkeepers” project funded by the National Science Foundation in the Friday Institute for Educational Innovation, Dr. Ron Tzur is developing and evaluating new ways to understand how K-2 teachers learn and use cutting-edge approaches that impact African American student math achievement.



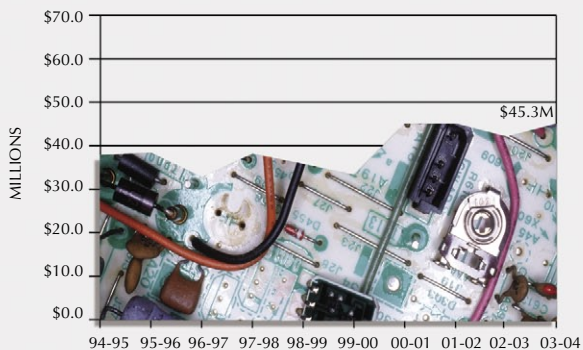
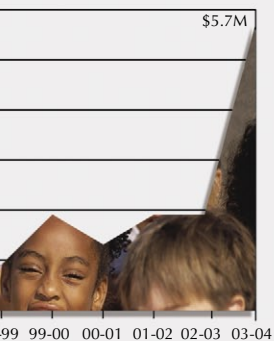
Dr. Joan Pennell and her team in the Department of Social Work are providing training to child welfare workers in 52 county social services departments as part of the Multiple-Response System child welfare reform effort in North Carolina.

Sociology professor Dr. Tomaskovic-Devey and her Chapel Hill collaborators have completed a pathbreaking study funded by the National Science Foundation that examines U.S. workplace race and gender segregation, examining pace, location, and barriers to equal employment opportunity in the U.S.

