Administrative Leadership Meeting

Randy Woodson
Chancellor
Tuesday, November 15, 2022
## Upcoming ALMs

<table>
<thead>
<tr>
<th>January 17</th>
<th>Athletics Update</th>
<th>Titmus</th>
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<tbody>
<tr>
<td>March 14</td>
<td>TBD</td>
<td>Titmus</td>
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Faculty and Staff Success

- Governor’s Award for Excellence
- APLU’s Innovation and Economic Prosperity Award – Place Category

Source Image 1: Governor’s Awards for Excellence
Source Image 2: Innovation & Economic Prosperity Universities, APLU
Commencement Update

- NC State’s fall Commencement will be held on Saturday, December 17.
- Dr. Chavonda Jacobs-Young will be the Commencement Speaker.
Advancing Research Innovations to the Marketplace & Solving Complex Problems

Wade Fulghum
Assistant Vice Chancellor Research Commercialization
Managing Director, Co-founder, Wolfpack Investor Network (WIN)
PI, NSF I-Corps Hub for NC State
Bayh-Dole Act
(Why do universities patent?)

- Bayh Dole Act was passed in 1980
- Allows universities to take ownership of inventions made by their researchers using federal funds.

- Actively promote and attempt to commercialize the invention.
- Give preference to US businesses and small businesses.
- Provide financial incentives to inventors with the goal to encourage innovation.
- Use remaining income for research and education.
Exponential advancement of technology through the issuance of patents

1776
1800
1825
1850
1875
1900
1925
1950
1975
2000
2025

1794
1840
1880
1886
1906
1950
1959
1979
1988
2003
2014

Cotton Gin
Telegraph
Lightbulb
Dishwasher
Flying Machine
Transistor
Glucose Detection
Personal Computer
Medical Stent
Internet Protocol
Mobile Robotic

No. X72
No. 1,647
No. 223,898
No. 355,139
No. 821,393
No. 2,524,035
No. 2,912,309
No. 4,136,359
No. 4,733,665
No. 6,574,628
No. 6,590,928
No. 8,649,899

Eli Whitney
Samuel Morse
Thomas Edison
Josephine Cochran
Osvin & Wilbur Wright
John Bardeen
Helen Free
Steve Wozniak
Julio Palmaz
Robert Kahn; Vinton Cerf; David Ely
Jaap Haartsen
Peter R. Wurman et al.

Article I, Section 8, Clause 8, of the United States Constitution (adopted 1787)
The Congress shall have power ... To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

The Patent Act of 1836 completely rewrites U.S. patent law. Charles M. Keller, who helped write the Act is the first person to hold the official title of "patent examiner."

The United States joins the Paris Convention in 1887; this international treaty strengthened the protection of patent holders worldwide.


The Patent Act of 1952 simplified and clarified language and arrangement, and eliminated obsolete and redundant provisions in existing U.S. patent law. It also effected several substantive changes.

The United States signs the Patent Cooperation Treaty in 1970, which provides a unified procedure for filing patent applications in each of its contracting countries.

America Invents Act was signed into law in 2011. The law transitioned from a "first-to-invent" to a "first-inventor-to-file" system.

Going from patent
4M—5M in 14 years
5M—6M in 8 years
6M—7M in 6 years
7M—8M in 5 years
8M—9M in 4 years
9M—10M in 38 months
10M to 11M in 35 months
Driving the Innovation Economy
Academic Technology Transfer In Numbers

From 1996 to 2017, up to...

$1.7 trillion contributed to U.S. gross industrial output

$865 billion contributed to U.S. gross domestic product

5.9 million jobs supported

480,000+ inventions disclosed...

