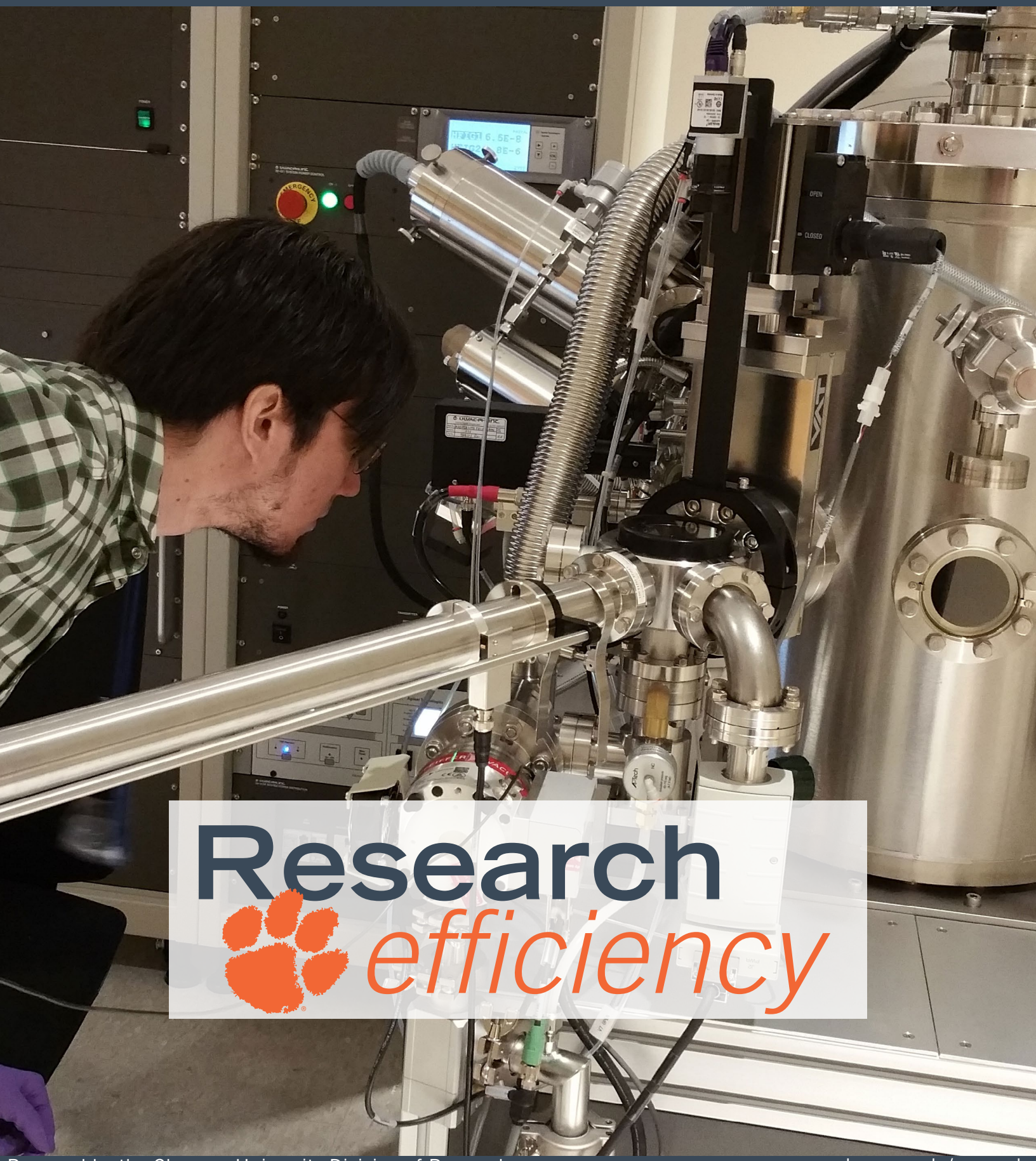
CLEMSON
DIVISION OF RESEARCH

Research and Economic Development Committee

Board of Trustees | Feb. 7, 2019



Research *efficiency*

A Note from the Vice President for Research

Dear Board of Trustees Members,

Borrowing a phrase from Coach Swinney, "little old Clemson" began the year with a significant national accomplishment. I am pleased to report that Clemson University's status as a Carnegie R1 institution has been reconfirmed for another three years. Our R1 designation – a key goal of the university's ClemsonForward strategic plan – classifies Clemson as one of the nation's most active research institutions. It helps us recruit the best and brightest faculty members and students and puts us in a great position to compete for high-value research projects. As you know, Clemson first achieved R1 classification in 2016. Our reconfirmation in December came amid unexpected and uncertain changes to Carnegie's data collection cycle and methodology, a testament to the strength and positive trajectory of our research enterprise over the past few years. As you'll see in this report, we continue to see positive trends among metrics collected by Carnegie.

In this report, I also want to focus on our efficiency as a research university. As you'll see in selected charts presented in this report, Clemson University's productivity compares favorably to our R1 peers considering the size of our faculty body and the research space available (see pages 8-10). Further, we have taken several steps to make our research enterprise even more efficient. We are investing in unique equipment that will give Clemson unmatched research capabilities in areas of strength (page 11). We have implemented an incentive program to reduce downtime at our core facilities and to boost research activity and proposal submissions (page 11). We are acquiring software solutions for facility and safety management that will reduce paperwork, save time, establish workflow consistencies and streamline tasks for more efficient operations (page 12). We are maximizing university investments in research through competitive R-Initiative grant programs that require matching funds (page 13). These programs help faculty pursue external funding opportunities, hire quality research faculty, upgrade equipment and complete projects.

We have also shifted the focus of the Clemson University Research Foundation (CURF) to better align its resources and capabilities with the ClemsonForward strategic plan (page 14). CURF will continue to manage technology transfer for the university – the movement of innovations from the lab to the market. Additionally, CURF is actively pursuing funding opportunities to help nurture Clemson technology development and will provide increased support for faculty research endeavors. This effort is being conducted efficiently, without any increase in cost.

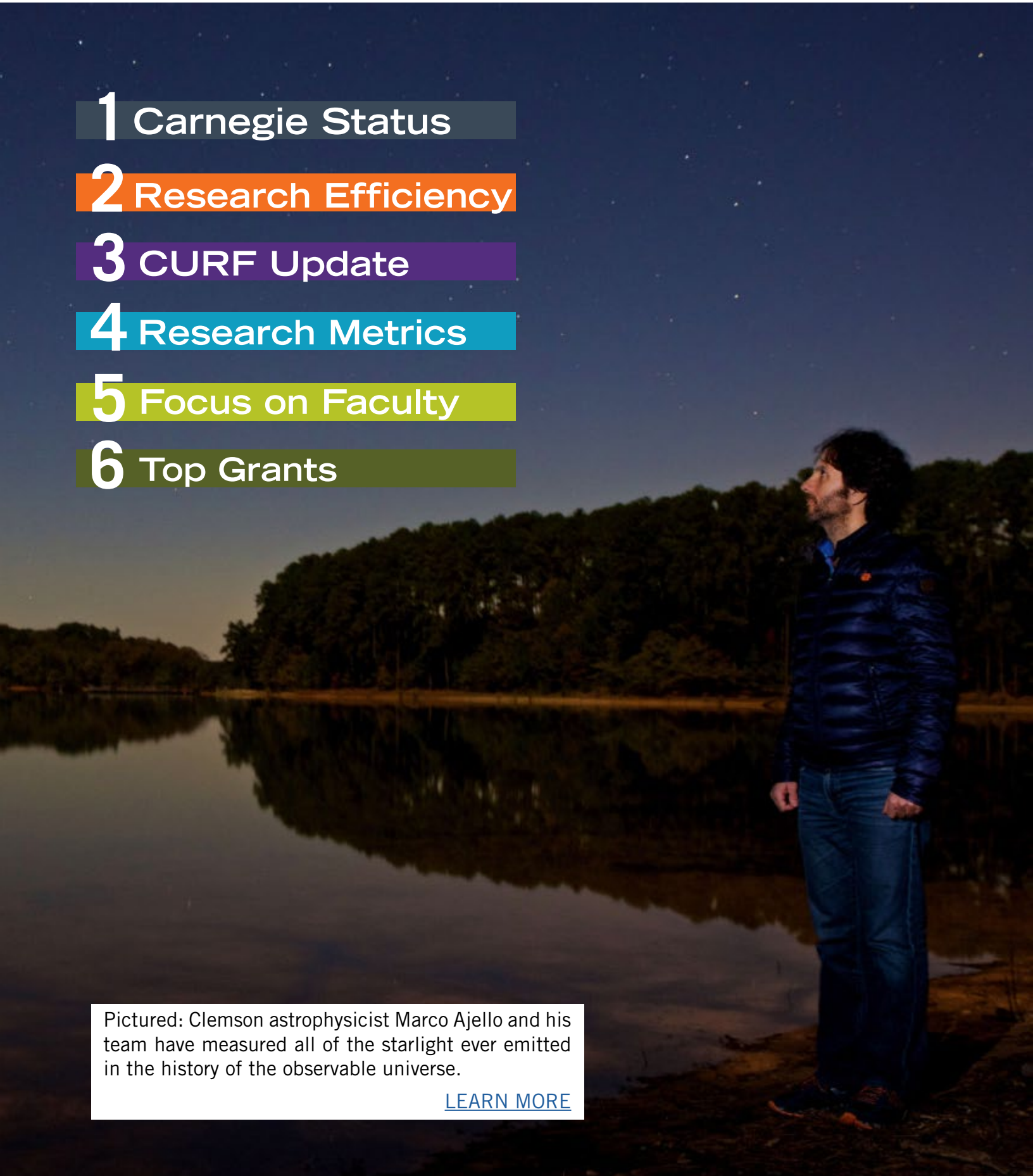
Over the past five-plus years, our research enterprise has reached unprecedented levels at Clemson. Grant awards nearly doubled from fiscal year 2013 to $150 million in fiscal year 2018. Research expenditures have increased 34 percent since 2014 to $94 million, just shy of our ClemsonForward goal of $100 million. We are doing much more without incurring significant costs and will continue to look at ways to improve efficiency while growing Clemson's research enterprise. I am proud of the progress we have made and excited to see what the future holds. We have plenty more to accomplish.

Respectfully submitted,

Tanju Karanfil, Ph.D., PE, BCEE, IWA Fellow

Vice President for Research, Clemson University

RESEARCH REPORT: CONTENTS



Pictured: Clemson astrophysicist Marco Ajello and his team have measured all of the starlight ever emitted in the history of the observable universe.

LEARN MORE

CARNEGIE R1 STATUS

This section reviews Clemson's performance in the metrics that determine Carnegie Classification.

R1 confirmed through 2021

EXECUTIVE SUMMARY

R1 confirmed through 2021

1 CARNEGIE R1 CONFIRMED

- We are excited to report that our Carnegie R1 status has been reconfirmed through 2021. This is a key goal of our ClemsonForward strategic plan. This distinction confirms Clemson's "very high research activity" and places us among the nation's top research institutions. The R1 designation helps us recruit the best and brightest faculty members, students and administrators and puts us in a great position to compete for high-value research projects.
- To be a perennial R1 institution is one of the first requirements for Clemson to become a member of the Association of American Universities (AAU).

2 CARNEGIE CLASSIFICATION CHANGES

- Clemson first achieved R1 classification in 2016. Our reconfirmation in 2018 came amid an unexpected change to Carnegie's data collection cycle from five years to three and methodology, a testament to the growing strength of our research enterprise over the past few years.
- Carnegie decided not to include professional practice doctoral degrees (MD, JD, Pharm.D, DVM, etc.) to its R1 and R2 classification metrics. They are grouped under a new category, R3.
- The total number of R1 and R2 universities increased from 222 to 260. Including R3, there are now 422 doctoral universities in the country.

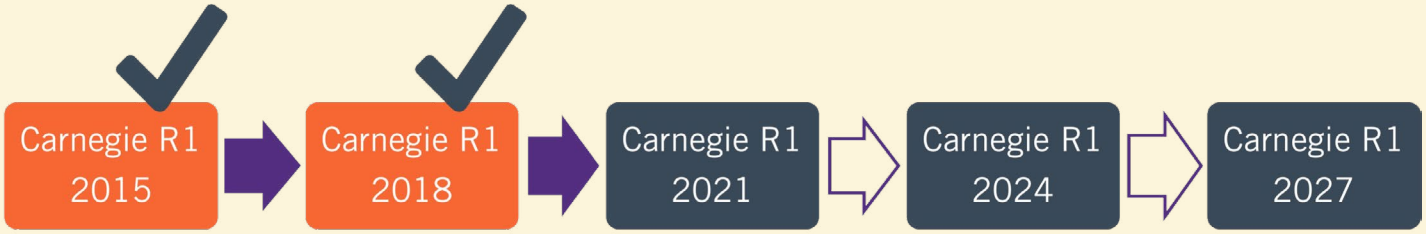
3 MOVING FORWARD

- Clemson continued to penetrate deeper into the field of R1 schools in 2018, making significant progress toward becoming a perennial R1 university, according to internal analysis of Carnegie's classification metrics (see graph on page 4).
- From 2015 to 2018, Clemson's data in all but one Carnegie metric improved (see ΔMetrics 2015-2018 column in table on page 5), and our ranking among R1 and R2 universities increased within most of the 10 Carnegie metrics (see ΔRank 2015-2018 column, table on page 5).

R1 confirmed through 2021

CARNEGIE CHANGES

NEXT CLASSIFICATION WILL BE RELEASED IN 2021



IMPACTS ON CLASSIFICATION

- In response to a question from Clemson, Carnegie confirmed that "doctoral degrees – professional practice" (MD, JD, Pharm.D, DVM, etc.) will not impact R1 or R2 designations. Those degree programs are now grouped under a new category: R3.
- The number of R1 and R2 institutions increased from 222 in 2015 to 260 in 2018 (see below).

COUNTING CARNEGIE SCHOOLS

422 Doctoral Universites

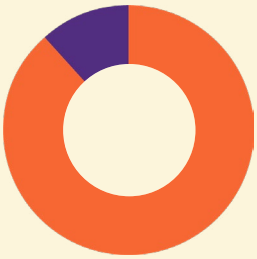
103* are new

* Of the 103 newly categorized doctoral universities, 12 are now R2 and 91 are R3.

No new schools made R1.

130 R1 Universities

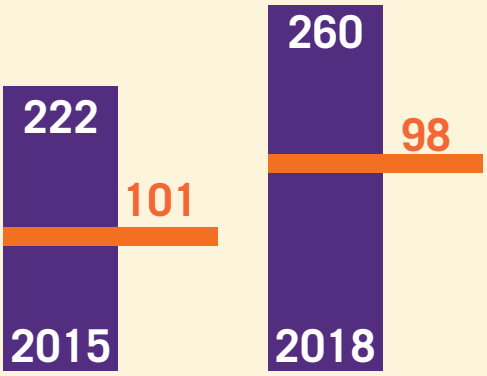
15* are new



* Of the 15 new R1 schools, all were previously ranked R2.

Total R1 and R2 Schools

Clemson's Rank*



* Carnegie does not rank schools. This is based on our analysis of Carnegie metrics data.