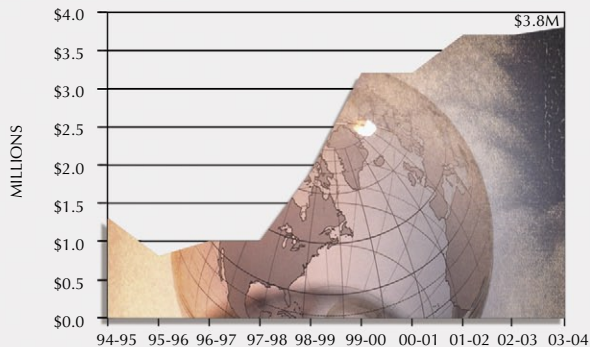
## COLLEGE OF HUMANITIES AND SOCIAL

# 10-YEAR COMPARISON 1995-2004

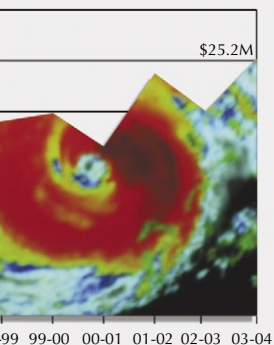
## ENGINEERING



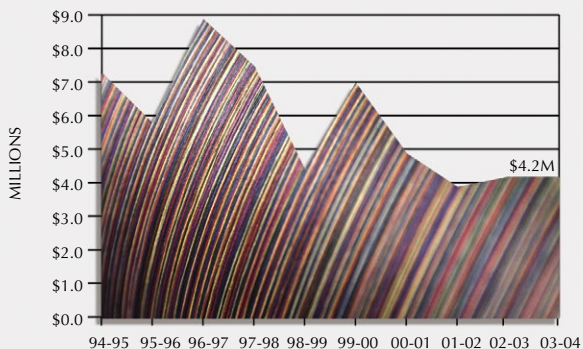
## HUMANITIES & SOCIAL SCIENCES



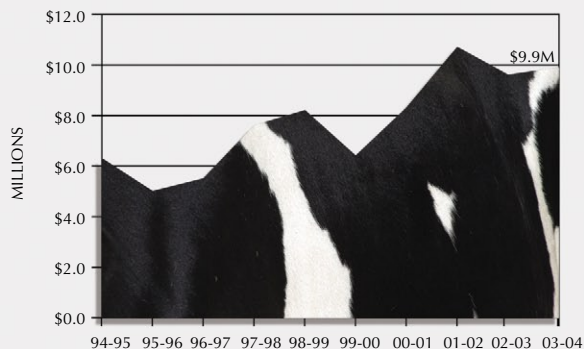
## MATHEMATICAL SCIENCES



## TEXTILES

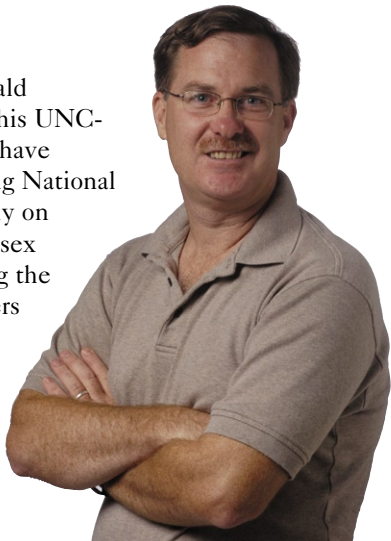


## VETERINARY MEDICINE



## COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

Donald  
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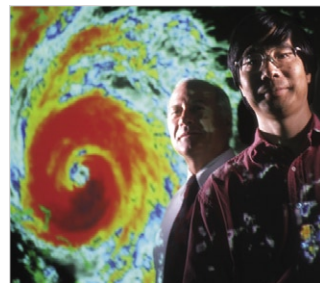


Statistics professor Anastasios "Butch" Tsiatis has received the highly prestigious National Institutes of Health MERIT Award

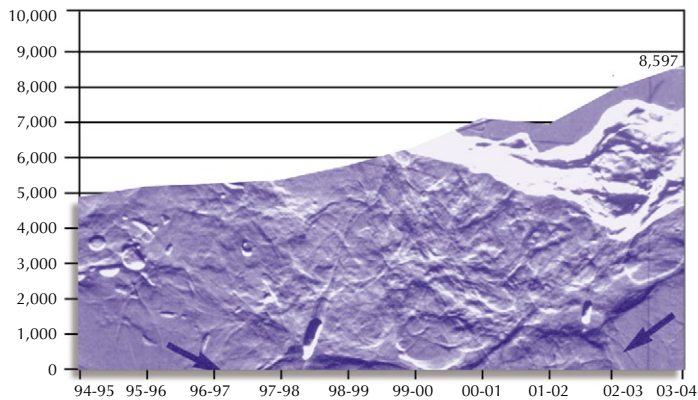


in recognition of his group's research on the relationship of HIV patient reactions to treatment interruptions.

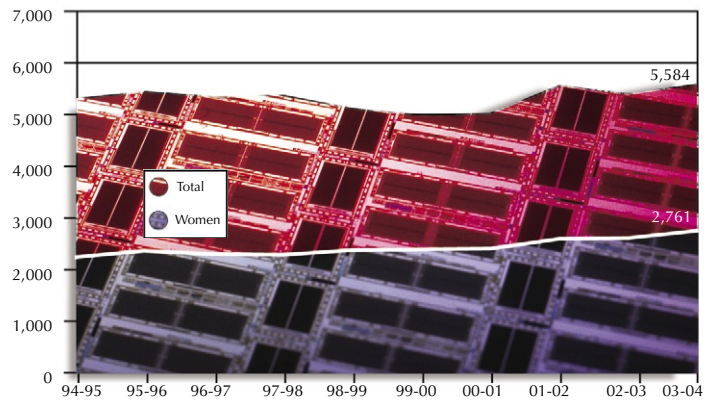
With support from the National Oceanic and Atmospheric Administration, Drs. Len Pietrafesa and Lian Xie in the Department of Marine, Earth and Atmospheric Sciences have made significant advances in remote sensing to give more accurate flooding predictions under severe storm conditions along the coastal regions of the Carolinas.



