



RESEARCH

A Carnegie R1 Institution



*Research Report
Board of Trustees
January 2022*

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▶ From the Vice President for Research

Dear Board of Trustees members,

I hope you enjoyed a restful holiday break with your families and I trust you are all healthy and doing well. I wish you all a healthy and prosperous 2022.

For our research enterprise, I am expecting to start the year with big news. By the time we meet at the end of January, I expect that the latest Carnegie Classification will have been officially released and that yet again Clemson University will be named among the most active research universities in the United States. The preliminary data released by Carnegie just before the holidays indicate Clemson will be reconfirmed as an R1 institution in the upcoming announcement. **For our research enterprise, this is our national championship.** It is a major achievement, a key goal of our ClemsonForward strategic plan, and reflective of a total team effort.

Being an R1 institution helps Clemson recruit the best faculty and students, opens the door for more collaboration and funding, boosts our overall national reputation, and attracts industry looking for a reputable, world-class academic research partner in South Carolina.

Carnegie tracks 10 metrics (**figure 1**) at universities across the country to compile its classifications. Clemson has improved in most metrics since 2015.

Doctoral universities are grouped into three categories: D/PU - Doctoral/Professional Universities; R2 Doctoral Universities – High Research Activity; and R1 Doctoral Universities – Very High Research Activity. Carnegie collects the data every three years to compile its university classifications.

Clemson first became an R1 university in 2015 and – based on analysis of performance among peers – continues to solidify its place among the nation’s most active research institutions. Clemson is

Figure 1: Carnegie Metrics

Metrics	Clemson 2015	Clemson 2021	Change
Science & Engineering Expenditures	\$117M	\$165M	+\$48M
Non-Science & Engineering Expenditures	\$44M	\$54M	+\$10M
Postdoc & Non-Faculty Researchers	65	162	+97
PhD Humanities	2	7	+5
PhD Social Sciences	9	25	+16
PhD STEM	143	156	+13
PhD Other	62	55	-7
Per Capita Science & Engineering Expenditures	\$180K	\$174K	-\$6K
Per Capita Non-Science & Engineering	\$52K	\$56K	-\$4K
per Capita Postdoc & Non-Faculty Researchers	0.08	0.17	+0.09

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▶ From the Vice President for Research

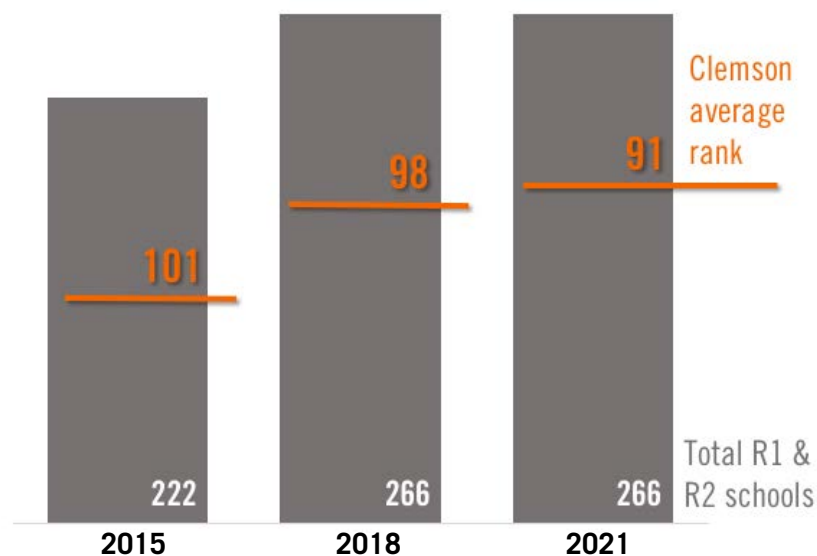
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in strong position to remain an R1 institution.

While Carnegie does not rank schools, the Division of Research has been analyzing Clemson's performance in Carnegie metrics to estimate its position among Carnegie R1 and R2 institutions.

Clemson has improved its position since 2015 from No. 101 out of 222 R1 and R2 schools to No. 91 out of 266 schools (**figure 2**). Clemson is penetrating deeper into the field of perennial R1 institutions.

Figure 2: Clemson Position among Carnegie Schools



While we await official notice from Carnegie, there is still much good news to report. As you know, our research enterprise has grown substantially in recent years. That growth has continued so far in fiscal year 2022:

- Competitive research awards are up 29 percent in the first quarter ([page 16](#)).
- Competitive research expenditures have increased 30 percent ([page 14](#)).
- Faculty continue to be successful earning high-value awards ([pages 17-19](#)) and continue to submit proposals for high-value research projects ([page 15](#)).

Behind this success, of course, are exceptional faculty members and students. It is important to recognize the great impact they are having through their research. A group of students designed and built an autonomous vehicle ([page 27](#)). A biochemistry major became the first Clemson student to become a Rhodes Scholar ([page 28](#)). An interdisciplinary team is helping manufacturers modernize machinery ([page 28](#)). A Clemson artist's work will be displayed in a movie ([page 30](#)). Two students developed new equipment to improve farm operations ([page 32](#)). A Clemson faculty member received a lifetime achievement award in recognition of her impact to the state's life sciences industry ([page 35](#)). Another faculty member was named among the nation's rising stars ([page 35](#)).

Clemson research is full of exciting stories like these. I have compiled several pages of significant accomplishments and impact stories on [pages 27-38](#). Additionally, the colleges have provided brief profiles of faculty members to give you a sense of the breadth of research activity at Clemson ([pages 39-56](#)). I hope you enjoy reading these stories as much as I have.

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From the Vice President for Research

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Research Efficiency

Finally, I would like to note how efficiently we have managed growth in our research enterprise. Our growth in productivity in the form of awards, submissions and expenditures has greatly outpaced any additions to the faculty body or student population ([page 7](#)).