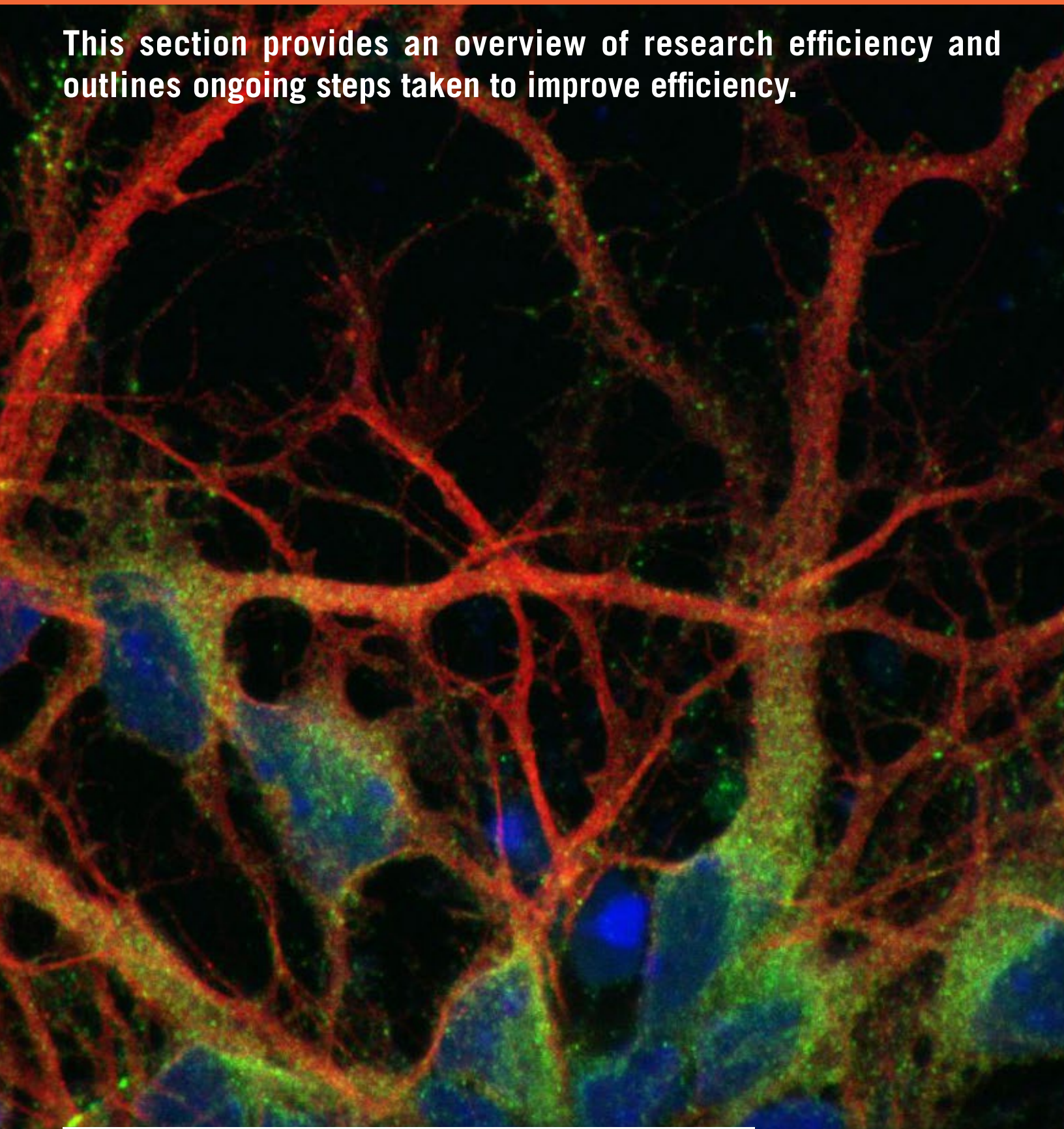
R1 confirmed through 2021

CLEMSON'S CARNEGIE METRICS

Metrics	Clemson 2015	Clemson Rank R1&R2 (n=222)	Clemson 2018	Clemson Rank R1&R2 (n=260)	Δ Metric 2015-2018	Δ Rank 2015-2018
1. Science & Engineering Expenditures	$116,871,000	114	$144,728,000	109	$27,857,000	↑ 5
2. Non-Science & Engineering Expenditures	$44,199,000	16	$48,540,000	19	$4,341,000	↓ 3
3. Research Faculty	65	132	111	116	46	↑ 16
4. PhD Humanities	2	165	8	141	6	↑ 24
5. PhD Social Sciences	9	152	20	113	11	↑ 39
6. PhD STEM	143	63	170 *	59 *	27 *	↑ 4*
7. PhD Other	62	87	33 *	150 *	-29 *	↓ 63*
8. Per Capita Science & Engineering Expenditures	$136,532	125	$158,690	126	$22,158	↓ 1
9. Per Capita Non-Science & Engineering Expenditures	$51,634	6	$53,220	11	$1,586	↓ 5
10. Per Capita Research Faculty	0.076	155	0.122	132	0.046	↑ 23

* These figures from Carnegie do not match Clemson's reported numbers. They are under review.

This section provides an overview of research efficiency and outlines ongoing steps taken to improve efficiency.



Pictured: A picture taken at the Clemson Light Imaging Facility (CLIF). Clemson has incentivized the use of CLIF and other facilities to reduce downtime and improve efficiency.

EXECUTIVE SUMMARY

1 OUR PEERS

- To analyze Clemson University's efficiency, we will compare against our peer Carnegie R1 universities that are public and do not have medical schools (some universities with veterinary and dental schools are included). There are 30 such peer Carnegie R1 schools (see chart page 8).

2 OUR RESEARCH EFFICIENCY

- Clemson compares well with its peers in terms of (i) expenditures per tenured and tenure-track faculty, (ii) expenditures per total researchers (i.e., tenure-track faculty, research faculty, research staff and postdocs), and (iii) expenditures per research space.
- Clemson has managed significant growth in awards without incurring significant additional expense (page 10).

3 STRATEGIES TO IMPROVE RESEARCH EFFICIENCY

- We are investing in unique, highly advanced research equipment that could generate new revenue streams by attracting external users and will help us build unmatched research programs at Clemson (see page 11).
- We are optimizing the use of facility space and reducing downtime by incentivizing faculty use of equipment through our new Clemson University Core Incentivized Access program (see page 11).
- We are implementing new software solutions that will allow us to better manage facility usage and laboratory risk (see page 12). This will greatly reduce workplace inconsistencies, redundancies and workloads, while helping to achieve safe, efficient laboratories.
- Our R-Initiative funding programs are boosting research activities at Clemson while also generating more research investments from colleges, departments, centers and faculty members through cost-share requirements that pull stagnant capital off the sidelines (see page 13).

There are 30 public R1 universities without medical schools;
Some have veterinary or dental schools.

OUR PEERS

R1, Public, No Medical School

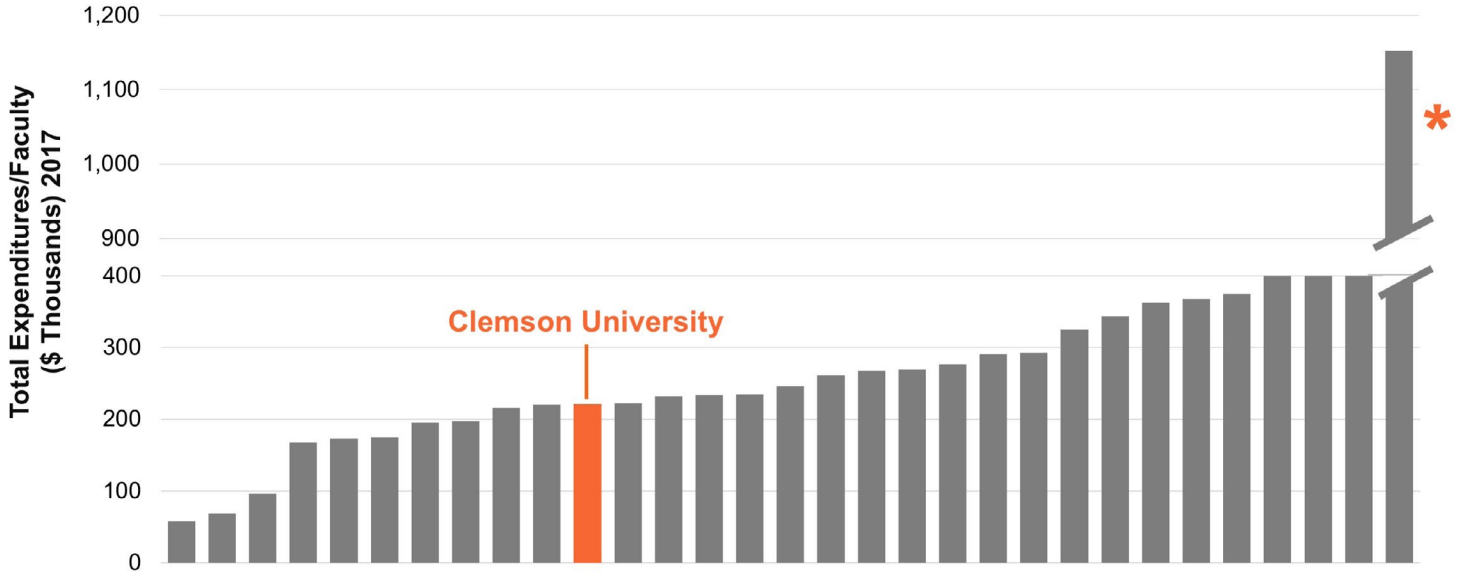
School			
Arizona State University			
Colorado State University	L	V	
CUNY Graduate School University Center			
George Mason University			
Georgia Tech			
Georgia State University			
Iowa State University	L	V	
Kansas State University	L	V	
North Carolina State University	L	V	
Oregon State University	L	V	
Purdue University	L	V	
SUNY Albany			
University of Arkansas, Fayetteville	L		
University of Buffalo (SUNY)			D
University of California, Berkeley	L		

School			
University of California, Riverside	L		
University of California, Santa Barbara			
University of California, Santa Cruz			
University of Colorado, Boulder			D
University of Delaware	L		
University of Georgia	L	V	
University of Houston			
University of Maryland, College Park	L		D
University of Massachusetts, Amherst	L		
University of Nebraska, Lincoln	L		
University of North Texas			
University of Texas, Arlington			
University of Texas, Dallas			
University of Wisconsin, Milwaukee			
Washington State University	L	V	

D Dental L Land Grant V Veterinary

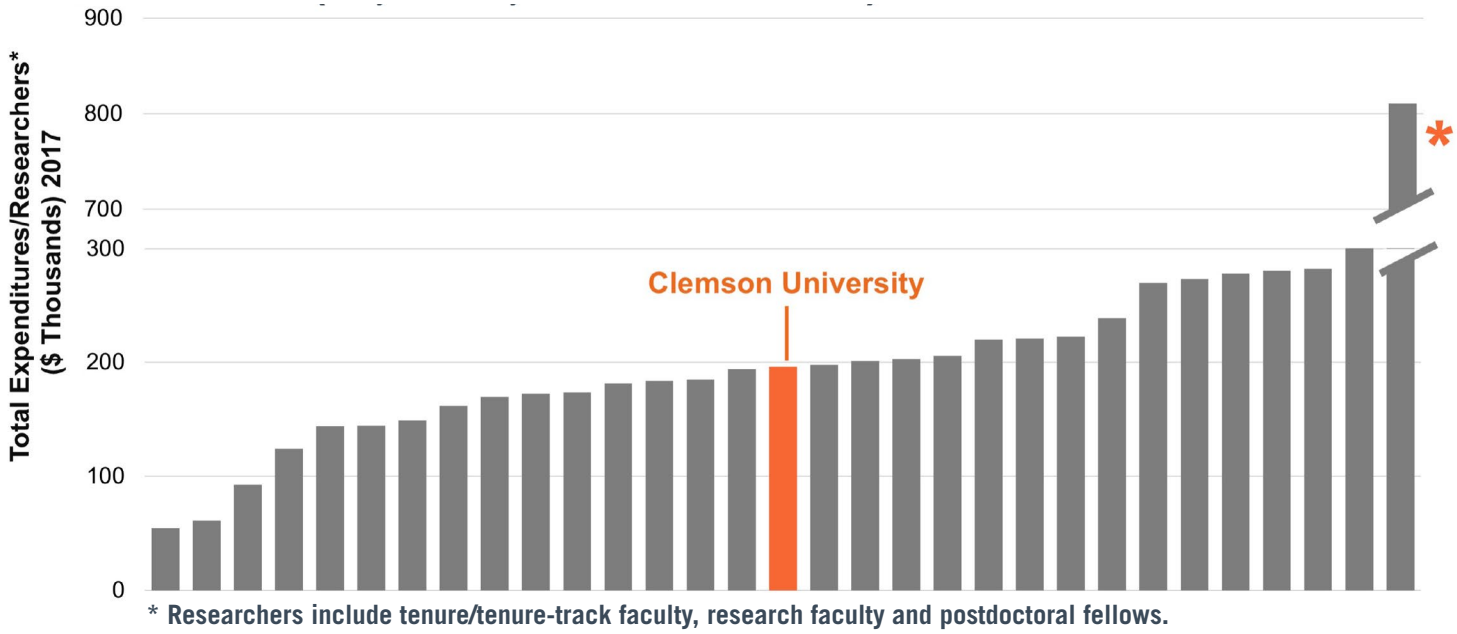
OUR PRODUCTIVITY

Total Expenditures per Tenure/Tenure Track Faculty: FY 2017 Peer 30 (R1, Public, No Medical School)



Georgia Tech reports 829 tenured/tenure-track faculty in 2017. While all expenditures from Georgia Tech Research Institute (GTRI) are counted in the expenditures total, faculty working in GTRI are not counted.

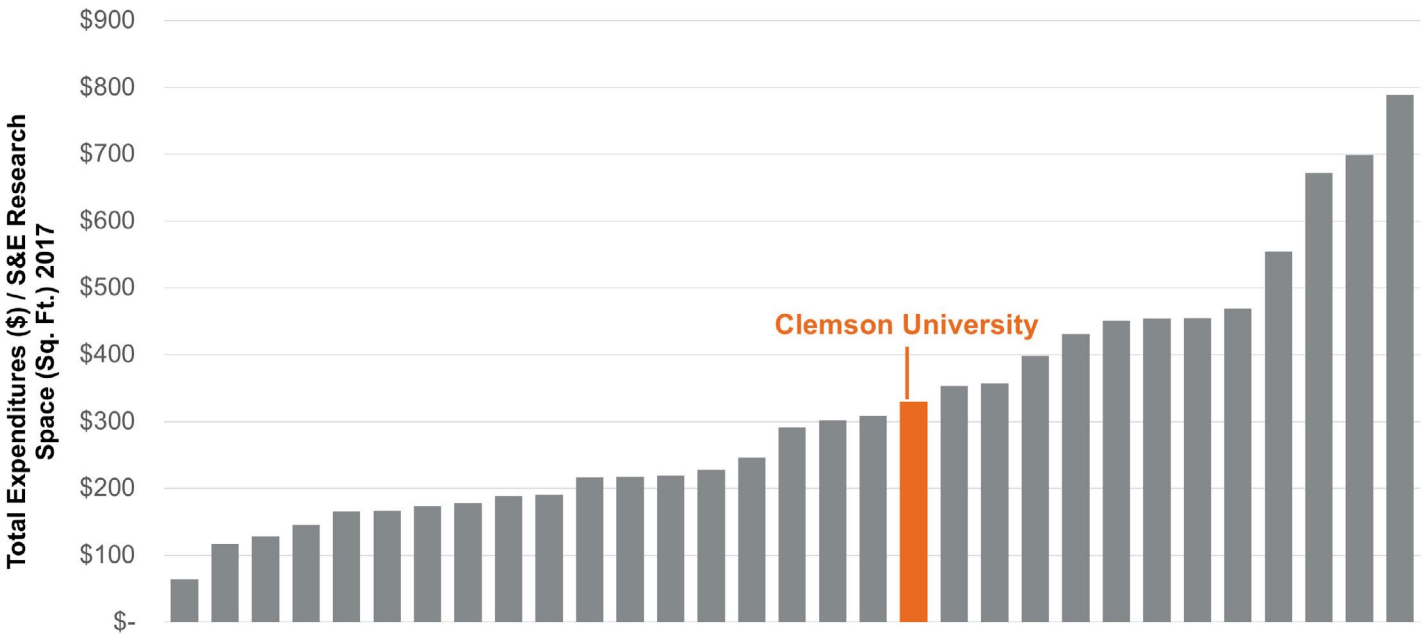
Total Expenditures per Researchers*: FY 2017 Peer 30 (R1, Public, No Medical School)



Georgia Tech reports 829 tenured/tenure-track faculty in 2017. While all expenditures from Georgia Tech Research Institute (GTRI) are counted in the expenditures total, faculty working in GTRI are not counted.