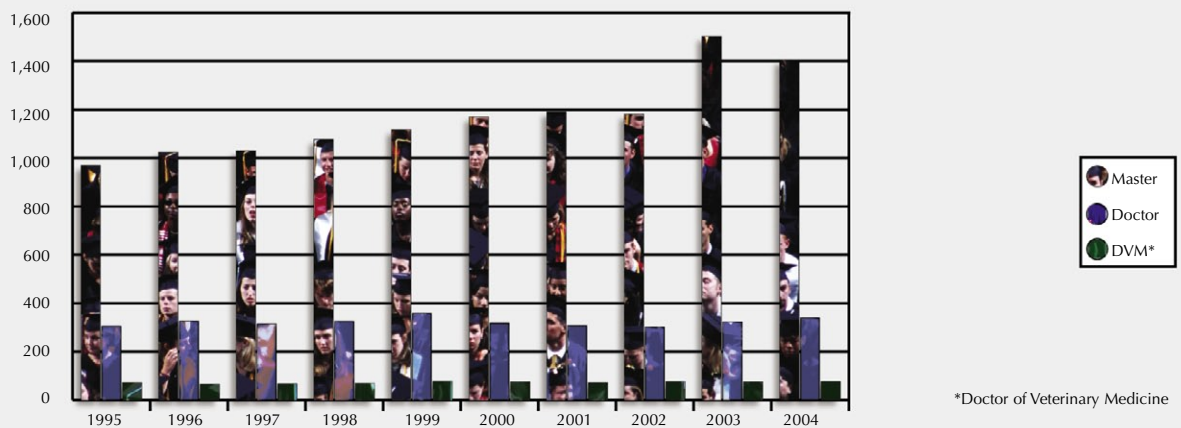
## GRADUATE APPLICANTS 1994-2003



## GRADUATE ENROLLMENT 1994-2003



## DEGREES AWARDED 1995-2004



### RESEARCH HIGHLIGHTS

#### COLLEGE OF AGRICULTURE AND LIFE SCIENCES

College of Management distinguished professor V. Kerry Smith has been elected to the esteemed National Academy of Sciences, bringing the total number of national academy members at NC State to nineteen.



Professor Vincent Chiang and researchers in the Forest Biotechnology Group have developed a revolutionary gene probe to help scientists eliminate inaccuracies in targeting and modifying genes in trees and plants.



#### COLLEGE OF TEXTILES

Led by College of Textiles professor Roger Barker, the Textile Protection and Comfort Center won the first-ever research contract from the Department of Homeland Security and has developed its first prototype of firefighter turnout gear offering thermal as well as chem/bio protection.

#### COLLEGE OF NATURAL RESOURCES

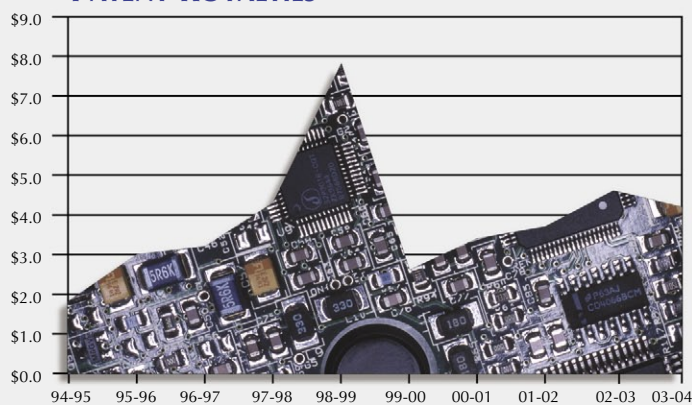
# PATENT AND LICENSING ACTIVITY

	INVENTION DISCLOSURES RECEIVED	U.S. PATENT APPLICATIONS FILED	U.S. PATENTS ISSUED	LICENSE AGREEMENTS	START-UP COMPANIES
94-95	126	45	26	63	2
95-96	97	31	28	43	2
96-97	115	49	25	54	3
97-98	101	53	28	39	5
98-99	144	79	31	83	8
99-00	170	97	45	47	6
00-01	211	110	25	60	7
01-02	188	140	35	55	5
02-03	206	172	49	67	7
03-04	176	139	46	62	4
<b>TOTAL</b>	<b>1,534</b>	<b>915</b>	<b>338</b>	<b>573</b>	<b>49</b>

## TOP PATENT AWARDEES IN 03-04:

DR. ROBERT DAVIS (8)  
 DR. THOMAS GEHRKE (5)  
 DR. KEVIN LINTHICUM (5)  
 DR. JONATHAN LINDSEY (4)  
 DR. RUBEN CARBONELL (3)  
 DR. JOSEPH DESIMONE (3)  
 DR. PHILLIP RUSSELL (3)

## PATENT ROYALTIES\*



\*Includes a one time ~\$5 million payment in 98-99

## START UP COMPANIES IN 03-04:

PREMITECH, INC.  
 BIOCELL, INC.  
 MULTIFORM HARVEST, INC.  
 PROTEIN REMOVAL AND DETECTION  
 TECHNOLOGIES, INC.