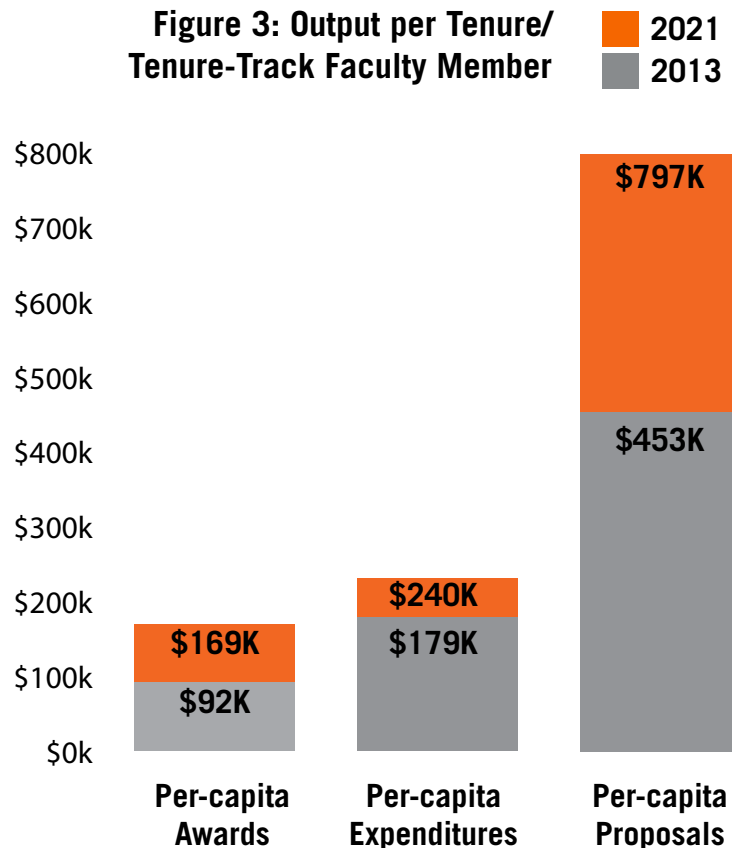
In fact, per-capita output has increased significantly with tenure/tenure-track faculty earning more awards and submitting more proposals than they were eight years ago. Figure 3 compares the average number of research awards, expenditures and proposals per faculty member from 2013 to 2021. The growth in per-capita productivity is remarkable.

The Division of Research has managed a great increase to workload without notable additions to staff size. We have implemented several strategies to both manage and conduct research more efficiently ([page 9](#)).

As we analyze research activity at other institutions, we see universities with higher levels of research activity have larger faculty bodies or more research space available, or both ([page 11](#)). When comparing our research activity to our peers, Clemson's research enterprise is at capacity.

I am proud of what we have accomplished at Clemson. It truly is a great time to be a Tiger.

Figure 3: Output per Tenure/ Tenure-Track Faculty Member



Tanju Karanfil

Respectfully submitted,

Tanju Karanfil, Ph.D., PE, BCEE, IWA Fellow
Vice President for Research, Clemson University

RESEARCH EFFICIENCY

This section covers institutional research efficiency.

Executive Summary

- *Percentage increases to research productivity (i.e. awards, proposals and expenditures) have increased at a greater rate than increases in inputs ([page 7](#)).*
- *Per capita output - research expenditures and awards per researcher and per tenure and tenure-track faculty - have increased considerably ([page 8](#)).*
- *The Division of Research has managed a significant increase in workload (i.e., additional proposal submissions, award management, compliance protocols, safety management, etc.) without increasing staff. To improve efficiency, the Division of Research has implemented strategies to better manage research safety, compliance protocols and facility usage ([page 9](#)).*
- *When comparing ourselves to peers, Clemson is above average in research expenditures per available space ([page 10](#)).*
- *When reviewing research enterprises at peer Carnegie R1 universities, we see that institutions with higher levels of expenditures (greater output) have larger faculty bodies and/or more available space ([page 11](#)). This suggests Clemson is operating at capacity.*