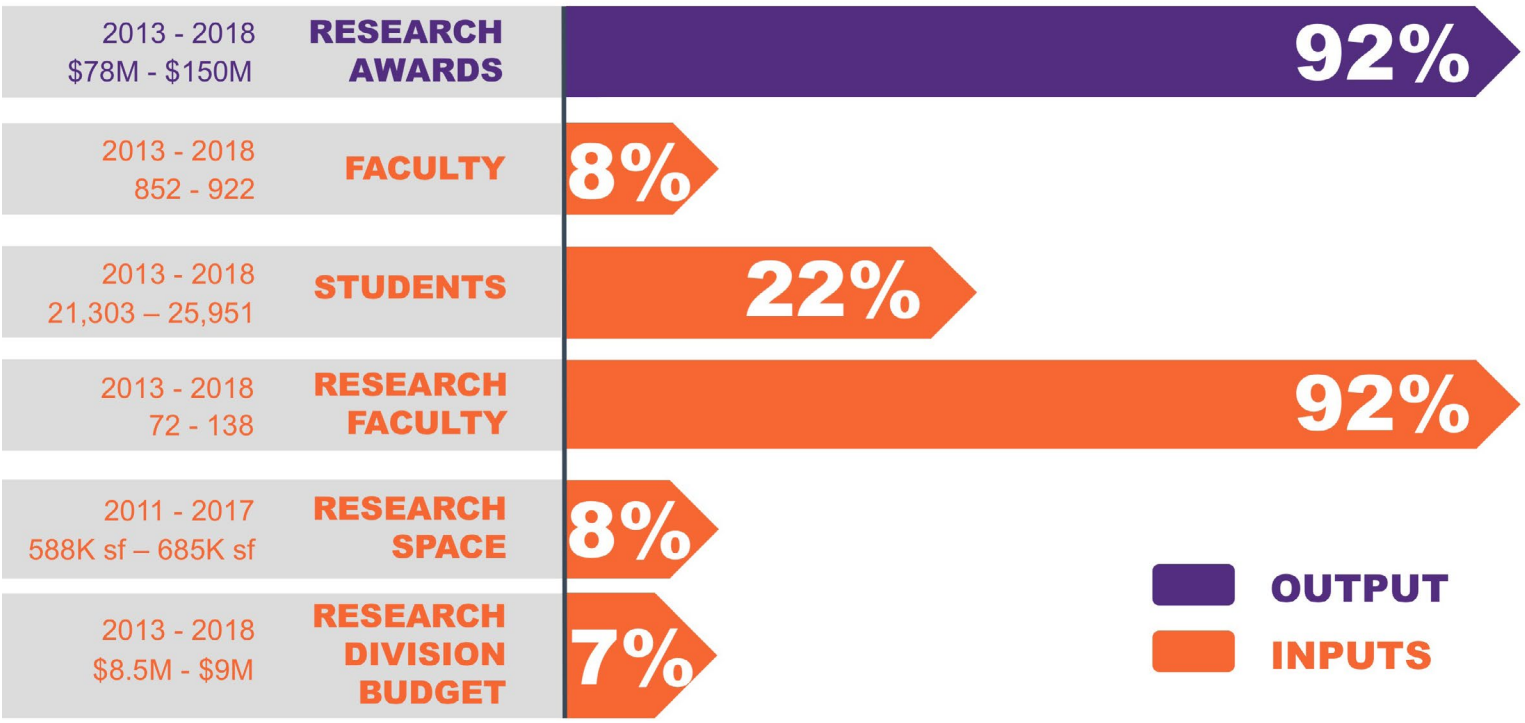
OUR PRODUCTIVITY

Expenditures Per Science & Engineering Research Space: FY 2017 Peer 30 (R1, Public, No Medical School)



EFFICIENCY: INPUTS AND OUTPUT

Chart compares the percentage increases to various inputs (i.e., faculty size, student body, etc.) and output (i.e., research awards).



OUR STRATEGIES

EFFICIENTLY OPERATED FACILITIES WITH UNIQUE CAPABILITIES

Clemson has added unique new equipment at facilities across campus.

Electron Microscopy: Adding four new machines, including the world's most advanced scanning electron microscope, used in product development in the aerospace, automotive, manufacturing, energy, and textile industries, among others. This new equipment will give the facility materials-analysis capabilities that are unique in the Southeast and will attract external revenue.

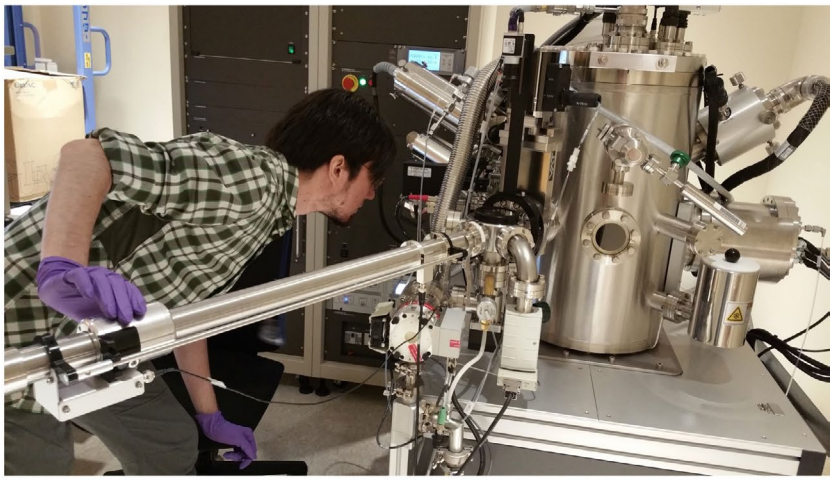
Nanotechnology: Clemson's Micro Fabrication Facility will add a new electron beam pattern generator that will allow researchers to produce nanotechnology-level devices right here on campus. Researchers had been traveling out of state for such work.

Composite Manufacturing: A high-pressure resin transfer molding machine matched with numerous features gives Clemson the unique ability to design, manufacture and test composite products and components in house at the Clemson University International Center for Automotive Research. No other university has this exact configuration of equipment.

REDUCE DOWNTIME AT CORE RESEARCH FACILITIES

We created the Core Incentivized Access program (CU-CIA) to increase use of research facilities.

- Boosts research activity by providing access to facilities and equipment
- Increases proposal submissions and proposal competitiveness
- Reduces downtime at core facilities for more efficient operations
- In first round, awarded time valued at more than $80,000 for projects involving 13 faculty members from nine departments.



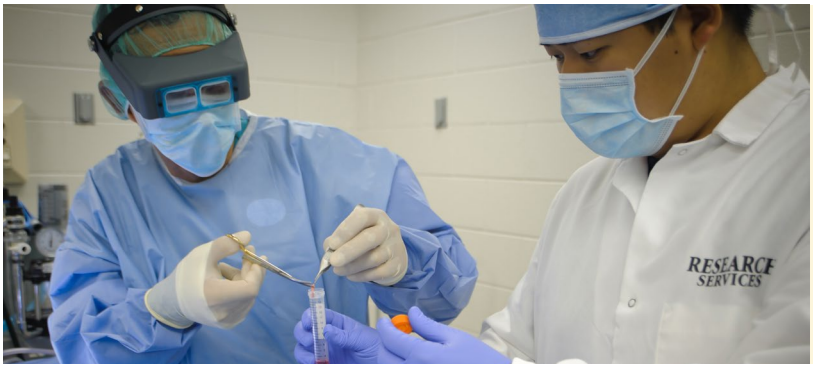
OUR STRATEGIES

IMPROVING OPERATIONAL EFFICIENCY

Clemson is investing in software management tools that will streamline operations, reduce workloads and improve productivity at facilities across campus.

Facility Management Software

A new cloud-based enterprise-wide Core Facility Management Software System solution will streamline facility scheduling and billing for facility directors and users, including industry clients, faculty, staff and students.



Safety Management Software

A new software management system will collect, organize and display a wide range of real-time safety data to improve visibility, reduce risk and increase productivity across research programs.

MEASURED EFFICIENCY IMPROVEMENTS

The developers of the new software management system Clemson intends to acquire for research safety operations report significant benefits at other research institutions.

36% **average reduction in time spent by researchers on the top 15 common safety tasks.**

53% **reported reduction in time for training and other safety specific tasks.**

1,288 **man hours saved on inspections.**

OUR STRATEGIES

INCREASING RESEARCH ACTIVITY AND INVESTMENT

R-Initiatives provide strategic grants that increase research activity across disciplines, lead to high-quality proposals, and spark shared investments from the university and the colleges.

$3 MILLION INVESTED to support projects involving **161** faculty from **36** depts.

FACULTY SUCCEEDS

Seed grants to assist interdisciplinary faculty teams in securing major external funding

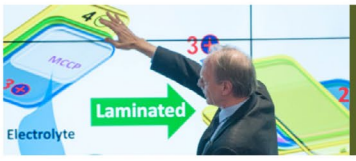
MAJOR RESEARCH INSTRUMENTATION

Grants for the purchase, replacement, or upgrade of major research equipment

RESEARCH FELLOWS

Supports hiring and training of research faculty and post-doctoral researchers

SEED

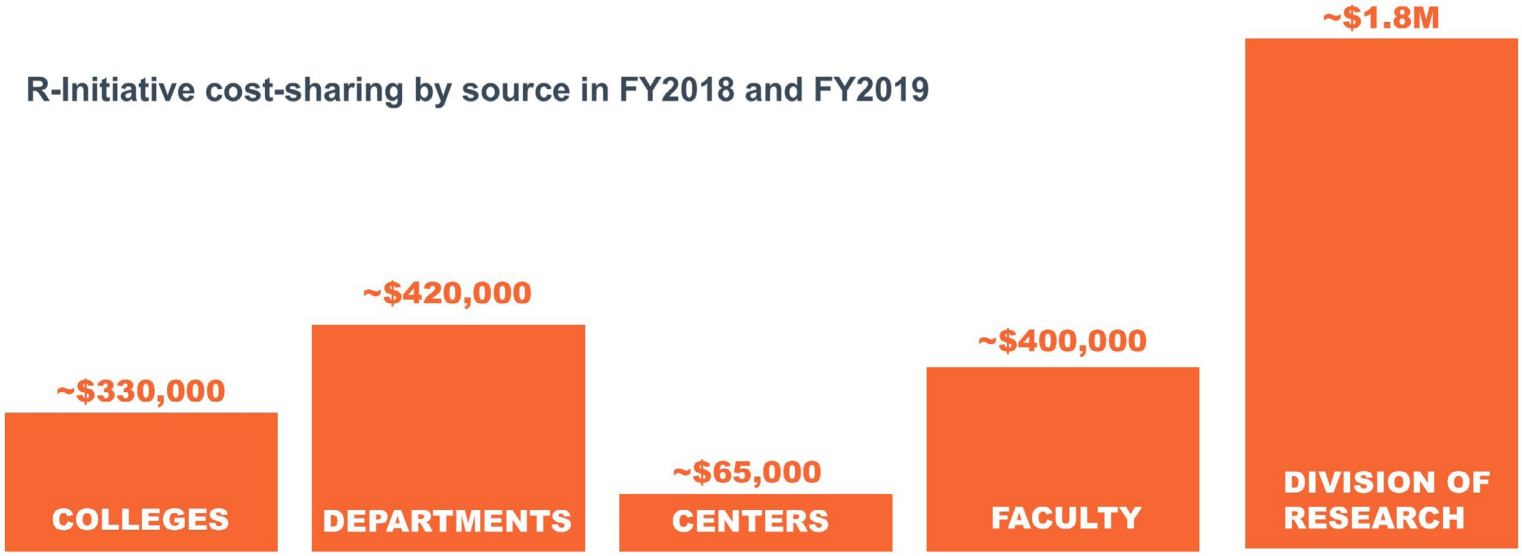


Funding to support the initiation or completion of a scholarly project or product

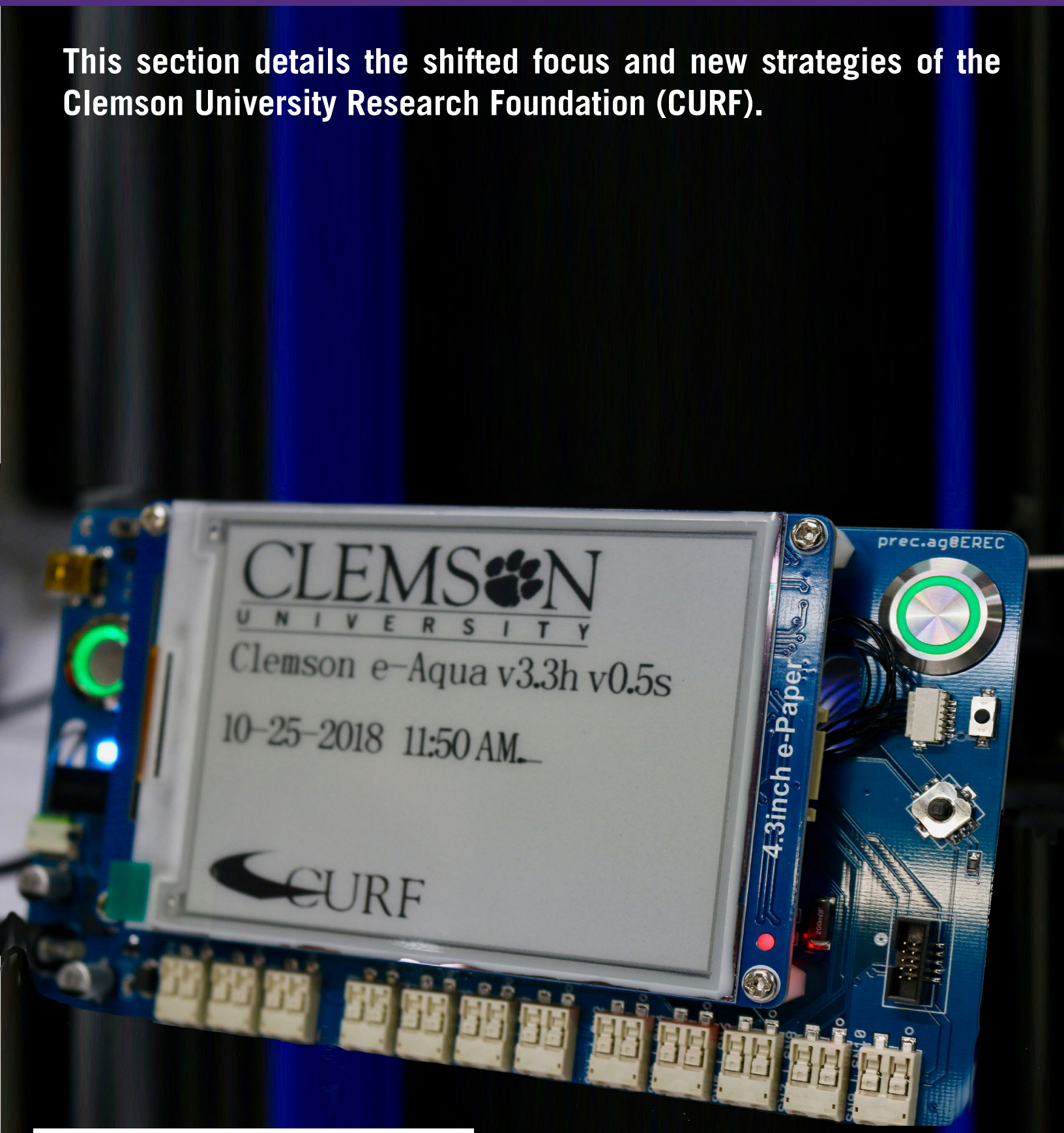
UNLOCKING INVESTMENT IN SHARED PRIORITIES

R-Initiative programs have moved capital from the sidelines by incentivizing investments in priority research from the colleges, departments, centers and faculty members through cost-share requirements.

R-Initiative cost-sharing by source in FY2018 and FY2019



This section details the shifted focus and new strategies of the Clemson University Research Foundation (CURF).



Pictured: CURF provides grants to nurture technology development at Clemson.

LEARN MORE

EXECUTIVE SUMMARY

1 CLEMSONFORWARD 2020 – RE-ENVISIONING CURF

- Conducted strategic realignment evaluation process in May – October FY2018.
- A pivot from a Tech-Transfer Centric focus to a ClemsonForward Centric focus was approved by CURF Board in October 2018.
- Established guiding principles for the ClemsonForward Centric model (see page 16) and proceeded with the implementation in FY2019.

2 ACCOMPLISHMENTS TO DATE

- Provided IP and contract support to university research offices: value of $12.4 million in proposals and awards.
- Partnered with other organizations on innovation grants to support research innovation and technology maturation: total value of $2.3 million (see page 17).
- Funded over $879,000 in technology maturation grants to Clemson Faculty over past five years, resulting in $3.5 million in follow-on research awards to Clemson (see page 18).