117,000+ U.S. patents issued...

to research institutions since 1996

15,000+ startups formed

68% of university licenses are to startups and small companies

200+ drugs and vaccines developed through public-private partnerships since Bayh-Dole Act enacted in 1980

Benefiting Society and the Economy
Academic Technology Transfer For 2020

$83.1 billion Research Expenditures

6,567 Startups Still Operational as of FY2020

1,117 Startups Formed

27,112 Invention Disclosures

Technology Transfer Life Cycle 2020

Research & Development

Invention

Evaluation

IP Protection

Product Development

Licensing

Marketing

Public Use & Economic Growth

933 New Products Created

10,050 Licenses & Options Executed

2030 Survey Sponsored by

For more information visit www.autm.net

Technology transfer professionals associated with universities and other academic institutions manage the complex process of transforming ideas from the lab to the marketplace—from evaluating and protecting discoveries to commercializing the inventions through new and existing companies.
NC State has 6 inductees into the National Inventors Hall of Fame

Sylvia Blankenship
1-MCP for Fruit, Vegetable and Flower Freshness

Donald Bitzer
Plasma Display

Bantval Jayant Baliga
Insulated Gate Bipolar Transistor

Edward Sisler
1-MCP for Fruit, Vegetable and Flower Freshness

Frances Ligler
Portable Optical Biosensors

Peter Wurman
Mobile Robotic Material Handling for Order Fulfillment
1926 progress

1924 progress

Shrine Room entrance

2021
• Interior stair installation

2021
• Shrine Room restoration

2021
• Cleaning and restoration of exterior
• HVAC installation
• New exterior lighting

2021
• New universally accessible plinth
Track Record of Success

Cree/Wolfspeed
Leading Semiconductor & LED producer

AgroFresh
Extending produce shelf life – $164M in sales

WebAssign
Leading provider of online instructional tools
VISION
Office of Research Commercialization

- Protecting and promoting university research discoveries and intellectual property
- Engaging and guiding industry partners
- Boosting the acceleration of startups
- Solving complex problems

Driving economic growth by facilitating the commercialization of research discoveries
Technology Transfer Process at NC State

- Reviewing Invention Disclosures
- Research Compliance
- Technology Evaluation
- Patentability Assessment and Coordinating/Manage Patent Filings
- Negotiating and Drafting Agreement (Confidentiality Agreements, Material Transfer Agreements, Inter-institutional/Joint IP Agreements, Option Agreements, License Term Sheets & License Agreements)
- Managing Existing Licenses
- Evaluating Potential Start-Up Opportunities

- Cost to obtain a US patent application: $15K – $50 K
- Cost to obtain foreign patent protection: $100 K+
- **The potential market size and future royalty returns to the university must be large enough to justify the expenditure and risk.**
  - Ex. If the market size is $100 K of sales per year, assuming a 3% royalty to the patent owner... $3K/year in royalties. This will likely not cover patent costs!
  - However if it is an exclusive license and the licensee is willing to cover patent costs separately, then the opportunity might be worth it!
- And remember….not every technology needs to be patented in order to be licensed (plants/software/tangible property/copyright/know-how).

### POL 10.00.01 - Patent and Tangible Research Policy

**1. PREAMBLE**

1.3 It is in the public interest for the University, when appropriate, to secure intellectual property protection for the products of its research to facilitate commercialization, to encourage entrepreneurship, to contribute to the professional development of University inventors, and to enhance the educational opportunities of participating students.

**4. OWNERSHIP**

4.1 University Ownership. All INVENTIONS arising from (1) research conducted with University-administered funds, (2) work within the INVENTOR’S SCOPE OF EMPLOYMENT, or (3) the SUBSTANTIAL USE OF UNIVERSITY RESOURCES are owned by the University.
Our IP & commercialization expertise accelerates university inventions into the marketplace through unparalleled support and guidance, increasing the impact of university research & innovation on a global scale.
POWERFUL PROGRAMS
# Chancellor’s Innovation Fund (CIF)

- $5M fund launched in 2010
- Supporting early-stage, industry-relevant projects

<table>
<thead>
<tr>
<th>TOTAL PROJECTS FUNDED</th>
<th>PROJECTS STILL ACTIVE (78%)</th>
<th>PROPOSALS SUBMITTED</th>
</tr>
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<tbody>
<tr>
<td>63</td>
<td>52</td>
<td>563</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>PROJECT TECHNOLOGIES LICENSED</th>
<th>STARTUP COMPANIES FORMED</th>
<th>TOTAL AWARDS FUNDED</th>
</tr>
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<tbody>
<tr>
<td>39</td>
<td>32</td>
<td>$4 MILLION</td>
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19:1 ROI
$74.9M in follow-on funding