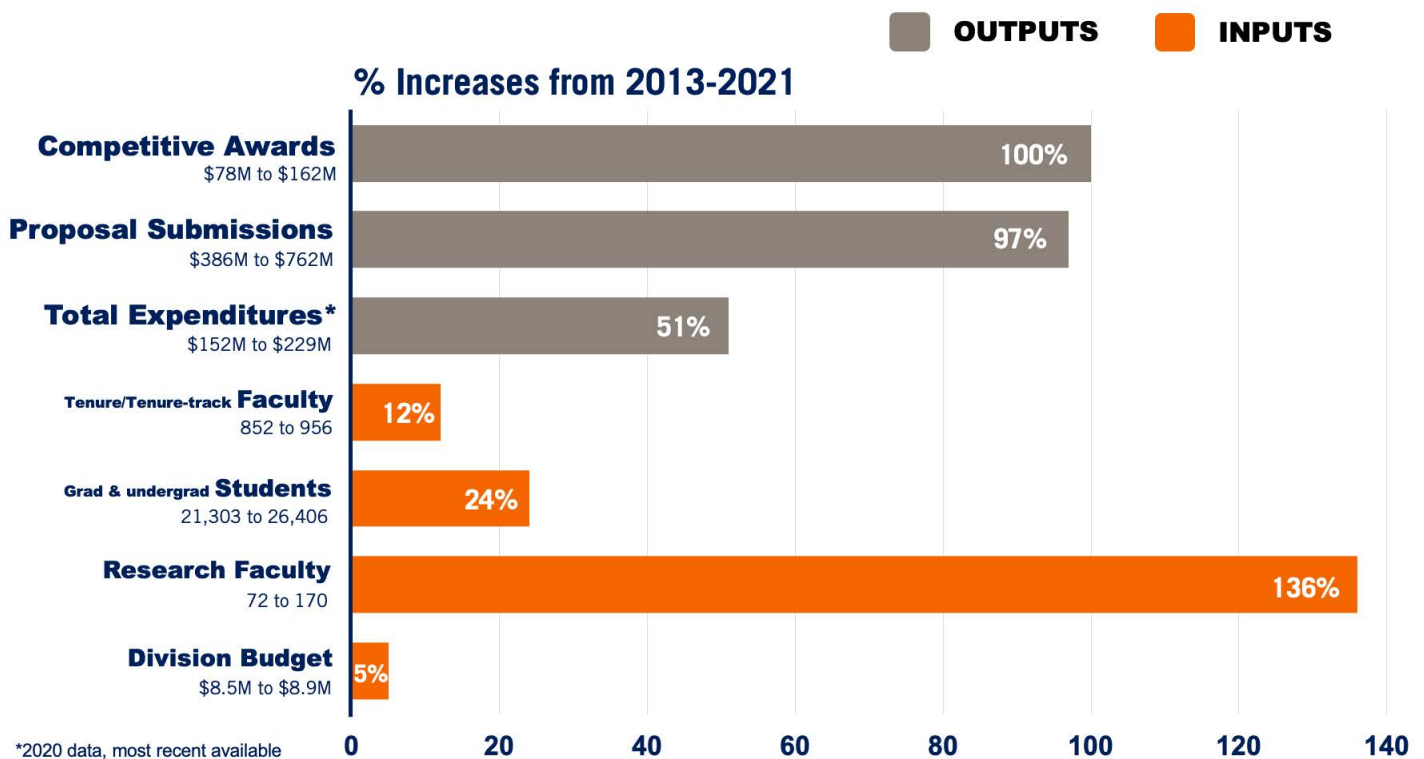
Gains in Productivity Outpace Inputs

To review research efficiency, we analyzed our productivity and have experienced notable improvements in the past seven years.

Research outputs, which are productivity measures including awards, submissions and expenditures, have been increasing at a greater percentage than our inputs, or the number of faculty members, students and Division of Research support services and staff who account for that research output (see chart below).

In the chart below, the gray bar represents outputs, and the orange bar denotes inputs. The bars show growth from 2013 to 2021, the most recent fiscal year for which year-end data is available. Total expenditures compare 2013 to 2020 because year-end data is not yet available for 2021.

The number of research faculty has increased substantially. Funds for those positions are covered by the grants and included in proposals submitted by faculty. The increase in research faculty is attributed to faculty members' increased success in earning competitively bid projects.

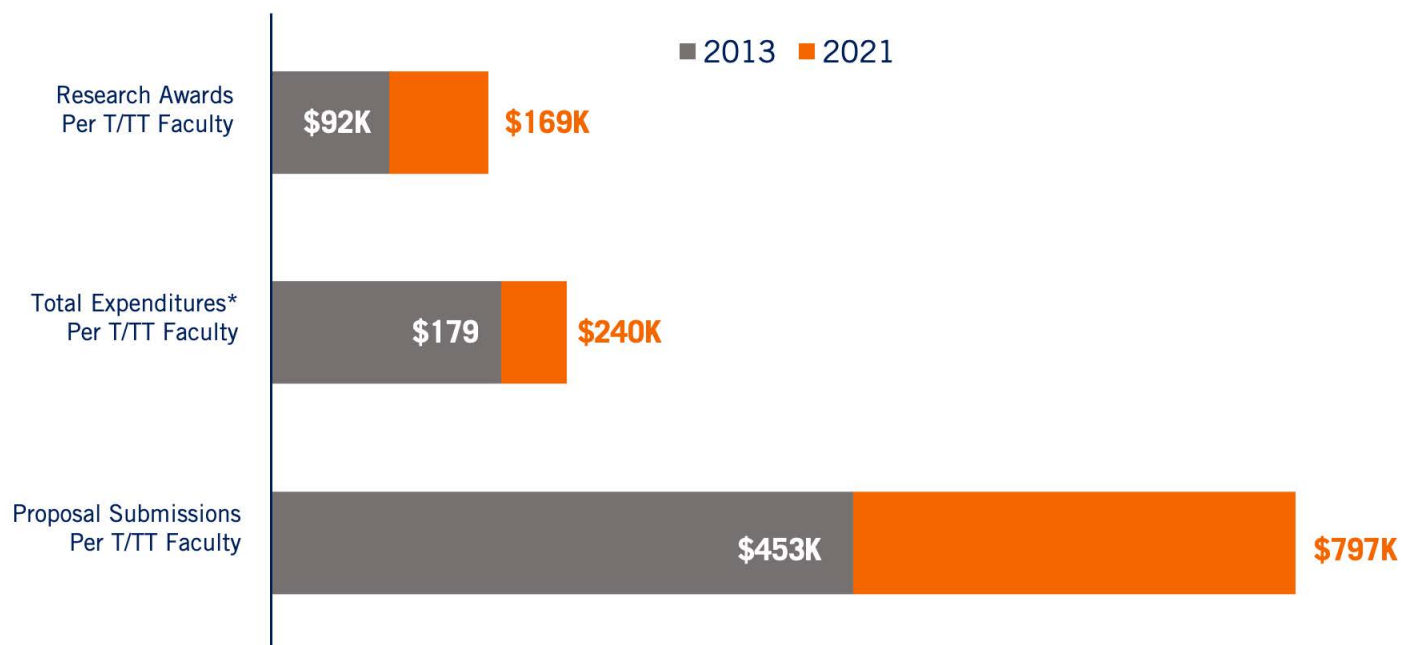


Per-capita Productivity is Increasing

To further review efficiency, we analyzed productivity on a per-capita basis.

We can see that on a per-capita basis, we are more productive than we were eight years ago.