3 OPPORTUNITIES AND INITIATIVES

- Expanding Vice President for Research R-Initiatives to incentivize industry-sponsored research engagement among faculty.
- Establishing a joint "Innovation Fund" with Greenville Health System Health Sciences Center (HSC).
- Initiating Precision Agriculture Software & App. Licensing Program.
- Launching annual Industry Research Symposium in Fall 2019.

REALIGNMENT

A BRIEF HISTORY OF CURF

1982	CURF Established as 501(c)(3)
1982 – 1999	Supported Clemson through: • Real estate acquisition or building construction • Grant facilitation (acting as the prime party) • Operation of off-campus facilities for research and incubation of start-up companies
1999 – 2018	Beginning in 1999 CURF's primary responsibility was technology transfer – the identification, capture, and licensing of university-generated intellectual property
NOW	**CURF has shifted from Tech Transfer Centric to ClemsonForward Centric**

GUIDING PRINCIPLES OF STRATEGIC SHIFT

1. CURF will support and contribute to the ClemsonForward strategic plan (maintain R1 status).
2. CURF will provide necessary technology transfer functions to the university research enterprise.
3. CURF will provide research contract and operational flexibility (e.g., financial, risk mitigation, HR) within the legal and regulatory requirements of a 501(c)(3) to grow the university research enterprise.

ACCOMPLISHMENTS

CURF HIGHLIGHTS FISCAL YEAR 2019

Faculty Research Support

- Acting prime for $300,000 grant from Musculoskeletal Transplant Foundation
- Provided IP support on $849,000 worth of research awards and $11.5 million in research proposals – first quarter 2019
- Three Clemson inventors inducted as Fellows to the National Academy of Inventors (NAI)

Innovation Pipeline Development

- $500,000 NIH award to create Southeast Regional Innovation Hub – Clemson subcontract
- $1.8 million i6 Economic Development Grant – SCRA/Clemson/MUSC
- Support for eight Small Business Innovation Research (SBIR) submissions
- Two $200,000 equity investments in Clemson start-ups

Technology Maturation

- Awarded 26 Maturation Fund Grants (out of 66 proposals) in last five years
- Over $850,000 in research awarded
- Resulted in six licenses/options executed and six licenses/options in negotiation
- Generated over $3.5 million in follow-on Clemson research awards

CURF

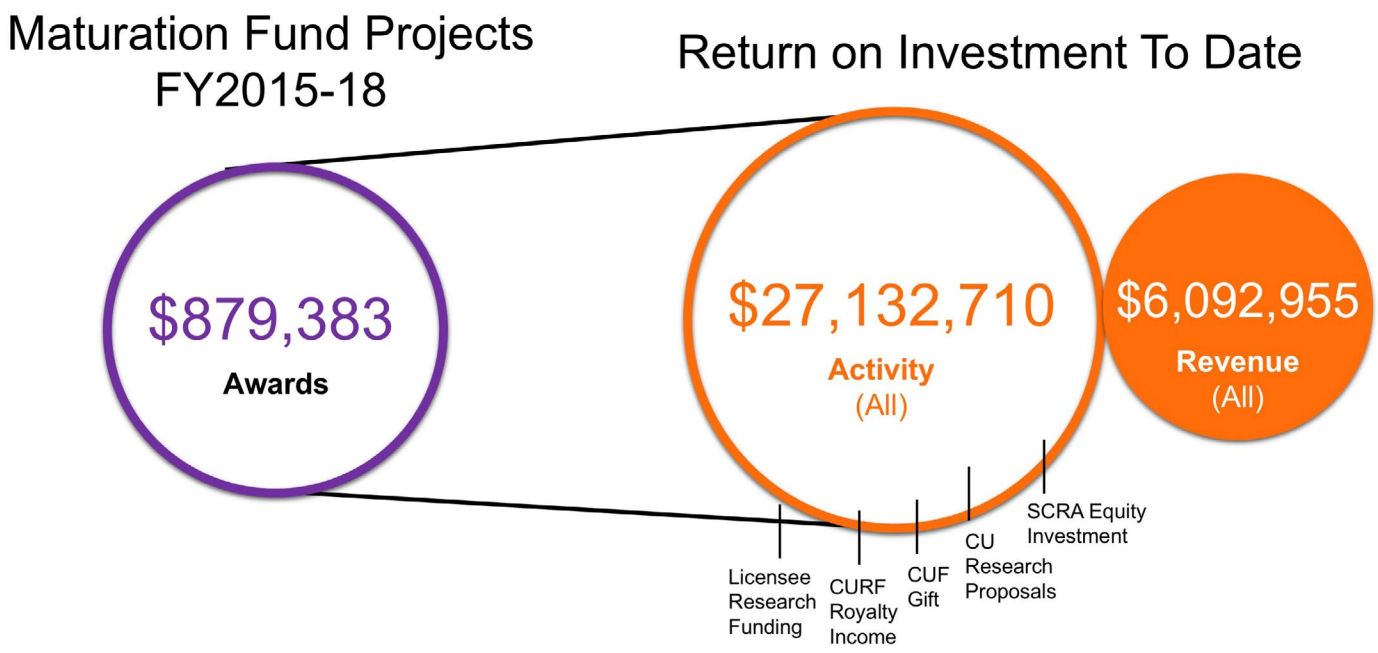
CLEMSON UNIVERSITY RESEARCH FOUNDATION

curf.clemson.edu

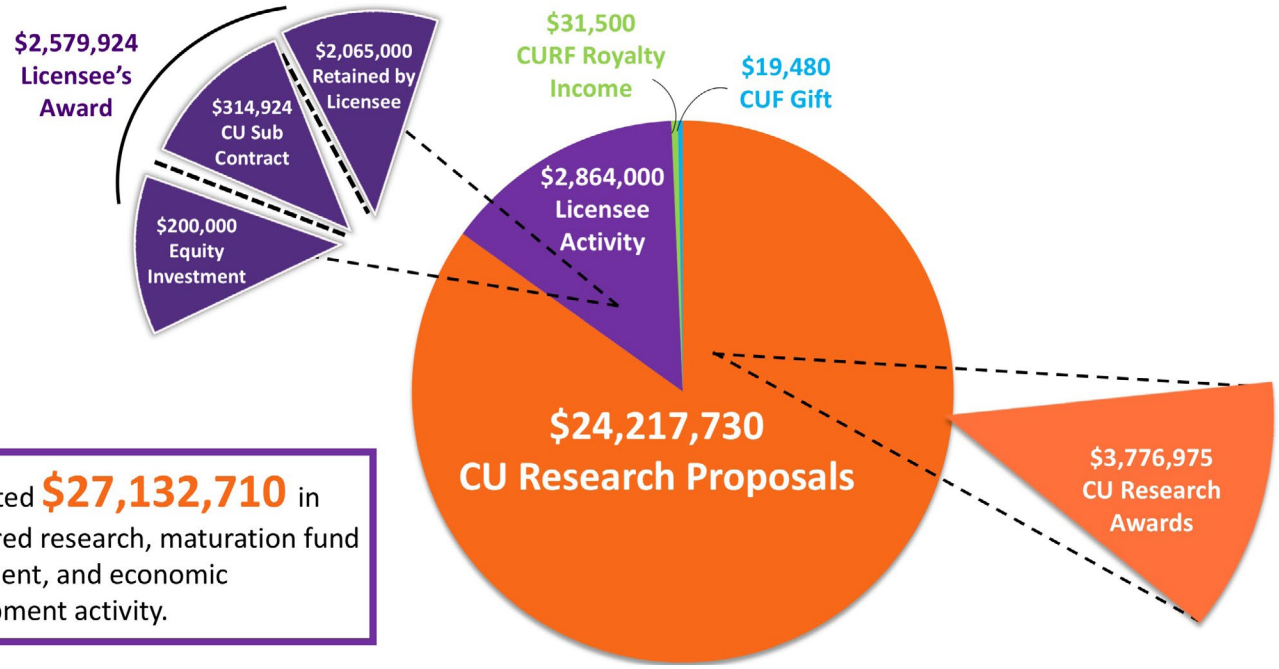
WITH ITS REALIGNMENT, CURF UNVEILED A REFRESHED LOGO (ABOVE)

ACCOMPLISHMENTS

CURF MATURATION FUND INVESTMENT (DEC. 31, 2018)



RETURN ON INVESTMENT (DEC. 31, 2018)



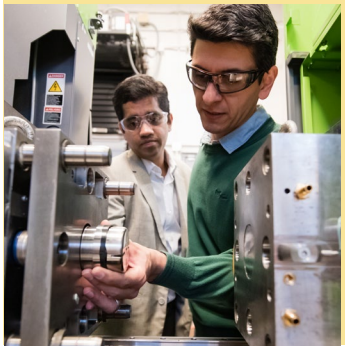
Generated **$27,132,710** in sponsored research, maturation fund investment, and economic development activity.

OPPORTUNITIES

Industry Research Symposium to be held Fall 2019

Clemson/Greenville Health System Innovation Fund

Resubmit Innovation Corps proposal to National Science Foundation



I-Corps provides grantees entrepreneurship training from established entrepreneurs.

New Division of Research R-Initiative programs:

Seed funding to incentivize faculty to engage in industry sponsored research for the 1st time.

Funding to incentivize faculty research collaborations across the entire CU enterprise.

Precision agriculture software and app licensing program:

Joint effort w/ CURF, PSA & CIO to provide funding to support internal resources for software development and end-user support

CURF EFFICIENCY

CURF HAS TAKEN ON NEW RESPONSIBILITIES AND SHIFTED ITS FOCUS WITHOUT INCREASING ANY COSTS.

This section breaks down research productivity data, including proposal submissions, awards, expenditures and output.

EXECUTIVE SUMMARY

1 STARTING THE YEAR STRONG

- Grant awards are tracking similarly to fiscal year 2018, which was our strongest year for awards.
- Clemson continues to be successful securing large grant awards that exceed $2 million. In the first two quarters of fiscal year 2019, Clemson has won 8 major research projects, the total value of which is $26.6 million.
- As of the end of Q2, research expenditures are tracking above FY2018 levels, the highest of the last six years.

2 SEEKING MORE EXTERNAL FUNDING

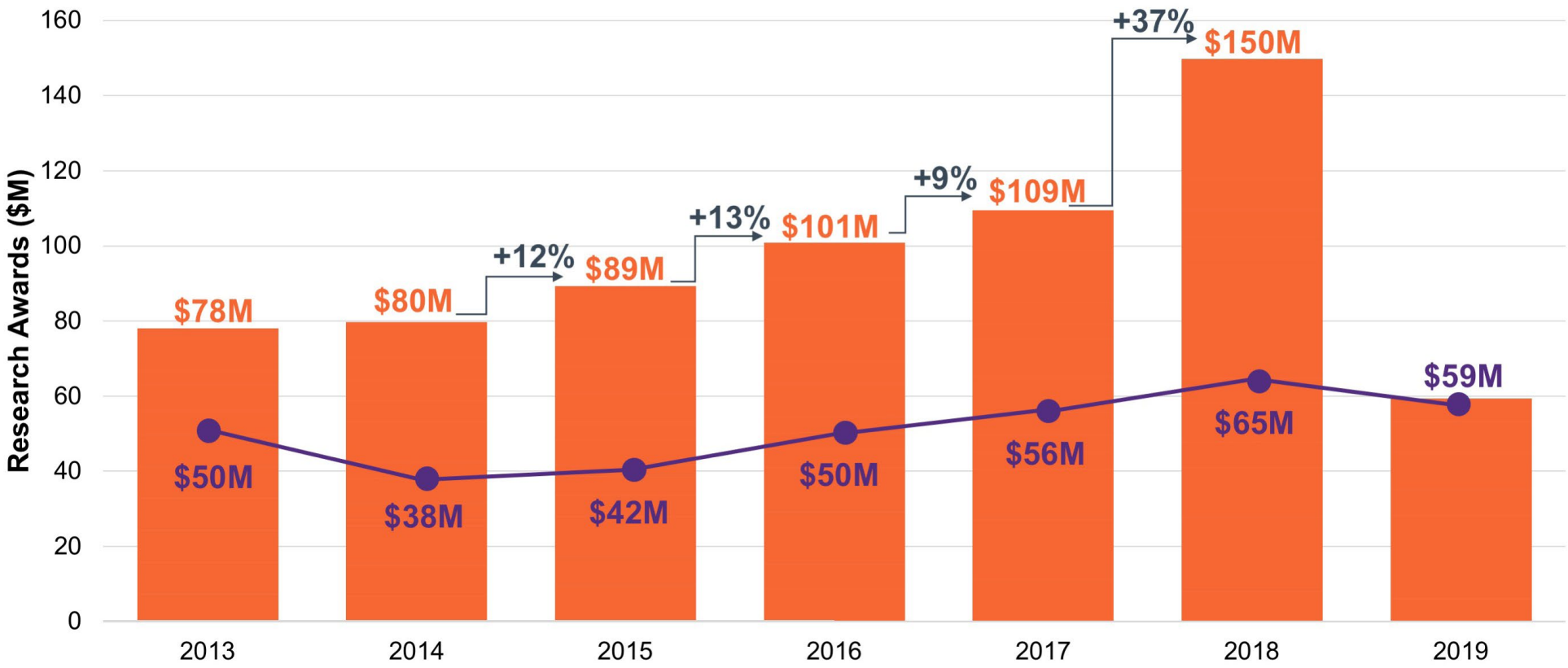
- Proposal submissions are tracking back toward our strongest year, fiscal year 2017, in which proposals reached a record $559 million.
- This fiscal year, submissions are heightened due to a very large proposal exceeding $100 million. Removing that, fiscal year 2019 submissions are approximately $211 million so far, which exceeds our performance at this point in 2018 by $22 million.

3 STRATEGIES TO CONTINUE MOMENTUM

We have taken several steps to boost submissions and maintain momentum:

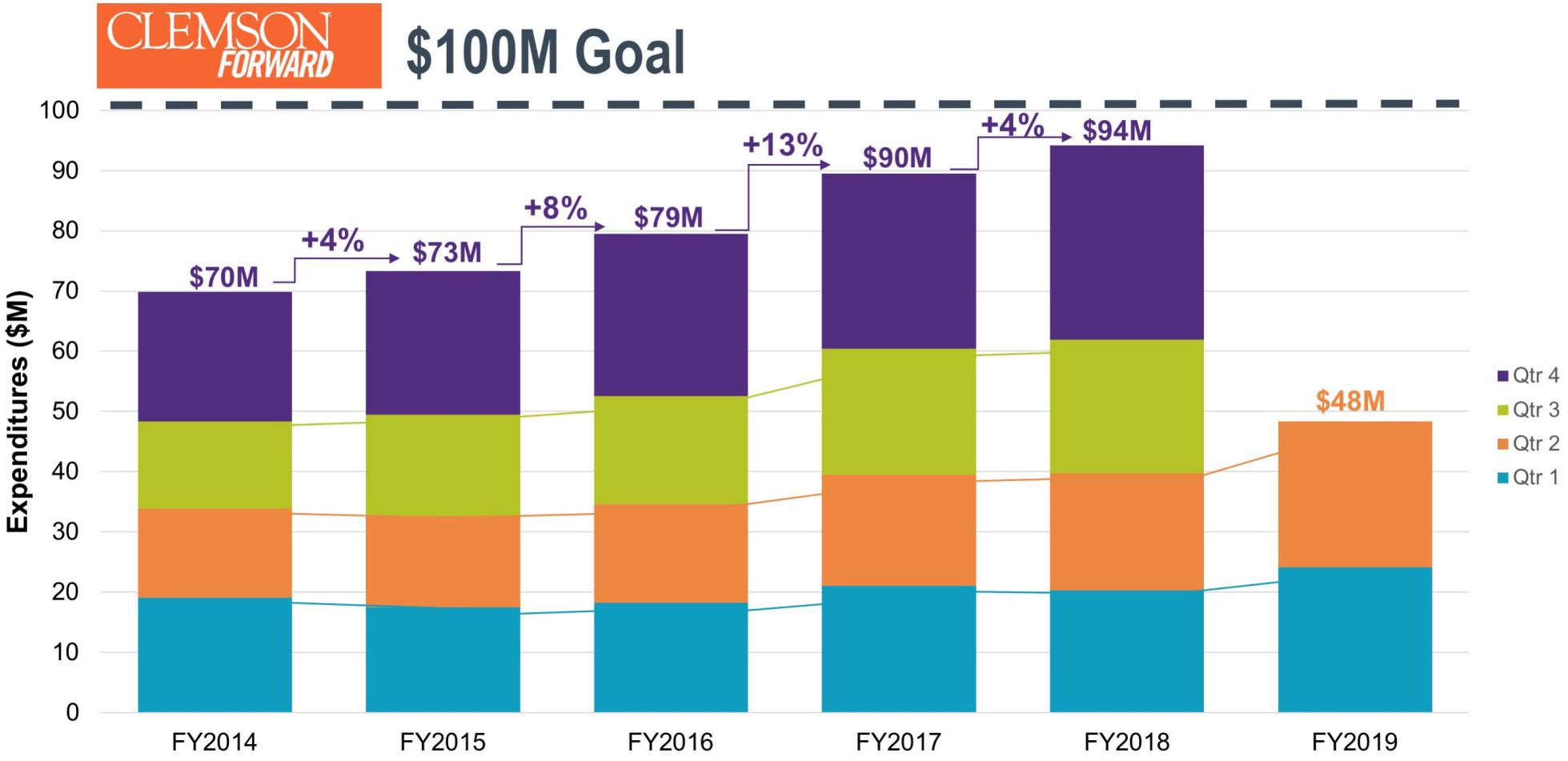
- Provost has set goals with college deans, establishing submission targets in order to reach ClemsonForward goals.
- Continuing support for R-Initiatives to provide funding for faculty in pursuit of large grant applications and for hiring research faculty.
- Offering support via the Office of Research Development to aid in the development of large, complex proposals.
- Reorganizing CURF to further grow industry/privately funded sponsored research.
- The Office of External Affairs is developing strategic initiatives to attract new industry research funding to Clemson.