$2.5M in licensing revenue
Daugherty Endowment

- To date $518,847 has been invested (2008 – 2022)
- 45 companies and 2 research projects have received support
- Funded companies have gone on to raise $65,576,706 combined in follow-on funding
NC State Startup Support

Providing early-stage companies with free services to boost their growth

1. Discounted Incorporation
2. Logo & Website Design
3. Access to Shared Office Space
4. Mentorship Network
5. Grant Writing Assistance
NC State I-Corps Program

- Launched in 2017
- Entrepreneurial training for faculty & students

16 Total I-Corps Cohorts
126 Participating Teams
2.6K+ Interviews Completed
26 Startups Formed
$4.3M in Follow-On Funding
Mid-Atlantic I-Corps Hub

$15M initiative to create a diverse, inclusive innovation ecosystem in the United States
IMPACTFUL INITIATIVES
Sweat Equity Challenge

From **Idea to Startup Launch** in just **9 Months**!
Spark Plug

- Funds for federal grant writing assistance
- $138K awarded to 18 startups
Alumni angel investor network investing in NC State startups

- 500+ engaged members
- $20M+ invested to date
- 34 startups funded
- 2 exits
- $3.2M return for members
Connecting NC State students & startups with knowledgeable advisors

- Launched 2021
- 250K+ alumni members in network to date
2021
• New clockworks
• 55-bell carillon and clavier playing cabin

2021
• Interior stair installation

2021
• Cleaning and restoration of exterior
• HVAC installation
• New exterior lighting

2021
• Shrine Room restoration

2021
• New universally accessible plinth

115 feet (35 meters)

1926 progress

1924 progress

Shrine Room entrance

1937 tower completion
Office of Research Commercialization

Licenses & Startups

FY12 - FY21

Significant Growth
Office of Research Commercialization

1.7B+ in Financing Raised by NC State Startups

800+ Commercialization Agreements

190+ Startups Launched

5K+ Invention Disclosures

600+ Products to Market

8.5K+ Total Jobs Created

1.5K+ Patents Issued
Rankings & Metrics

4th
Startups Launched

1st
Active Licenses & Options

6th
Total Disclosures

1st
Total Options

6th
Total Licenses

5th
Research Expenditures
Bill Spruill

Why is there a need for this kind of organization?

We've got a lot of active founders, who are doing different things. But I would argue that what we don't necessarily have pro-active, exited founders, who have made it their sole mission to lift up the Triangle. I've decided that is my mission.

“national dominance by 2033.”

Growing the Triangle Ecosystem through Focused Execution on Education, Investment, and Global Collaboration

2ndF
"When thinking about the Research Triangle of North Carolina from an international perspective, CED is my selfish personal heartbeat. This small group of connected experts (since 1984) are united around a shared drive. We like to create - in order to solve problems, we enjoy throwing ourselves at the hardest challenges, even if it feels “like eating glass and staring into the abyss”- Elon [at times]. Let’s grow the next generation of companies that will solve the world’s grandest challenges. I'm blessed and honored to be asked to serve. Let’s get to work!

Go Pack! Go WIN!"

Wade Fulghum, NC State
AVC Research Commercialization
Managing Director, Wolfpack Investor Network (WIN)
Biden signs CHIPS bill in bid to supercharge US semiconductor production

The CHIPS and Science Act of 2022, which received wide bipartisan support, includes $52.7 billion to increase domestic semiconductor production.

FACT SHEET: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China

- Catalyze regional economic growth and development. The CHIPS and Science Act authorizes $10 billion to invest in regional innovation and technology hubs across the country, bringing together state and local governments, institutes of higher education, labor unions, businesses, and community-based organizations to create regional partnerships to develop technology, innovation, and manufacturing sectors.