In the chart below, the gray bar represents the per-capita output in 2013 and the orange bar represents the per capita output in 2021. Per-capita output is the number of awards, expenditures and proposal submissions per tenure/tenure-track faculty member. Data for total expenditures is for 2020 because 2021 data is not yet available.



*2020 data, most recent available

T/TT = Tenure/Tenure Track Faculty

Steps to Improve Research Efficiency

To improve operational efficiency and handle the increased workload, the Division of Research invested in new digital management solutions and implemented new operational procedures. These measures have not only saved the Division time, but they have saved Clemson faculty time, as well, allowing them to devote more time on submitting proposals, conducting research and educating students. Several Division efficiency measures are listed below.

BioRAFT Digital Safety Management

BioRAFT makes it easier for faculty, staff and students to complete safety training online, digitally inventory chemicals and other materials, track safety equipment, and streamline lab inspections. The system reduces paperwork and provides a single, user-friendly online platform for safety management. Researchers at other universities reported spending **60.5% less time** on average completing the top 15 common safety tasks when using BioRAFT. Additionally, researchers spent **53%-84% less time** on training and other safety specific tasks.



iLab Core Facility Management

iLab is a user-friendly online system for scheduling, invoicing and usage analysis at Clemson's core research facilities. The system integrates with the existing PeopleSoft system for billing, allows credit card payments for external users, and allows users to track their usage and budgets across multiple facilities.

Online Compliance Review

The Office of Research Compliance implemented online submission modules into the InfoEd digital administration platform for the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), and the Institutional Biosafety Committee (IBC). InfoEd already is used by faculty to submit grant proposals, so now they can manage research compliance with InfoEd as well, saving time. Previously, researchers manually submitted research protocols via email to the compliance committees for regulatory review. When received, ORC manually entered the data into InfoEd and manually updated it for the life of the project. The new process increases transparency and efficiency.

Facility Training Program

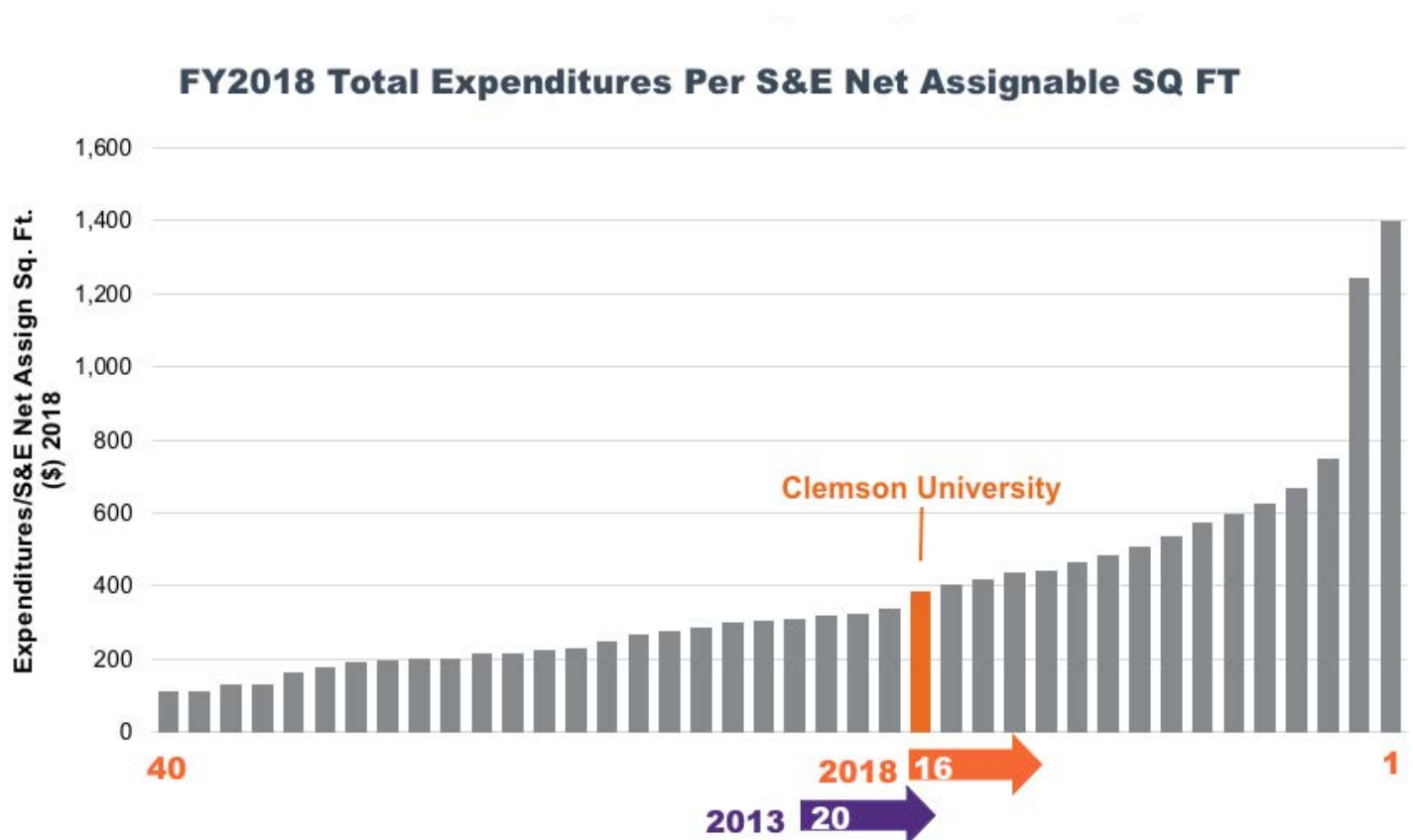
Through a new equipment-assistance program, highly trained Electron Microscopy Facility staff members are working directly with all faculty users associated with select high-end, unique and complex instrumentation. This optimizes faculty members' time on this equipment by reducing time spent trouble-shooting or correcting errors. **Faculty members have reported a 50% time reduction**, or a savings of \$40,000 in one fiscal year. Additionally, EMF has implemented a training system to allow users to use less-complex equipment independently after receiving training. That has freed up staff time to focus on other tasks, such as instrument maintenance and working with other users on more complex equipment.