Research Awards 2013-19



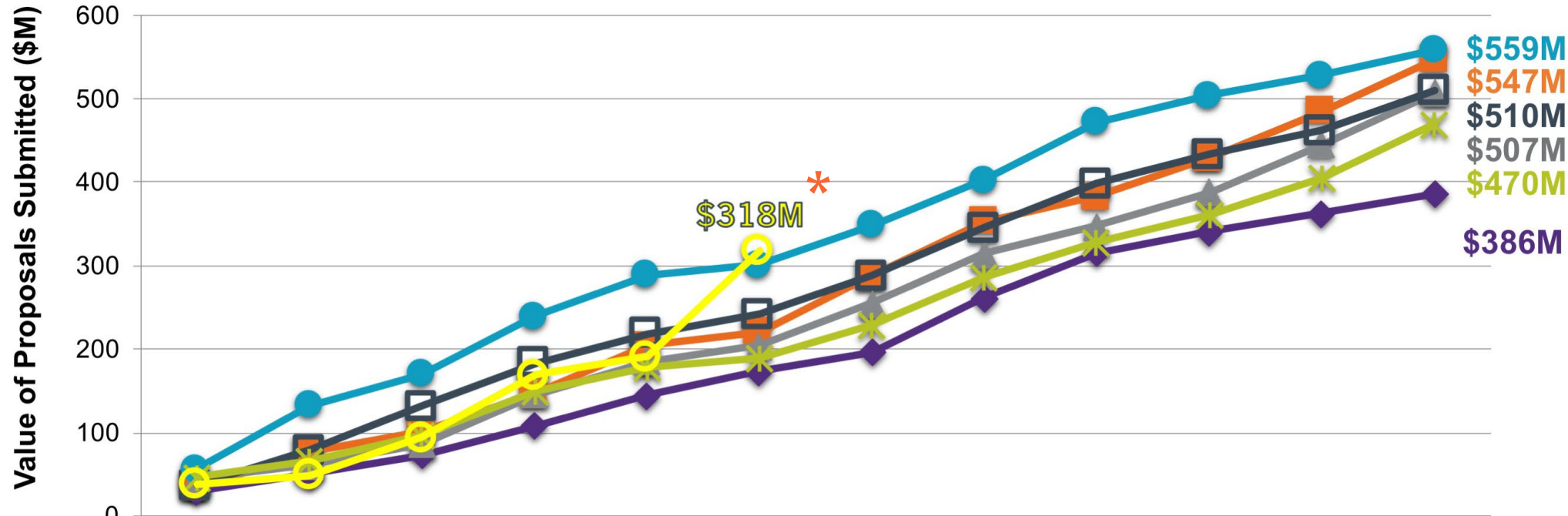
As of the end of Q2

Research Expenditures FY2014-19



As of the end of Q2

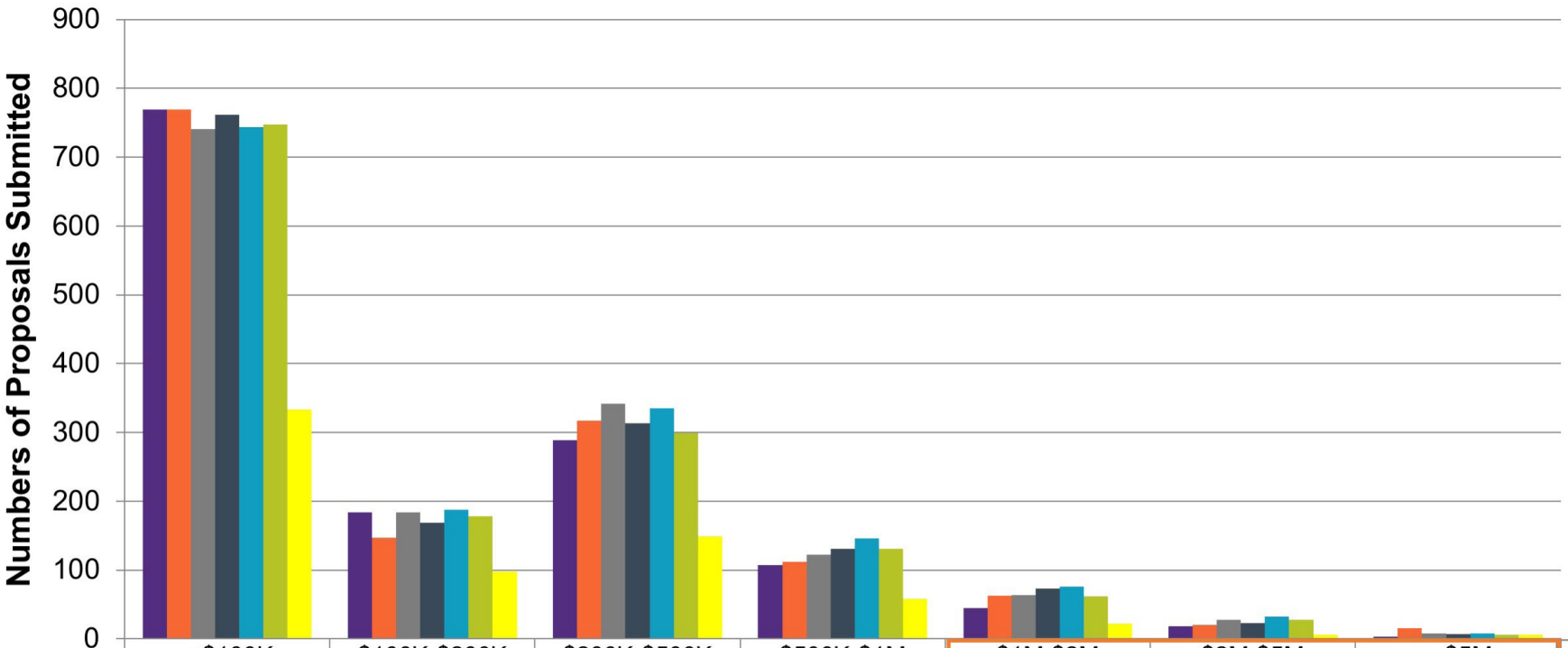
Proposal Submissions: Requested $ 2013-19



	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June
FY 2013	$30	$50	$73	$108	$145	$173	$196	$262	$316	$341	$363	$386
FY 2014	$34	$76	$102	$147	$204	$221	$288	$353	$383	$429	$485	$547
FY 2015	$45	$61	$86	$146	$186	$204	$255	$314	$347	$388	$446	$507
FY 2016	$37	$79	$131	$183	$219	$242	$288	$345	$398	$433	$462	$510
FY 2017	$57	$133	$170	$240	$289	$301	$349	$403	$472	$504	$528	$559
FY 2018	$47	$67	$97	$150	$179	$189	$230	$286	$329	$362	$406	$470
FY 2019	$38	$49	$94	$169	$190	$318						

* This figure is heightened by a large $107 million proposal by a multi-discplinary collaborative between Clemson and Greenville Health System. Without that proposal, submissions are at $211 so far in FY2019.

Proposal Submissions: $ Range 2013-19



	< $100K	$100K-$200K	$200K-$500K	$500K-$1M	$1M-$2M	$2M-$5M	> $5M	> $1M
FY2013	769	184	289	107	45	18	3	66
FY2014	769	147	317	112	63	20	15	98
FY2015	741	184	342	122	64	28	8	100
FY2016	762	169	313	131	73	23	7	103
FY2017	744	188	335	146	76	32	8	116
FY2018	747	178	299	131	62	28	6	96
FY2019	333	98	149	58	22	6	6	34 *

* Figure is for the first two quarters of FY2019.

Report Card: Second Quarter FY2019

		2013	2014	2015	2016	2017	2018	2019
								Q2
RESEARCH INPUTS								16-Jan
a. Proposal Submissions (PI College, Count)		1,414	1,443	1,489	1,478	1,529	1,451	672
1	AAH	38	51	65	62	69	64	53
2	CAFLS	235	230	224	222	241	229	155
3	CBSHS	81	93	102	104	112	101	53
4	CECAS	549	555	582	617	618	587	282
5	COE	51	54	39	45	46	37	13
6	COB	7	15	13	15	7	10	2
7	COS	242	247	263	239	230	227	83
8	CCIT	12	12	6	3	5	1	-
9	PSA	88	90	118	97	170	163	12
10	VP for Res & Interdisc Inst	31	17	7	17	14	12	14
11	All Other	80	79	70	57	17	20	5
b. Proposal Submissions (Key Personnel Allocation, Value)		$386M*	$547M*	$507M	$510M	$559M	$470M	$318M
12	AAH			$9.4M	$8.6M	$3.1M	$5.7M	$1.8M
13	CAFLS			$42.6M	$23.8M	$43.4M	$37.1M	$40.9M
14	CBSHS			$28.4M	$40.1M	$41.4M	$25.9M	$59.2M
15	CECAS			$260.5M	$281.2M	$306.4M	$235.5M	$107.2M
16	COE			$13.8M	$14.7M	$18.1M	$19.1M	$4.8M
17	COB			$7.5M	$4.3M	$2.8M	$1.8M	$0.05M
18	COS			$100.2M	$111.3M	$95.9M	$100.4M	$28.2M
19	CCIT			$4.3M	$2.0M	$4.0M	$0.9M	$4.3M
20	PSA			$23.3M	$10.4M	$31.3M	$25.8M	$5.5M
21	VP for Res & Interdisc Inst			$5.6M	$7.7M	$6.0M	$12.7M	$61.2M
22	All Other			$11.4M	$5.6M	$6.0M	$5.0M	$4.7M

Report Card: Second Quarter FY2019

		2013	2014	2015	2016	2017	2018	2019
								Q2
RESEARCH INPUTS continued								16-Jan
c. Research Awards		$78.0M	$79.7M	$89.3M	$100.9M	$109.5M	$149.8M	$59.4M
23	AAH	$0.2M	$0.6M	$0.7M	$1.4M	$0.5M	$1.9M	$1.6M
24	CAFLS	$7.3M	$6.7M	$14.1M	$8.6M	$10.9M	$13.9M	$6.7M
25	CBSHS	$2.7M	$3.4M	$4.8M	$5.1M	$4.6M	$8.1M	$3.5M
26	CECAS	$34.2M	$37.7M	$48.2M	$45.5M	$54.0M	$80.8M	$30.0M
27	COE	$2.6M	$4.1M	$3.2M	$2.9M	$2.8M	$4.5M	$1.7M
28	COB	$2.0M	$1.1M	$1.3M	$0.8M	$1.2M	$1.1M	$0.1M
29	COS	$10.3M	$7.8M	$9.9M	$15.6M	$19.9M	$14.7M	$10.3M
30	CCIT	$1.6M	$5.7M	$0.7M	$0.8M	$0.5M	$1.3M	$0.01M
31	PSA	$14.8M	$12.3M	$9.6M	$13.0M	$7.9M	$6..6M	$1.2M
32	VP for Res & Interdisc Inst	$1.8M	$0.3M	$0.6M	$5.1M	$5.0M	$15.1M	$4.2M
33	All Other	$0.3M	$0.2M	$1.2M	$2.0M	$1.2M	$1.7M	$0.1M
d. Notable Awards								
34	NSF CAREER Awards (by start date)	4	1	3	5	7	7	1
35	NIH R01-Equivalent Awards (by start date)	-	-	2	2	2	3	5
36	NIH Career Awards (by start date)	1	-	-	-	-	-	-
37	Air Force Young Investigator Awards	-	-	1	2	-	-	-
38	DOE Early Career Awards	1	-	-	-	-	-	-
e. Supporting Workforce								
39	Graduate Student Enrollment	4,206	4,372	4,670	4,664	4,425	4,985	5,282
40	Sponsored Graduate Research Assistants	822	745	707	693	696	761	558
41	Postdoctoral Fellows	48	64	83	85	90	97	98
42	Research Faculty: Permanent 100% Non-E&G Funded	6	6	6	11	17	14	29
43	Research Faculty: Temporary 100% Non-E&G Funded	18	18	15	14	24	27	11

Report Card: Second Quarter FY2019

		2013	2014	2015	2016	2017	2018	2019
RESEARCH PROCESS								
f. Sponsored Research Expenditures by Business Unit		$75.4M	$70.0M	$73.3M	$79.5M	$89.5M	$94.2M	$48.4M
44	AAH	$0.5M	$0.4M	$0.4M	$1.1M	$1.3M	$1.4M	$0.7M
45	CAFLS	$8.8M	$7.7M	$6.8M	$8.6M	$11.1M	$11.0M	$6.2M
46	COB	$1.2M	$1.2M	$1.1M	$1.0M	$0.9M	$0.8M	$0.3M
47	CECAS	$35.0M	$35.0M	$35.0M	$37.5M	$42.9M	$45.1M	$24.3M
48	CBSHS	$3.1M	$2.8M	$3.7M	$4.1M	$4.4M	$4.9M	$2.5M
49	COE	$3.3M	$3.3M	$3.8M	$2.5M	$2.6M	$2.2M	$1.1M
50	COS	$13.2M	$10.5M	$9.3M	$11.3M	$14.8M	$16.7M	$7.0M
51	CCIT	$2.0M	$1.6M	$3.4M	$2.8M	$0.4M	$0.6M	$0.1M
52	PSA	$4.7M	$4.9M	$5.8M	$5.6M	$5.7M	$5.9M	$1.9M
53	VP for Res & Interdisc Inst	$1.9M	$1.3M	$1.9M	$3.5M	$3.9M	$3.9M	$3.3M
54	All Other	$1.7M	$1.7M	$2.2M	$1.5M	$1.5M	$1.6M	$1.0M
g. Sponsored Research Expenditures by Innovation Cluster		$75.4M	$70.0M	$73.3M	$79.5M	$89.5M	$94.2M	$48.4M
55	Advanced Materials	$14.3M	$11.3M	$10.7M	$10.4M	$10.7M	$12.1M	$7.9M
56	Cyberinfrastructure and Big Data Science	$10.3M	$10.5M	$10.1M	$8.9M	$8.1M	$9.6M	$3.5M
57	Energy, Transportation and Advanced Manufacturing	$4.7M	$5.7M	$7.2M	$7.6M	$17.8M	$16.8M	$8.4M
58	Health Innovation	$13.1M	$10.2M	$10.2M	$12.5M	$16.3M	$17.8M	$10.4M
59	Human Resilience	$8.2M	$7.7M	$9.7M	$9.8M	$7.8M	$8.6M	$4.0M
60	Sustainable Environments	$18.3M	$16.9M	$17.9M	$21.7M	$18.9M	$19.5M	$9.3M
61	Other	$6.5M	$7.6M	$7.4M	$8.6M	$9.9M	$9.6M	$4.9M
h. Sponsored Research Expenditures by Funding Source		$75.4M	$70.0M	$73.3M	$79.5M	$89.5M	$94.2M	$48.4M
62	Federal Gov	$62.9M	$56.9M	$58.5M	$65.1M	$74.6M	$78.2M	$39.6M
63	Foundations, Societies, and Associations	$4.2M	$4.3M	$4.7M	$4.1M	$4.7M	$5.1M	$3.8M
64	Industry/Other	$4.9M	$5.6M	$6.1M	$6.9M	$6.8M	$6.3M	$2.3M
65	International	$0.8M	$0.6M	$0.8M	$0.8M	$0.5M	$0.4M	$0.1M
66	Local Gov	$0.6M	$0.6M	$0.6M	$0.5M	$0.5M	$0.5M	$0.2M
67	State Gov	$1.9M	$1.9M	$2.7M	$2.0M	$2.4M	$3.7M	$2.3M