(d) Use of Funds.—In addition to activities listed under section 10383, an eligible entity receiving an award under this section may use funds to—

(1) identify academic research with the potential for technology transfer and commercialization, particularly as relevant to the purposes of the Directorate under section 10382;

(2) ensure the availability of staff, including technology transfer professionals, entrepreneurs in residence, and other mentors as required to accomplish the purpose of this section;

(3) help offset the costs of patenting and licensing research products, both domestically and internationally;

(4) revise institution policies, including policies related to intellectual property and faculty entrepreneurship, and taking other necessary steps to implement relevant best practices for academic technology transfer;

(5) develop local, regional, and national partnerships among institutions of higher education and between institutions of higher education and private sector entities and other relevant organizations, including investors, with the purpose of building networks, expertise, and other capacity to identify promising research that may have potential market value and enable researchers to pursue further development and transfer of their ideas into possible commercial or other use;

(6) develop seminars, courses, and other educational opportunities for students, post-doctoral researchers, faculty, and other relevant staff at institutions of higher education to increase awareness and understanding of entrepreneurship, patenting, business planning, research security, and other areas relevant to technology transfer, and connect students and researchers to relevant resources, including mentors in the private sector; and

(7) create, support, or fund entities or competitions to allow entrepreneurial students and faculty to illustrate the commercialization potential of their ideas, including through venture funds of institution of higher education.

(d) Limitations on Funding.—

(1) Awards made under this section shall be at least 3 years in duration and shall not exceed $1,000,000 per fiscal year.

(2) Awards made under this section shall not support the development or operation of capital investment funds.
Imagine Optix
Next-generation optics for VR & AR

Locus Biosciences
Launching major CRISPR gene editing clinical trial

TreeCo
Revolutionizing tree breeding with CRISPR gene editing
WORLD-CLASS EXPERTISE
WIN TEAM

Wade Fulghum  
Assistant Vice Chancellor

Miranda Drake  
Executive Assistant

Abby Phillips  
Assistant Director for Membership Services

Alan Taylor  
Assistant Vice Chancellor for Principal gifts

Lisa Chang  
Director of TEC Program

Raj Narayan  
Associate Director Kenan Institute for Engineering, Technology & Science

Harbright Ventures

Zach Williams  
New Ventures Program Manager

Melicia Ryles  
Financial Manager

Sasha Campbell  
Creative Services Manager

Cameron Feuerhelm  
Creative Services Assistant
Wade Fulghum  
Principal Investigator, I-Corps Instructor

Amy Parker  
Managing Director, I-Corps Instructor

Tim Martin  
I-Corps Instructor

Zach Williams  
I-Corps Instructor

Lisa Chang  
I-Corps Instructor

Kevin Wright  
I-Corps Instructor

Robert Sheehan  
I-Corps Instructor

Greg Marvin  
I-Corps Instructor
Office of Research Commercialization Resources

ORC Website
NSF I-Corps Mid-Atlantic Hub
Chancellor’s Innovation Fund
Wolfpack Investor Network (WIN)
Office of Research Commercialization Advisors (ORCA)
ORC Impacts and Stats
“Ask the Pack”
NSF I-Corps Mid-Atlantic Hub
SBTDC
SWEAT Equity Challenge
KIETS

National Inventor’s Hall of Fame
NIHF Cultivating Curiosity
https://youtu.be/TiSLv6yU3To

Not Your Average Hall of Fame
https://youtu.be/Df629L9TVa4

Dr. Jay Baliga
https://youtu.be/YkvrcXF9ooE

Dr. Fran Ligler
https://youtu.be/-LXDx5OOfTE

Dr. Peter Wurman
https://youtu.be/y95XR2iyj0I

Dr. Sylvia Blakenship & Dr. Ed Sissler
https://youtu.be/NzkYwtFe9X0
External Partners
Council for Entrepreneurial Development (CED)
Bill Spruill Recent exit
2ndf.org
Association of University Technology Managers (AUTM)
NC Biotechnology Center

Video Highlights
Cathedral Thinking
“Unlocking Innovation”
Impact of NSF Innovation Corps (I-Corps) pw: I-Corps1234!
Elon Musk on Failure

Selected Publications
Heartland Forward Study Part 2: RESEARCH TO RENEWAL: ADVANCING UNIVERSITY TECH TRANSFER
Part 1
The George W. Bush Institute study on The Innovation Impact of U.S. Universities listed NC State as one of the top 20 universities for innovation impact.
The Milken Institute, an economic think tank, cited the collaboration and innovation fostered by NC State — and particularly by Centennial Campus — as key reasons why Raleigh is one of the top 10 best-performing large cities in the United States.
Questions?

Wade Fulghum