Operating Efficiently Compared to Peers

To analyze efficiency, we also compare ourselves to our peer institutions, which we define as public R1 universities without medical schools. The chart below includes expenditures per square footage of space assigned for Clemson (the orange bar) and our peer R1 institutions.

As the chart below shows, we are slightly above average in expenditures per available space. Clemson is middle of the pack in this category, ranking No. 16. This was up four spaces from 2013 (No. 20) as our total expenditures have increased substantially.

To dig deeper, we plotted these institutions based on the size of the research workforce and the amount of available space to see if there was a correlation to production, or research expenditures (see the chart on the next page).



Productivity at available capacity

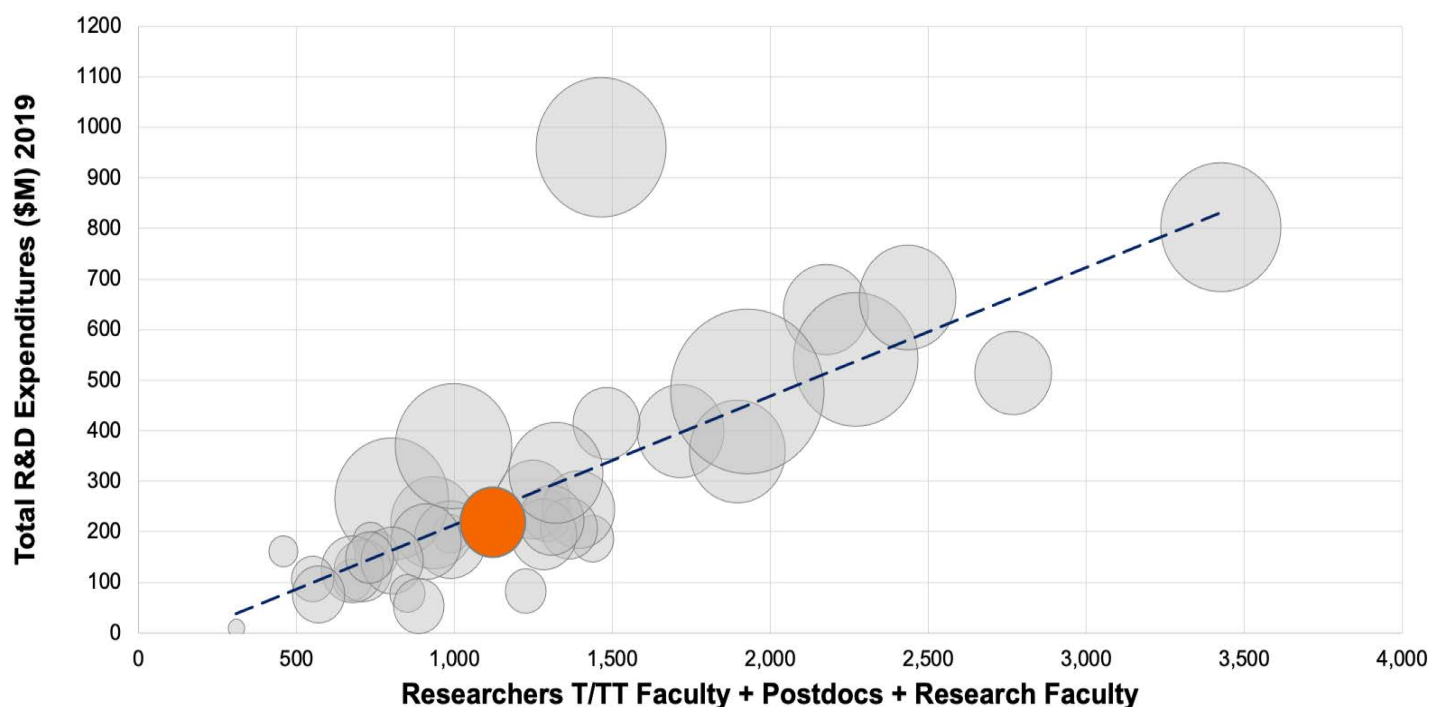
Growth in Clemson's research enterprise has been extraordinary and largely accomplished without an increase to the size of the faculty body or the number of researchers available to do the work. To estimate where Clemson can go from here, we can compare research activity (in this case signified by expenditures), the size of the research workforce and the space available to that of our peer institutions.

The chart below plots Clemson's peer R1 universities (similar public universities without medical schools) and Clemson (the orange bubble) based on number of researchers, amount of space available and total expenditures. The size of the bubble depicts research space available: the bigger the bubble, the more space.

When plotting universities this way, we see that universities with higher levels of expenditures also have larger faculty bodies and/or more available space. This suggests that Clemson is operating at its research capacity, so further research growth would require faculty hiring and investments in space.