Report Card: Second Quarter FY2019

		2013	2014	2015	2016	2017	2018	2019
RESEARCH PROCESS continued								
i. Sponsored Research Expenditures per T/TT Faculty by College								
68	AAH	$3,299	$2,264	$2,343	$5,841	$8,177	$8,945	$4,003
69	CAFLS	$88,570	$81,120	$69,612	$84,618	$105,396	$103,814	$58,993
70	COB	$14,415	$13,047	$11,510	$9,683	$8,855	$8,269	$3,346
71	CECAS	$169,754	$160,698	$163,406	$163,685	$194,323	$214,280	$108,990
72	CBSHS	$27,982	$26,853	$33,764	$42,376	$34,751	$39,532	$19,157
73	COE	$54,779	$51,688	$62,195	$38,037	$44,483	$40,197	$20,383
74	COS	$95,724	$72,421	$61,912	$77,589	$95,956	$110,206	$47,950
75	CU average (Total exp/Total T/TT faculty)	$83,858	$75,089	$78,826	$85,753	$84,297	$103,706	$37,546
RESEARCH OUTPUTS/OUTCOMES								
76	Doctorates Awarded (Aug, Dec, May)	187	217	237	233	231	234	160
77	STEM Doctorates Awarded (Aug, Dec, May)	118	153	165	138	156	171	116
78	Disclosures	102	129	70	60	65	48	23
79	Patents	16	15	15	14	18	11	15
80	Licenses/Options	9	7	7	5	10	10	10
81	Licensing Revenue	$1,134,289	$762,811	$360,131	$354,827	$539,490	$388,751	$155,921
82	Start-up Companies (based on licenses/options above)	1	4	4	2	3	3	3
* FY15-18 Submissions are by faculty % allocation. There was insufficient data to attribute FY13 and FY14 similarly.								

This section highlights faculty research, scholarly productivity and achievements from each college, as provided by the colleges.

Pictured: Seven Clemson faculty members received prestigious CAREER Awards from the National Science Foundation in 2018.

LEARN MORE

Nathan M. Long, PhD

Assistant Professor
Animal and Veterinary Science

Nathan Long is a ruminant physiologist whose research investigates the effects of maternal and environmental factors that can alter fetal growth and development, and ultimately, how those alterations during fetal life persist into the postnatal animal and lead to alterations in growth, endocrine regulation, and body composition. His other research interests include the effects of postnatal nutrition and specific nutrients on growth and marbling of beef calves. Currently, he is working on a project funded by the USDA NIFA looking at the effects of increased cortisol at birth on postnatal endocrine regulation and development of the appetite control centers of the brain. He conducts most of his research at the Clemson Simpson Station REC and the Clemson Edisto REC, but has also traveled to Argentina to collaborate on research with the National Agricultural Technology Institute (INTA) in Rauch, BA.

Selected Accomplishments

- Received $716,500 in grant funding and $199,700 in industry gifts of money and supplies for research and teaching.
- Served as a Southern Section of ASAS Undergraduate Competition committee member 2015-2019.
- Served as a National ASAS Beef Cattle Nutrition Symposium committee member 2014-2016.
- Published 30 peer reviewed journal articles, 32 national and international meeting abstracts and four popular press articles.
- Traveled to Argentina twice to present his research and to collaborate on 4 research projects with INTA.
- Hosted members of INTA during their visit to Clemson.
- Mentored seven graduate students and served on five additional graduate student committees.

Marzieh Motallebi, PhD

Assistant Professor
Forestry and Environmental Conservation

Marzieh Motallebi is a natural resource economist who works on economic and human dimensions of environmental markets. She received her PhD in Ecology from Colorado State University, where she worked on economic, hydrological, behavioral, and ecological aspects of the water quality trading market in Jordan Lake, NC. Marzieh's current projects are supported by the SC USDA NRCS and the United Sorghum Checkoff Program. She is heavily involved in applying for federal and state grants and collaborating with her colleagues. Her research lab consists of one post-doctoral fellow and one master's student, and she is in the midst of hiring two PhD students for January 2018. She also serves as a search committee member for hiring new assistant professors in the Forestry and Environmental Conservation Department.

Selected Accomplishments

• Awarded a research grant from SC NRCS for Promotion of a Sustainable Carbon Market to South Carolina Forest Landowners (total funds $149,862 (1:1 matching funds)) (PI).

• Awarded a research grant from SC NRCS for Evaluating the Potential of Organic Farming Practices in SC. SC NRCS (total funds $149,752 (1:1 matching funds)) (PI).

• Awarded a research grant from the United Sorghum Checkoff Program for Sorghum as a Feedstuff for Gamebirds and Broilers in the Southeast. United Sorghum Checkoff Program (requested funds $123,415) (Co-PI).

• Awarded a research grant from SC NRCS for Design of a Framework for Payments for Ecosystem Services and Analysis of Adoption Behavior in the Santee Basin. SC USDA NRCS (requested funds $149,730 (1:1 matching funds)) (Co-PI).

• Published four peer-reviewed journal articles, one peer-reviewed conference proceeding article, and one Clemson Cooperative Extension factsheet on "Carbon Offsets for South Carolina Family Forest Landowners."

• Conducted a state-wide survey on forest landowners' perception about willingness to participate in the carbon market.

Sarah A. White, PhD

Associate Professor
Plant and Environmental Sciences

Sarah White is an environmental toxicologist who studies the use of plant-based treatment systems to clean water. She helps both nursery and greenhouse industries adopt technologies to recycle water, preserving water resources for human and environmental purposes, while ensuring continued resources for green industry sustainability. She conducts most of her research in SC, but also collaborates extensively across the continental United States. Current research projects are supported by the National Institute of Food and Agriculture-United States Department of Agriculture – Specialty Crop Research Initiative, the SC Institute for Water Research (USGS), and the Horticulture Research Institute. She serves as faculty advisor for the Horticulture Club. Her research lab consists of one research assistant professor, two PhD students, one Master's student, and three undergraduate research interns.

Selected Accomplishments

- Received an $8.26M + $1.78M cost-share ($10.04M) research grant from NIFA-USDA, Specialty Crops Research Initiative and directed the project with 21 Co-PIs and 9 Institutions to "Clean WateR3: Reduce, Remediate, Recycle" irrigation water at nursery operations (PD).

- Received $26,115 from USGS – Water Resources Commission (Co-PI).

- Received $28,200 from the Horticulture Research Institute (PI).

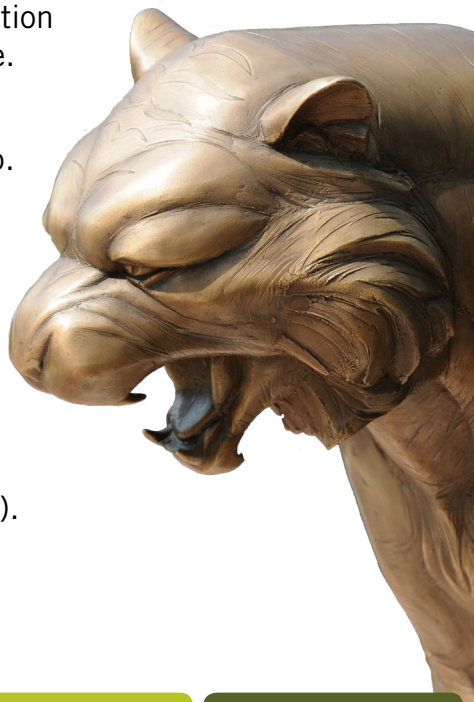
- Chair of the Plant and Environmental Sciences Department Tenure, Promotion and Reappointment Committee and Department Faculty Advisory Committee.

- Chair of the Southern Nursery Integrated Pest Management Working Group.

- Chair of the Executive Committee of the Southern Region American Society for Horticultural Science (SR-ASHS).

- Blue Ribbon Extension Publication Award from SR-ASHS.

- Participated in the Presidents Leadership Institute and LEAD21 (Class 13).



Vernon Burton, PhD

Matthew J. Perry Professor
History, Sociology and Computer Science

Orville Vernon Burton is the inaugural Matthew J. Perry Professor of History at Clemson University. Burton also holds appointments in the departments of Sociology, and Computer Science, and is the Director of the Clemson CyberInstitute. Burton serves as vice chair of the Board of Directors of the Congressional National Abraham Lincoln Bicentennial Foundation. He was elected into the S.C. Academy of Authors in 2015, and in 2017 received the Governor's Award for Lifetime Achievement in the Humanities from the South Carolina Humanities Council. A recognized expert on race relations and the American South, and a leader in Digital Humanities, Burton is often invited to present lectures, conduct workshops, and consult with colleges, universities, and granting agencies. Burton's research and teaching interests include the American South, especially race relations and community, and the intersection of humanities and social sciences.

Selected Accomplishments

• Burton is a prolific author and scholar (20 authored or edited books and more than 200 articles); and author or director of numerous digital humanities projects. The Age of Lincoln (2007) won the Chicago Tribune Heartland Literary Award for Nonfiction and was selected for Book of the Month Club, History Book Club, and Military Book Club. One reviewer proclaimed, "If the Civil War era was America's 'Iliad,' then historian Orville Vernon Burton is our latest Homer." The book was featured at sessions of the annual meetings of African American History and Life Association, the Social Science History Association, the Southern Intellectual History Circle, and the latter was the basis for a forum published in The Journal of the Historical Society . His In My Father's House Are Many Mansions: Family and Community in Edgefield, South Carolina (1985) was featured at sessions of the Southern Historical Association and the Social Science History Association annual meetings .

The Age of Lincoln and In My Fathers' House were nominated for Pulitzers. His most recent book is Penn Center: A History Preserved (2014).

• Burton was selected nationwide as the 1999 U.S. Research and Doctoral University Professor of the Year (presented by the Carnegie Foundation for the Advancement of Teaching and by the Council for Advancement and Support of Education).

• With support from the South Carolina Humanities Council, Burton successfully organized a four-day conference at Clemson titled Lincoln's Unfinished Work," from November 28-December 1, 2018.

Tiffany Creegan Miller, PhD

Assistant Professor
Languages

Tiffany Creegan Miller is an Assistant Professor of Spanish in the Department of Languages at Clemson University. Dr. Miller received her PhD from the University of Kansas in 2014, and her interdisciplinary research intersects literary studies and anthropology to engage in cultural and linguistic revitalization projects of indigenous Mayan languages. Given her work at the crux of indigenous oral cultures and performance, Dr. Miller was an NEH (National Endowment for the Humanities) Summer Scholar at the University of Georgia in Summer 2018. The NEH Summer Institute June 17-29 focused on Digital Technologies in Theatre and Performance Studies.

Selected Accomplishments

• As one of the few non-natives proficient in the Kaqchikel Mayan indigenous language, Miller has been working with Kaqchikel Maya language teachers in Guatemala to record orally circulating Kaqchikel children's songs since 2010. From this ethnographic fieldwork, Dr. Miller has identified "Chila' pa nujuyu'" (Over there on my hill"), "Jun ti sanïk" ("A little ant"), and "Xseqär nana'" (Good Morning, Grandmother") as some of the key songs used in bilingual education initiatives in Spanish and Kaqchikel.

• Funded by the Tinker Foundation and internal grants at Clemson, and through numerous events hosted by Elon and Tulane Universities, her work has garnered her such respect that she has been invited to deliver talks in Guatemala at Oxlajuj Aj, a Kaqchikel Mayan language field school. Bringing some of Clemson's rapidly growing track record in the digital humanities, Miller is continuing on with this collaboration with a sociolinguist from Guatemala by creating digital recordings of songs and poems for use in Kaqchikel language programs in Santa María de Jesús (Junajpu').

• Miller volunteers as a medical translator and interpreter, and has collaborated with a team of researchers affiliated with this NGO to create informational materials about diabetes (rujotolem rukab'il kik') for use in popular education initiatives. Currently, she is working with researchers from Wuqu' Kawoq to develop an online, trilingual medical dictionary in Kaqchikel Maya, Spanish, and English focusing on women's health terminology.

Ehsan Mousavi, PhD

Assistant Professor
Construction Science and Management

Ehsan Mousavi is an Assistant Professor in the Department of Construction Science and Management (CSM) at Clemson University. Dr. Mousavi received his Ph.D. from the University of Nebraska in 2015 and has served in various capacities in the construction industry including dam, road, and building construction projects. Collaborating on projects funded by the U.S. Department of Energy, and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Dr. Mousavi has developed an extensive research background in the indoor air quality of hospitals. Specifically, he has studied the effect of environmental parameters (ventilation rate, ventilation arrangement, temperature, door motion, etc.) on the transmission and spread of pathogenic agents. Moreover, he is the principal investigator for a collaborative research project between GHS and Clemson's CSM Department that has received $62,860 in funding from ASHRAE to conduct literature review for ASHRAE Standard 170-2013.

Selected Accomplishments

• Mousavi has been awarded a prestigious National Science Foundation (NSF) grant of $162,550 for support of a project entitled "RII Track4: Event Based Approach to Model Indoor Airflow Patterns." This award started October 1, 2018 and will end September 30, 2020. As part of this research, he will work with other researchers at the University of California at Berkeley, and will spend the next two summers in residence there.

Stephanie C. Davis, PhD , RN, FNP-BC

Professor and Director of Graduate Programs
School of Nursing

Stehpanie Davis is a nationally certified family nurse practitioner with a clinical specialty in the medical management of weight loss. She also holds a certificate in women's studies from the University of South Carolina. Her research interests include quality of life, body image, sexuality, social support in the experience of breast cancer, international medicine, and instructional pedagogy. Davis (CO-I), and her research team (Margaret Wetsel, Co-I: Veronica Parker, and Kathleen Valentine), are currently working on a grant entitled "Healthy Greenville 2036: Expanding Primary Care Access in Greenville County through Nurse Practitioner Education." The award ($410,000), supported by the Greenville Health Authority (GHA), links Clemson University School of Nursing (CUSON), Greenville Health System (GHS), and the Greenville Health Authority for the purpose of making a significant contribution toward expanding the cadre of nurse practitioners, from under-represented groups in nursing. The award supports 10 nurse practitioner students, from under-represented groups in nursing. Scholarship recipients receive academic, financial, and mentorship support.

Selected Accomplishments

• Davis is a Faculty Scholar in the Clemson University School of Health Research (CUSHR). She was one of 30 faculty across campus chosen for the Inaugural Provost's Leadership Development Summit. She is a past awardee of the Excellence in Graduate Academic Advising award. Dr. Davis is also an awardee of the Palmetto Gold Nurse Recognition and Scholarship Program Recognition of Excellence in Nursing Practice and Commitment to the Profession, awarded by the South Carolina Nurses Association (SCNA).

• Davis serves as the SCNA Nominations Committee Chair and is a member of the Lieutenant Governor's Alzheimer's Disease and Related-Disorders Resource Coordination Center committee. She has served on the Volunteers in Medical Missions Board of Directors for nine years, holding positions as Vice Chair and Personnel/Nominations Committee Chair. Published 30 peer reviewed journal articles, 32 national and international meeting abstracts and four popular press articles.

• Davis has co-led a medical mission trip to South and Central American countries for 14 years during spring break. Dr. Davis and co-faculty have taken undergrad and graduate nursing students, a pre-med student, and construction sciences students on the trips. A trip is planned for spring break 2019 to the Dominican Republic and will include nursing students and a student from the Food, Nutrition, and Packaging Sciences department.