## COLLEGE OF VETERINARY MEDICINE



Dr. Jim E. Riviere, distinguished professor of pharmacology in the College of Veterinary Medicine, has been elected to the prestigious Institute of Medicine of the National Academies — one of the highest national honors in the field of medicine and health.

Dr. Jennifer Davis, a resident in the Veterinary Clinical Pharmacology Program, is conducting groundbreaking research on identification of factors that often prevent effective absorption of antibiotic and antifungal drugs in horses.



# NC STATE UNIVERSITY

VICE CHANCELLOR FOR RESEARCH  
AND GRADUATE STUDIES  
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DEAN, GRADUATE SCHOOL  
Robert S. Sowell

ASSOCIATE VICE CHANCELLOR FOR  
SPONSORED PROGRAMS AND  
REGULATORY COMPLIANCE SERVICES  
Matthew K. Ronning

ASSISTANT VICE CHANCELLOR FOR  
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DIRECTOR, OFFICE OF TECHNOLOGY TRANSFER  
Donna M. Cookmeyer

DIRECTOR, RESEARCH PROPOSAL DEVELOPMENT  
Jaine P. Place

## ASSOCIATE DEANS FOR RESEARCH:

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Steven W. Leath (interim)

DESIGN  
James D. Tomlinson

EDUCATION  
Samuel S. Snyder

ENGINEERING  
Sarah A. Rajala

NATURAL RESOURCES  
J. B. Jett

HUMANITIES AND SOCIAL SCIENCES  
Matthew T. Zingraff

MANAGEMENT  
Steven G. Allen

PHYSICAL AND MATHEMATICAL SCIENCES  
Raymond E. Fornes

TEXTILES  
Harold S. Freeman  
Behnam Pourdeyhimi

VETERINARY MEDICINE  
Neil C. Olson

# NC STATE IN TOP RANKS OF U.S. PUBLIC UNIVERSITIES

3RD IN TOTAL RESEARCH FUNDING AMONG PUBLIC UNIVERSITIES WITHOUT MEDICAL SCHOOLS 🏆  
4TH IN BEST OVERALL UNIVERSITY VALUE \*  
6TH IN TECHNOLOGY STRENGTH OF PATENTS 🌐  
19TH IN TOTAL RESEARCH FUNDING AMONG ALL PUBLIC UNIVERSITIES 🏆  
20TH IN QUALITY OF LIBRARIES ★  
24TH IN NUMBER OF NATIONAL ACADEMY MEMBERS ON FACULTY 🏆  
27TH IN PROGRAM STRENGTH 🏆  
28TH IN NUMBER OF PH.D. DEGREES AWARDED 🏆

## 23 DEPARTMENTS RANK IN TOP 35 NATIONALLY: 🌐

AEROSPACE ENGINEERING (20)  
AGRICULTURAL ENGINEERING (6)  
APPLIED MATHEMATICS (17)  
CHEMICAL ENGINEERING (12)  
CHEMISTRY (32)  
CITY MANAGEMENT AND URBAN POLICY (14)  
CIVIL ENGINEERING (16)  
COMPUTER ENGINEERING (11)  
COMPUTER SCIENCE (29)  
ECONOMICS (26)  
ELECTRICAL ENGINEERING (16)  
ENVIRONMENTAL ENGINEERING (18)  
GRAPHIC DESIGN (2)  
INDUSTRIAL ENGINEERING (9)  
MATERIALS SCIENCE & ENGINEERING (12)  
MATHEMATICS (32)  
MANAGEMENT (34)  
MECHANICAL ENGINEERING (23)  
NUCLEAR ENGINEERING (7)  
PHYSICS (32)  
PUBLIC AFFAIRS (35)  
SOCIOLOGY (29)  
VETERINARY MEDICINE (4)

## Sources:

- 🏆 *THE TOP AMERICAN RESEARCH UNIVERSITIES*, THE CENTER AT THE UNIVERSITY OF FLORIDA, NOV. 2003
- \* *U.S. NEWS AND WORLD REPORT*, APRIL 2004
- 🌐 *MIT TECHNOLOGY REVIEW MAGAZINE*, NOV. 2003
- ★ *ASSOCIATION OF RESEARCH LIBRARIES MEMBERSHIP INDEX*
- 🏆 *U.S. NEWS AND WORLD REPORT*, SEPTEMBER 2004

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RESEARCH  
AND GRADUATE  
STUDIES AT NCSU

# RESULTS

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