Total Expenditures by Researchers Per Science and Engineering Space:

The size of the bubble depicts amount of space; Clemson is the orange bubble



RESEARCH METRICS

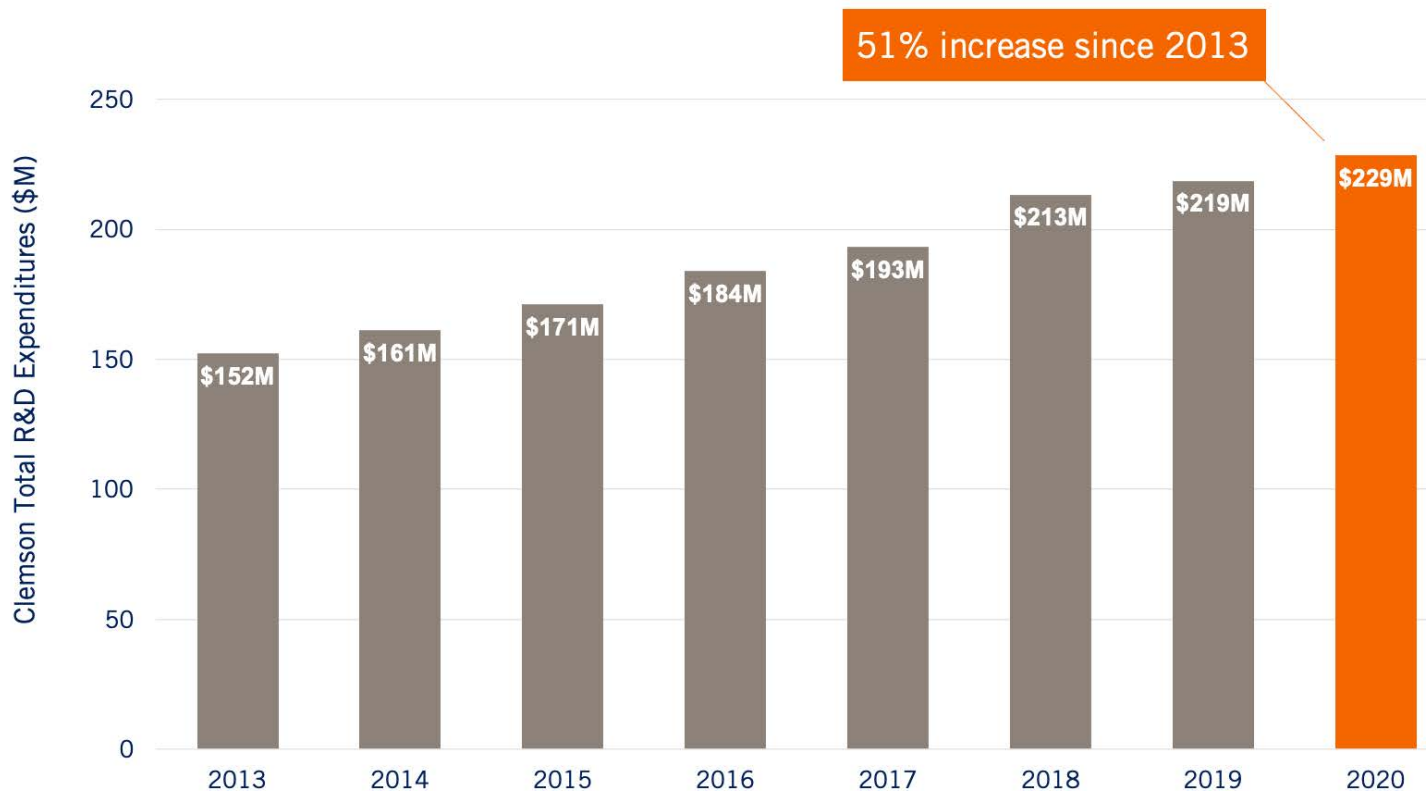
This section covers institutional research productivity with data on proposal submissions, awards and expenditures.

Executive Summary

- *Information in this section covers research activity through the first quarter of Fiscal Year 2022, the latest period for which data was available. More current figures will be presented at the Research and Economic Development Committee meeting.*
- *Total R&D expenditures, which include funds from all research revenue, have increased 51% since 2013 ([page 13](#)).*
- *Competitive expenditures, which include funds from competitively bid awards, are up 30% in the first quarter compared to the same period a year ago ([page 14](#)).*
- *Proposal submissions remain strong as faculty continue to pursue high-value projects ([page 15](#)).*
- *Research awards increased nearly 30% in the first quarter compared to the same period in FY2021 ([page 16](#)).*
- *Clemson faculty have earned numerous high-value grants. Descriptions of the 10 highest value grants are on [pages 17-19](#).*
- *The research report card provides additional information, including research metrics per college, innovation cluster and business unit ([pages 19-23](#)).*

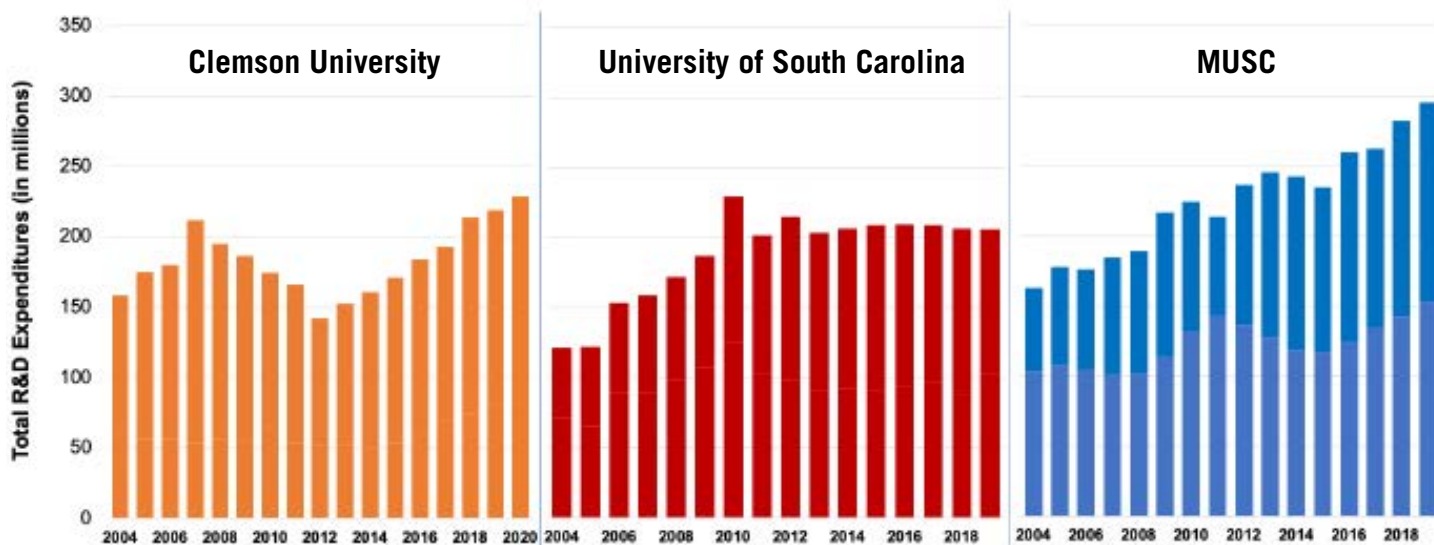
Total R&D expenditures continue to increase