Catherine Mobley, PhD

Professor
Sociology, Anthropology and Criminal Justice

Catherine Mobley holds a B.A. in Sociology from Clemson University, an M.S. in Policy Analysis from the University of Bath (England), and a Ph.D. in Sociology from the University of Maryland. She has been a Professor of Sociology at Clemson University since 1996. Since arriving at Clemson, Mobley has been involved as PI, Co-PI or Evaluator on nearly 45 grants and contracts totaling $6,414,026. Nearly all of this funding has been obtained from external sources, including eight major grants from the National Science Foundation (NSF). Additional funders of her research include the South Carolina Department of Health and Environmental Control, the United Way of Pickens County, and the Clemson University Restoration Institute. Much of Mobley's research is interdisciplinary as she has collaborated with colleagues from across the university. Her primary areas of research are engineering/STEM education, environmental sustainability, and applied sociology. Mobley and her colleagues have received nearly $4.8 million of support from the NSF to study retention and success in STEM education.

Selected Accomplishments

• PI on a recently awarded NSF grant (2018-2021; $398,263) to research educational pathways of Black students in engineering.

• Co-PI on NSF grant (2014-2019: $565,541) to investigate the experiences of student military veterans majoring in engineering. This project has resulted in three journal articles and 19 peer-reviewed conference papers, one of which won a "Best Paper Award" (Military Veterans and Constituents Division of the American Society for Engineering Education).

• Co-PI on NSF grant (2018-2021; $599,950) to assess how virtual reality field experiences enhance learning in the geosciences.

• PI on grant from Greenville Health System (2015; $9,490) to explore the attitudes of underserved populations toward neighborhood-based mobile health care.

• Trevillian Distinguished Professorship, College of Business and Behavioral Science, 2015-2018.

• Clemson University Class of '39 Award for Faculty Excellence, 2014.

• Elected to serve as a Council Member of the Section on Sociological Practice and Public Sociology for the American Sociological Association.

Jeffrey S. Peake, PhD

Professor and Department Chair
Political Science

Jefrrey Peake's research interests focus on the presidency, Congress, and US foreign policy. More specifically, he has written on the domestic politics of international agreements, presidential leadership of the media, and the public and presidential-congressional relations. He teaches courses on the presidency, Congress, media politics, and foreign policy. Peake has been the chair of the Department of Political Science since arriving to Clemson in 2011, after serving on the faculty at Bowling Green State University for 11 years. As chair, Peake has focused on growing the department's faculty to offer a broader range of courses to students, increase the department's research output, and expand the department's international programs. Under his leadership, graduate education has become a focus of the department. Peake's current research focuses on the domestic politics of international agreements and various human rights conventions.

Selected Accomplishments

• Directs the Clemson in Belgrade, Serbia, semester study abroad program. The program is in its fourth year and has grown to 10 students per spring semester taking a full load of Clemson international relations courses in Belgrade each spring semester.

• In the last three years, Dr. Peake has published five peer-reviewed journal articles and book chapters.

• Google Scholar indicates 1,813 citations of Dr. Peake's research, averaging 150 citations over the last five years, with an H index of 17.

• Led a Creative Inquiry team of political science undergraduates that has produced numerous conference presentations, posters, and article publications.

• Peake is a recognized expert on the domestic politics of international agreements. His work has been recently cited in the press, including the NY Times, Wall Street Journal, and Politifact, among others. He consulted with the Daily Show in 2015.

Marten Risius, PhD

Assistant Professor
Management

Marten Risius is a data scientist who addresses substantial business and societal issues in the context of social media and blockchain technologies. In his research he develops algorithms to identify fake news, builds a news recommender system to overcome social media echo-chambers or analyzes blockchain related threats such as the centralization of control and privacy risks. These ambitious projects are pursued together with experts from different departments at Clemson and around the world. His research is covered by major news organizations such as the Boston Globe and has received various national and international research and industry awards. Marten Risius joined the discipline of business administration from a related field and was the first psychologist to ever earn his PhD from the House of Finance at the Goethe University Frankfurt, Germany.

Selected Accomplishments

- Finalist for the Schmalenbach Young Talent Award 2017 $11,400 (10,000€) – Schmalenbach Foundation.

- Awarded with the Young Researcher Award 2017 $8,800 (6,000€) – Frankfurt Chamber of Industry and Commerce.

- Awarded with the TARGION Science Award for Strategic Information Management and Digitalization 2017 $11,400 (10,000€) – INTARGIA Management Consultants.

- Awarded with the German Young Talent Award in Business Administration 2017 $2,850 (2,500€) – VHB (German Academic Association for Business Research).

- Received a $28,500 (25,000€) grant for blockchain research from the German Academic Exchange Service.

- Nominated for the 2018 AIS Early Career Award – International Conf. on Information Systems.

- Finalist for the 2018 Best Conf. Paper Award – Strategic Management Society Conf.

- Awarded with the Best Conf. Paper Award – Pacific Asia Conf. on Information Systems.

Anastasia Thyroff, PhD

Assistant Professor
Marketing

Thyroff researches complex market systems. Specifically, she analyzes consumers, culture, institutions, and the markets they interact in. She's particularly interested in how consumers are impacted by market systems and the role of marketers in shaping and responding to market systems. Her three focus areas within market systems are sustainability, well-being, and market formation and evolution. Thyroff's research has appeared in many top business outlets, including the Journal of Business Research, Academy of Marketing Science Review, Journal of Interactive Marketing, Journal of Consumer Affairs, and Marketing Theory. Some of her research awards include: The SMA Paper in Conference Award (2013), The SMA Solomon Best Paper in Buyer Behavior Track (2012), and The Journal of Consumer Affairs Best Article Award (2011).

Selected Accomplishments

- Published six peer-reviewed academic journal articles in 2018, including two manuscripts in the Journal of Business Research, and a solo-authored manuscript in Marketing Education Review based on Creative Inquiry experience.

- Published three peer-reviewed national conference proceedings in 2018, with seven undergraduate co-authors.

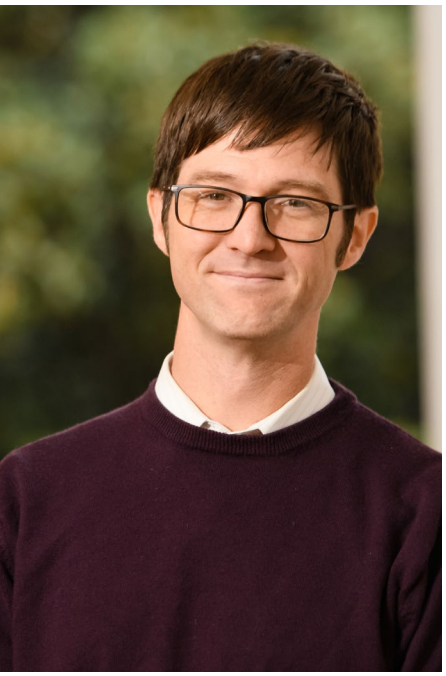
- Received Dan Duncan Research Fellowship.

- Received College of Business Dean's Award for Student Engagement.

- Served on University Business Anthropology Certificate Committee that achieved certificate approval from BOT in 2018.

- Served on Marketing Department Honor's committee and currently advises two undergraduate honors student thesis and one graduate student dissertation.

- Received more than 100 citations for 2013 Journal of Business Research article, titled "To Be or Not to Be Green: Exploring Individualism and Collectivism as Antecedents of Environmental Behavior."



Patrick Warren, PhD

Assistant Professor
John W. Walker Department of Economics

Patrick Warren is an Associate Professor of Economics who has been at Clemson since 2008. Before coming to Clemson, Dr. Warren studied at MIT, earning a PhD in Economics (2008), and an undergraduate degree from the South Carolina Honors College (BArSc, 2001). Dr. Warren's research investigates the operation of organizations in the economy, including for-profit and non-profit firms, bureaucracies, political parties, and even armies. He has written numerous peer-reviewed articles in top economics and law journals. At Clemson, he has served on the Honors College Oversight Board, the University Research Grants Committee, and is a member of the second class of the President's Leadership Institute. He has served on the Faculty Senate since the fall of 2017, representing the College of Business.

Selected Accomplishments

- Received a $99,000 grant from the Naval Postgraduate School of Acquisition and Research Program.

- His research on Russian Twitter Trolls was featured by several news and information outlets including the Wall Street Journal, the New York Times, the Washington Post, the BBC, NPR, the Guardian and the 538 blog.

- He is an active member in the Clemson-Calhoun Rotary Club and with the League of Women Voters.

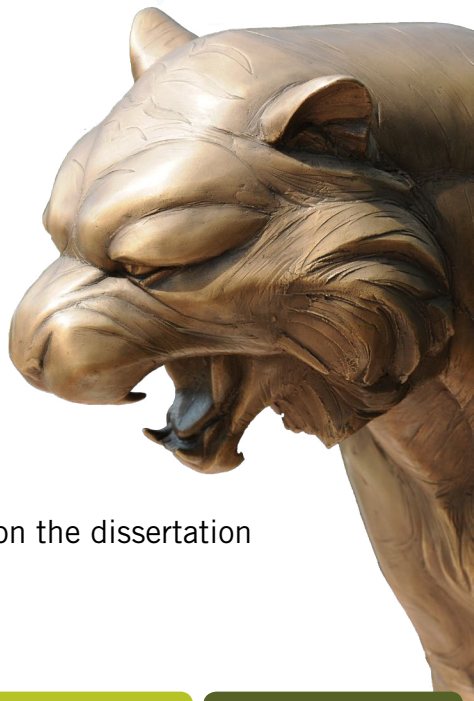
- Patrick has 10 articles published in highly regarded economics and legal journals.

- Has been invited to present his research at more than 25 peer-reviewed conferences and academic institutions.

- Served on the board of the Society for Institutional and Organizational Economics.

- Serves as an associate editor of the Public Finance Review.

- Has served as the dissertation supervisor for five students and has served on the dissertation committee for six other students.



S. Megan Che, PhD

Associate Professor
Teaching and Learning

Megan Che is a mathematics educator who studies issues of social justice and equity in mathematics teaching and learning. Her latest funded research project is a collaboration with faculty in the School of Computing to better understand how teachers can implement rigorous, culturally responsive computer science in introductory high school classes. Additionally, this project prepares teachers from districts across the state to teach introductory computer science classrooms, broadening participation of high school students in South Carolina in computer science. This project supports three doctoral students and four undergraduate students, who engage in project-related research and professional development. Che teaches undergraduate and graduate courses in mathematics education as well as graduate seminar courses in computer science and undergraduate courses for the Honors College. Che has chaired or co-chaired six doctoral students in Curriculum and Instruction.

Selected Accomplishments

• Che, S.M., Kraemer, E., Sitaraman, M. (2017). "CS For All: RPP: A Scalable RPP For Preparing and Supporting Teachers to Teach Culturally Responsive and Rigorous CS Courses in SC High Schools," awarded by the National Science Foundation. $1,015,927. Funded August 2017.

• Served on the standards writing committee for the inaugural computer science standards in South Carolina for grades k-8 (2017-2018).

•Director At Large, Board of Directors, School Science and Mathematics Association, 2017-2020.

• Research Council on Mathematics Learning president-elect (2018-2019).

Kristin K. Frady, PhD

Assistant Professor
Educational and Organizational Leadership

Kris is an educator whose research focuses on how organizational leadership and learning in educational, community, and workforce development applications influence innovative and technologically infused educational programs and solutions. She further examines how these program and solutions relate to educational development and improving access and equity through building educational and career pathways, specifically focusing on technical college applications. As a native South Carolinian and third-generation Clemson graduate, Kris is passionate about applying research and programs in areas of greatest need with the goal of creating innovative and unique opportunities for students and workers throughout the state. Frady is currently a Co-PI on three different National Science Foundation grants researching two-year college educational technology and collegiate STEM preparedness.

Selected Accomplishments

- Principal investigator of the National Science Foundation Research in the Formation of Engineers (RFE). Research: Developing Engineering Experiences and Pathways (DEEP) in Engineering Technology Career Formation. September 2018 – August 2020 $274,879.

- Senior Personnel on the National Science Foundation Research Traineeship (NRT). NRT: Technology-Human Integrated Knowledge Education and Research (THINKER). September 2018 – August 2023. $3,000,000.

- Co-Principal Investigator of the National Science Foundation Advanced Technological Education (ATE). A Sustainable ATE Coordination Network for Enhancing Personalized Learning Using Virtual and Augmented Reality-based Technology Innovations in Technician Education. $792,820.

- Co-Principal Investigator of the National Science Foundation INCLUDES. NSF INCLUDES Statewide Consortium Supporting Underrepresented Populations in Precalculus by Organizational Redesign toward Engineering. December 2017-November 2019. $297,192.

- Co-Principal Investigator of the National Science Foundation. Workshop: Reducing Attrition in Precalculus Pathways to Engineering Degrees (WRAPPED). August 2017-July 2018. Co-PI (30%). $49,711.

- Co-author of upcoming book, Managing Technology and Middle and Low Skilled Employees: Advances for Economic Regeneration, Emerald Publishing Group.

Dani Herro, PhD

Associate Professor
Digital Media and Learning

Dani Herro is a learning scientist who studies how youth and young adults participate and make meaning with technology in order to suggest ways to bridge in-school and out-of-school learning. She has written and studied curriculums implemented in middle and high school classrooms based on video game and app design, as well as curriculums using social, collaborative and other online technologies to solve real world problems. She has also spent the last five years working with hundreds of teachers and students while conducting a longitudinal study on STEAM (Science, Technology, Engineering, Arts/Humanities and Mathematics) Education in underserved schools in South Carolina and Wisconsin. Herro developed four fully online STEAM courses for the College of Education M.Ed. program and teaches two of the courses; she also teaches graduate level courses focused on theory and learning with social media, games and emerging technologies.

Selected Accomplishments

- Received $3 million in funding from NSF and private foundations to study STEAM Education and computer-supported collaborative learning; awarded $95,000 in internal awards for technology-related studies and resources for Clemson students.

- Nominated for the Robert F. Cherry Award for Great Teaching (under review).

- Awarded an Edmund Gordon Fellowship for 21st century learning from 2013-2016.

- Published 26 articles in peer-reviewed journals, 12 conferences proceedings papers, four book chapters, one book review and two white papers in the last six years at Clemson.

- Co-Author of a book on STEAM education in press with Teachers College Press.

- Editor of a series of three books on Digital Media and Learning; two published, one in progress.

- Invited guest speaker in Barcelona, Spain and Rabat, Morocco in 2017 and 2018.

- Invited symposia speaker at the University of Buffalo; selected by education faculty.

Suyi Li, PhD

Assistant Professor
Mechanical Engineering

Suyi Li's research aims at transforming Kirigami and Origami – the ancient art of paper cutting and folding – into a new engineering discipline that can foster the next generations of adaptive structures, multi-functional materials, and re-configurable robots. His current research is supported extensively by the National Science Foundation with more than $1 million in total funding, including an NSF CAREER award. Some of his research papers have been published by prestigious journals like Physical Review Letters and Advanced Materials. Besides research, Li is also passionate about bringing Origami and Kirigami into the classroom other arenas of education. He is establishing a Creative Inquiry team, in collaboration with Clemson Engineers for Developing Countries (CEDC), to design origami emergency shelters for communities in Haiti. He also brings his research group to Greenville Artisphere every year and showcases origami-inspired engineering to the public.

Selected Accomplishments

- $500,000 NSF CAREER Award on multi-functional origami materials (PI).
- $192,604 NSF research grant on origami dynamics (PI).
- $715,182 NSF collaborative research grant on adaptive Kirigami composites (Lead PI).
- Clemson CECAS Dean's Faculty Fellow Award.
- Eastman Award for Faculty Excellence.
- Best Paper Award (as the lead author), by ASME Adaptive Structures and Materials Systems Branch in Aerospace Division.
- Published 10 peer-reviewed journal papers, and another 10 conference proceedings.
- Elected to serve on the program committee of SPIE Smart Structures + NDE Conference.