This data includes expenditures on all research revenue, including state support, gifts, external research services, competitive awards, and other sources. In 2020, total R&D expenditures increased nearly 5 percent from the previous year.



SOURCE: NSF Higher Education Research and Development (HERD) Survey

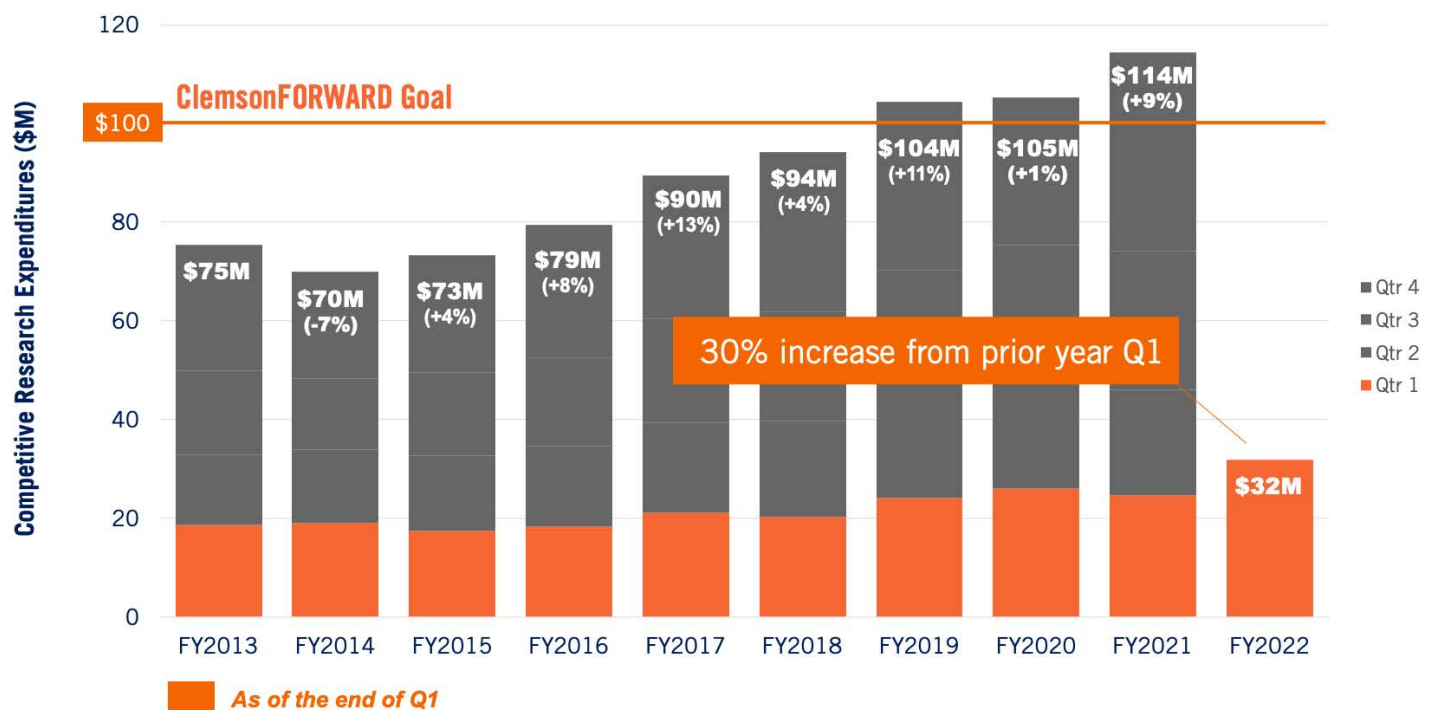
Used in the Carnegie Classification, this data is reported to the National Science Foundation, which allows for an apples-to-apples comparison to peer institutions. Total R&D at Clemson has surpassed University of South Carolina.