Fei Peng, PhD

Associate Professor
Materials Science and Engineering

Fei Peng is currently an associate professor in the Department of Materials Science and Engineering at Clemson University. Peng's research is focused on the advanced processing of ceramics, material thermodynamics and kinetics, and properties. The materials of interest include the structural and high temperature ceramics for the extreme environments, high performance sensors for medical and health applications and extreme environment monitoring, materials for renewable energies, and nuclear materials. Peng's current research projects are focused on additive manufacturing of ceramics, thermal and environmental barrier ceramic coatings, nuclear fuel fabrication, high performance sensors, ceramic nanofibers and composites, smart materials, sintering of ultra-high temperature ceramics, and the high-temperature oxidation resistance of borides and carbides.

Selected Accomplishments

• Received $600,000 from the U.S. Department of Energy (DoE) for research on "Integrated TBC/EBC for SiC Fiber Reinforced SiC Matrix Composites for Next Generation Gas Turbines" (co-PI).

• Is a Junior Investigator in the recently funded $11 million grant from NIH on the topic of "South Carolina COBRE for Translational Research Improving Musculoskeletal Health (SC-TRIMH)" (co-PI); $1 million to Fei Peng's credit over five years.

• Received $1.6 million from DoE for research on "Laser 3D Printing of Highly Compacted Protonic Ceramic Electrolyzer Stack" (co-PI).

• Received $800,000 from NASA (subtract from BWXT) for research on "Fabricating Uranium Mononitride Powder and Microsphere using Sol-Gel Processing" (PI).

• Served as faculty advisor of Materials Advantage (MA) and Keramos student professional societies. Helped MA receive $1,500 for a 3D printer from the Glass and Ceramic Industry Foundation for the K-12 classroom demonstration to attract more students to the field of materials science and engineering.

• Member of advisory board of Bulletin of American Ceramic Society.

• Elected as program chair of Basic Science Division of the American Ceramic Society.

Weichiang Pang, PhD

Associate Professor
Civil Engineering

Weichiang Pang is an Associate Professor of Civil Engineering who is most interested in reducing and mitigating hurricane-induced damage risk to coastal communities. Ideally, he would like to design a hurricane-resistant home by understanding the impact of wind-borne debris on structures. His current research projects are supported by the US Forest Service, the US Department of Transportation, the National Science Foundation, the US Endowment for Forestry and Communities, and the American International Group. Pang currently teaches courses on Statics, Reinforced Concrete Design, Wood Design, Risk Assessment, and Earthquake Engineering. He also taught a Creative Inquiry (CI) on "Bamboo Reinforced Concrete as a Sustainable Alternative to Steel Reinforced Concrete." He serves as faculty advisor of the American Society of Civil Engineers (ASCE) Steel Bridge Team. His research lab currently consists of two post-doctoral fellows, eleven Doctoral Students, and four Master's students.

Selected Accomplishments

- Received a $344,956 grant from the United States Department of Agriculture, Forest Service as PI in 2016.
- Received a $305,000 grant from the United States Endowment for Forestry and Communities as PI in 2017.
- Received five project awards totaling $534,599 from the American International Group as PI in 2018.
- Awarded the Intelligent Infrastructure Professorship in 2018.
- Published 23 peer-reviewed journal articles during the past five years.
- Graduated three PhD students and one MS thesis student in 2016-2018.
- Serves as an Advisory Committee Member for the SC Department of Insurance and SC Building Codes Council, Loss Mitigation Program, SC Safe Home, 2015-present.
- Served as Session Chair for the 2nd International Bridge Seismic Workshop held in Shanghai, China in 2017.

Leah Casabianca, PhD

Assistant Professor
Chemistry

Leah Casabianca's work is in the area of using Nuclear Magnetic Resonance (NMR) to investigate the interactions between small molecules and the surface of nanomaterials. This work is important when using nanomaterials as catalysts, drug-delivery vehicles, and implantable medical devices. It also has applications to understanding why nanomaterials used in everyday products could be toxic. Casabianca's work has gained international attention, and she has given talks at conferences in Canada and Sri Lanka. She is dedicated to helping recruit and train the next generation of female chemists, both through advising graduate and undergraduate research students and through outreach to middle-school girls in collaboration with Women in Science and Engineering (WISE). Her work is supported by the National Science Foundation and the American Chemical Society Petroleum Research Fund.

Selected Accomplishments

• Awarded an NSF CAREER award ($575,000), a Doctoral New Investigator Award from the American Chemical Society Petroleum Research Fund ($110,000), and was the lead PI on a Major Research Instrumentation Grant from the National Science Foundation for the purchase of a 500 MHz NMR spectrometer with cryoprobe ($478,169).

• Published six independent and two collaborative papers since arriving at Clemson (three papers have undergraduate co-authors).

• Chaired the 2018 Southeastern Magnetic Resonance Conference.

• Awarded the 2018 College of Science Rising Star in Discovery Award.

• Serves as the faculty co-advisor to the Student Affiliates of the American Chemical Society (the undergraduate chemistry club).

• Serves on the Editorial Board of Scientific Reports, an open-access journal of the Nature Publishing Group.

• Chair of the Chemistry Department seminar committee and serving on the College of Science Global Engagement Committee.

• Currently advising two graduate and four undergraduate students (all female).

Hugo Sanabria, PhD

Assistant Professor
Physics and Astronomy

Hugo Sanabria is an experimental biophysicist who studies the relationship between structure, dynamics, and function of biomolecules. He pioneered single molecule fluorescence spectroscopic approaches for structural biology. His primary interest is to understand how information is transferred and encoded by dynamic proteins at synapses, the region that connects neurons. Current research projects are sponsored by NIH and NSF. Sanabria currently teaches the introductory physics courses for the Honors college. He is committed to global engagement activities and leads two Creative Inquiry (CI) programs. His research lab consists of two post-doctoral fellows, one lab manager, three graduate students, one undergraduate intern, and two Creative Inquiry teams.

Selected Accomplishments

- 2018 NSF CAREER Awardee ($634,261).
- Co-PI on a Research Experience for Undergraduate grant from NSF ($419,295).
- Jr. Investigator on the COBRE SC TRIMH ($11,028,141).
- Co-I on an NIH R01 collaboration with Stony Brook University ($341,433).
- Received a CU-Fellows grant to expand the research capacity of Clemson University ($133,594).
- Co-I on an R01 collaboration with the University of Texas Health Science Center ($661,867).
- Co-PI from the 100k strong in Americas, to promote student mobility between U.S. and Mexico Institutions ($25,000) with the invitation to the White House to receive the award (2015).
- Received a DAAD fellowship through the Heinrich Heine University Alumni Program to sponsor a Ph.D. student summer research stay in Germany (2018).

Rajan Sekhon, PhD

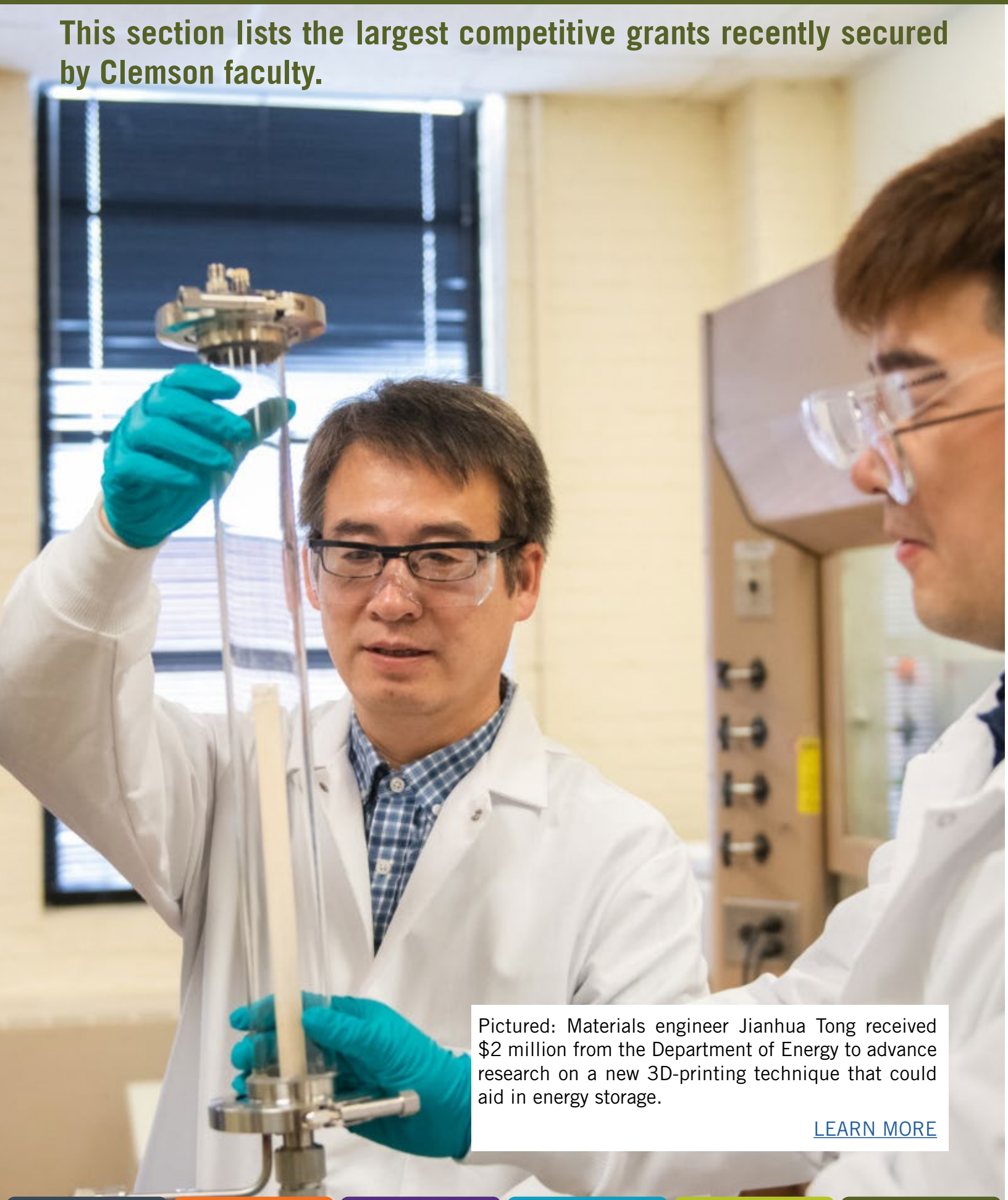
Assistant Professor
Genetics and Biochemistry

Rajan Sekhon is a plant geneticist who investigates the genetic regulation of important agronomic traits in corn and sorghum relevant to southeastern agriculture. He and his team are investigating the genetic mechanisms that would allow corn plants to photosynthesize for a longer period (stay green) and produce more food. Another project in his lab combines plant genetics with structural engineering and mathematical modeling to improve lodging (bending or breaking of stalks) resistance of corn and sorghum. This project was recently awarded a $6 million multi-institutional grant to Sekhon and his collaborators from the National Science Foundation. Supporting the land-grant mission of Clemson University, and to prepare the next generation of crop geneticists, Sekhon trains 10-15 Clemson students in crop genetics every year in his research plots at the Simpson Research Farm and in his laboratory.

Selected Accomplishments

- Awarded $1.6 million as part of $6 million grant from NSF-EPSCoR program to improve lodging resistance in corn and sorghum.
- Received a $200,000 grant from NIFA-Hatch program.
- Published five peer-reviewed research papers in international journals.
- Developed a new course on epigenetics.
- Co-developed a course on statistical genomics.
- Mentored undergraduate students via MaGNET (Maize Genetics Network Enhancement via Travel) program at the annual Maize Genetics Conference at Saint-Malo, France.
- Served on department executive committee.

This section lists the largest competitive grants recently secured by Clemson faculty.



Pictured: Materials engineer Jianhua Tong received $2 million from the Department of Energy to advance research on a new 3D-printing technique that could aid in energy storage.

LEARN MORE

1 Curtiss Fox received $2.3M from the Department of Energy

Project Title: High Speed Medium Voltage CHP System with Advanced Grid Support

Summary: This project pairs Clemson University with TECO Westinghouse, a leading manufacturer of electric motors, generators and drives. Researchers will use the eGRID facilities in Charleston to develop and test a medium voltage high speed CHP, combined heat and power system, to improve power generation efficiency and reliability for manufacturing environments.

2 Narendra Vyavahare received $2.2M from the National Institutes of Health

Project Title: Medial Arterial Calcification: Mechanisms and Therapy

Summary: Degradation and calcification of elastin fibers in arteries occurs as individuals age, but for patients with diabetes or chronic kidney disease, calcification of elastin can lead to cardiovascular disease or other unfortunate outcomes like lower extremity amputation. Clemson researchers, working with colleagues at MUSC, have developed nanoparticles that target calcified tissues in order to remove mineral deposits.

3 Ranjandeep Sekhon received $2.1M from the National Science Foundation

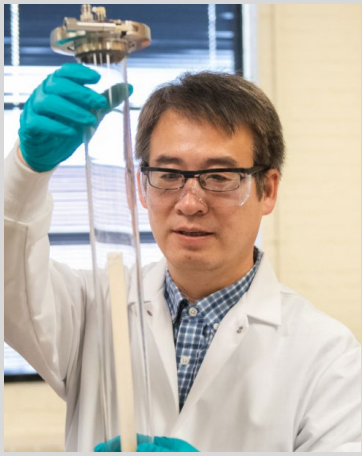
Project Title: A Multiscale, Multiphysics, Modeling Framework for Genome-to-Phenome Mapping via Intermediate Phenotypes

Summary: Clemson joins University of Kentucky and University of Idaho to examine how plant genetics lead to stalk lodging resistance, the breaking or snapping of plant stems prior to harvest, in maize and sorghum. Clemson will contribute its expertise in genetics and modeling to identify the genes responsible for this complex agricultural problem.

4 Jianhua Tong received $2M from the Department of Energy

Project Title: Laser 3D Printing of Highly Compacted Protonic Ceramic Electrolyzer Stack

Summary: Four Clemson researchers will use laser 3D printing technology (L3DP), an emerging additive manufacturing technology, to manufacture complex ceramic parts rapidly and inexpensively. These ceramic parts are integral to the production of hydrogen gas for use in solid oxide fuel cells.



5 Vincent Richards received $1.9M from the National Institutes of Health

Project Title: Oral Microbiomes and Dental Caries in a Human Immunodeficiency Virus Infected Population

Summary: Clemson researchers will collaborate with colleagues at the University of Florida and Dartmouth to examine how the altered oral microbiomes of Nigerian children being treated for HIV lead to dental caries, or tooth decay, in order to develop effective prevention strategies.

6 William Richardson received $1.8M from the National Institutes of Health

Project Title: Systems Mechanobiology Modeling for Patient-Specific Cardiac Fibrosis

Summary: Cardiac fibrosis, or the thickening and stiffening of the cardiac muscle or valves, is prevalent in patients who will progress to heart failure. This project will create new integrated models to predict cardiac fibrosis.

7 Anand Gramopadhye received $1.8M from the U.S. Navy

Project Title: Time for Robotics – Technology in Manufacturing Education for Robotics

Summary: Focusing on the advanced manufacturing talent pipeline, Clemson researchers will develop a novel hybrid educational program integrating E-learning and virtual reality to better equip students – from those in high school to those at the graduate level – for careers in advanced manufacturing.

8 Jane Riese received $1M from the Dept. of Health and Human Services

Project Title: PA Department of Health, Olweus Bullying Prevention Program for Community Youth Organizations

Summary: DHHS and the Pennsylvania Department of Health are working with Clemson University's Olweus Bullying Prevention Program researchers to develop a comprehensive K-12 bullying prevention training and certification program for Pennsylvania community youth organizations.

9 Harlan Russell received $900K from the U.S. Deptartment of Education

Project Title: Leadership Development for PhD Students in Electrical and Computer Engineering

Summary: Clemson University will work to fill a critical need for electrical and computer engineers at the doctoral level by providing seven doctoral fellowships to high-achieving students from underrepresented groups. These fellowships will aid in the recruitment and support of students with the aim of increasing the talent pipeline.

10 Sarah Griffin received $800K from the Centers for Disease Control

Project Title: South Carolina County Health Extension: High Obesity Prevention and Elimination

Summary: In 2015, South Carolina ranked among the top states for the numbers of counties with obesity rates exceeding 40% of the adult population. Clemson University, using the community networks sustained by its Cooperative Extension units, will lead a project aimed at obesity intervention and prevention in three adversely affected South Carolina counties.

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