Competitive expenditures up from prior year

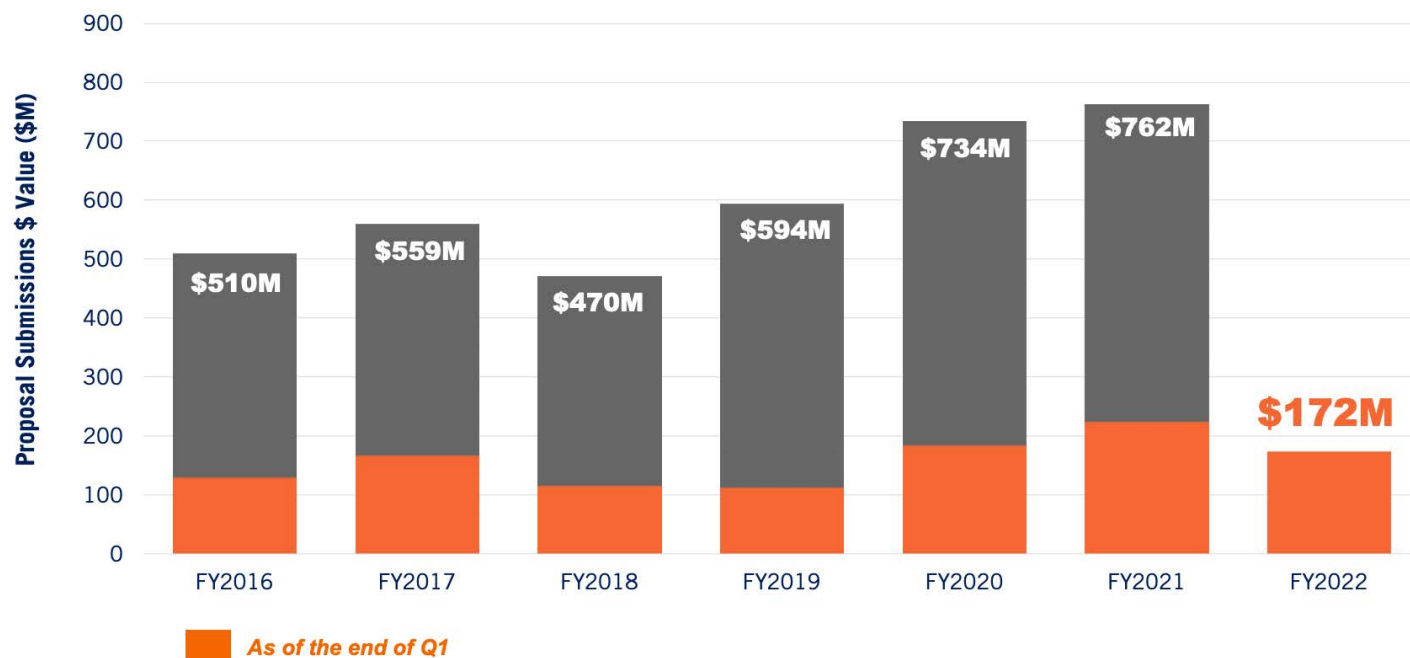
In the ClemsonForward strategic plan, Clemson University aimed to surpass \$100 million in annual competitive expenditures by 2026. Clemson achieved that goal (marked on the graph below with an orange line) seven years ahead of schedule in 2019 and notched more than \$100 million in competitive expenditures again in fiscal years 2020 and 2021. FY2022 is off to a strong start with competitive expenditures increasing 30 percent in first quarter when compared to the same quarter in the prior fiscal year.

Competitive expenditures include funds from competitively bid projects, such as highly competitive federal grant awards.

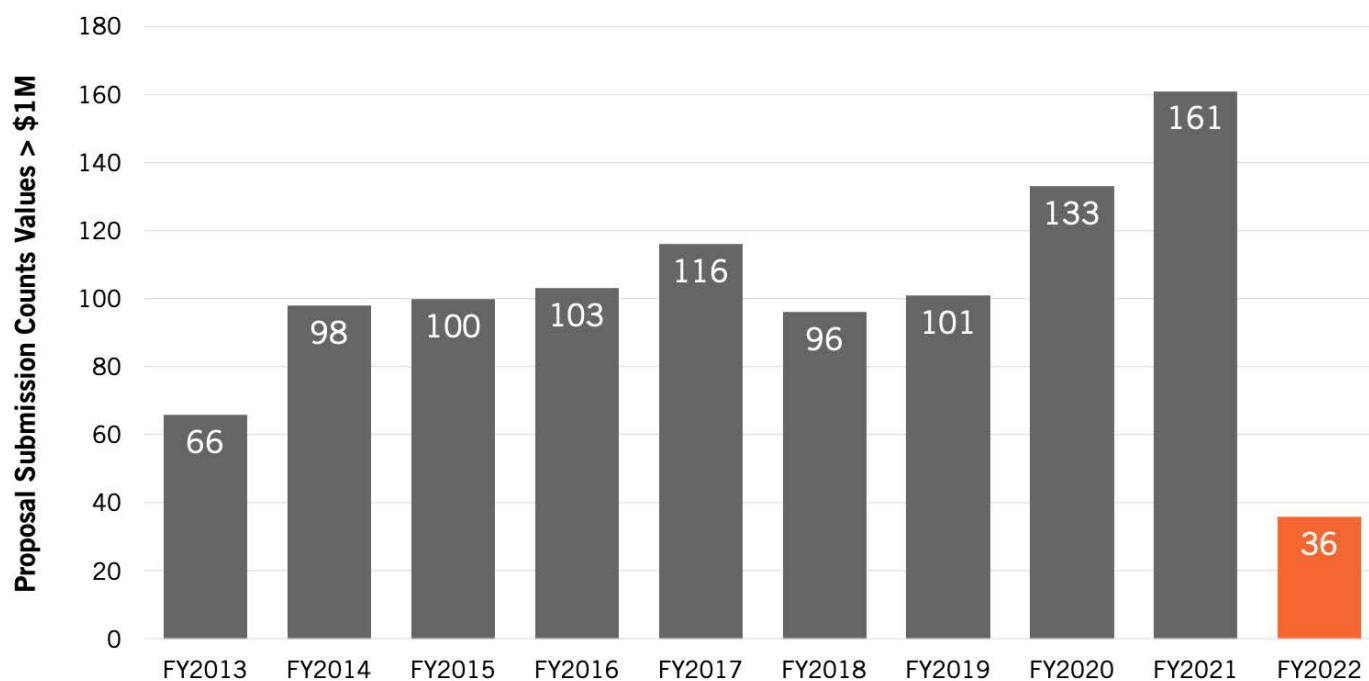


Proposal submissions

Even as faculty have earned more awards, they continue to pursue more funding opportunities. In FY2021, proposals increased 4 percent from FY2020, which had been a high mark. Proposal submissions remain strong so far in FY2022.

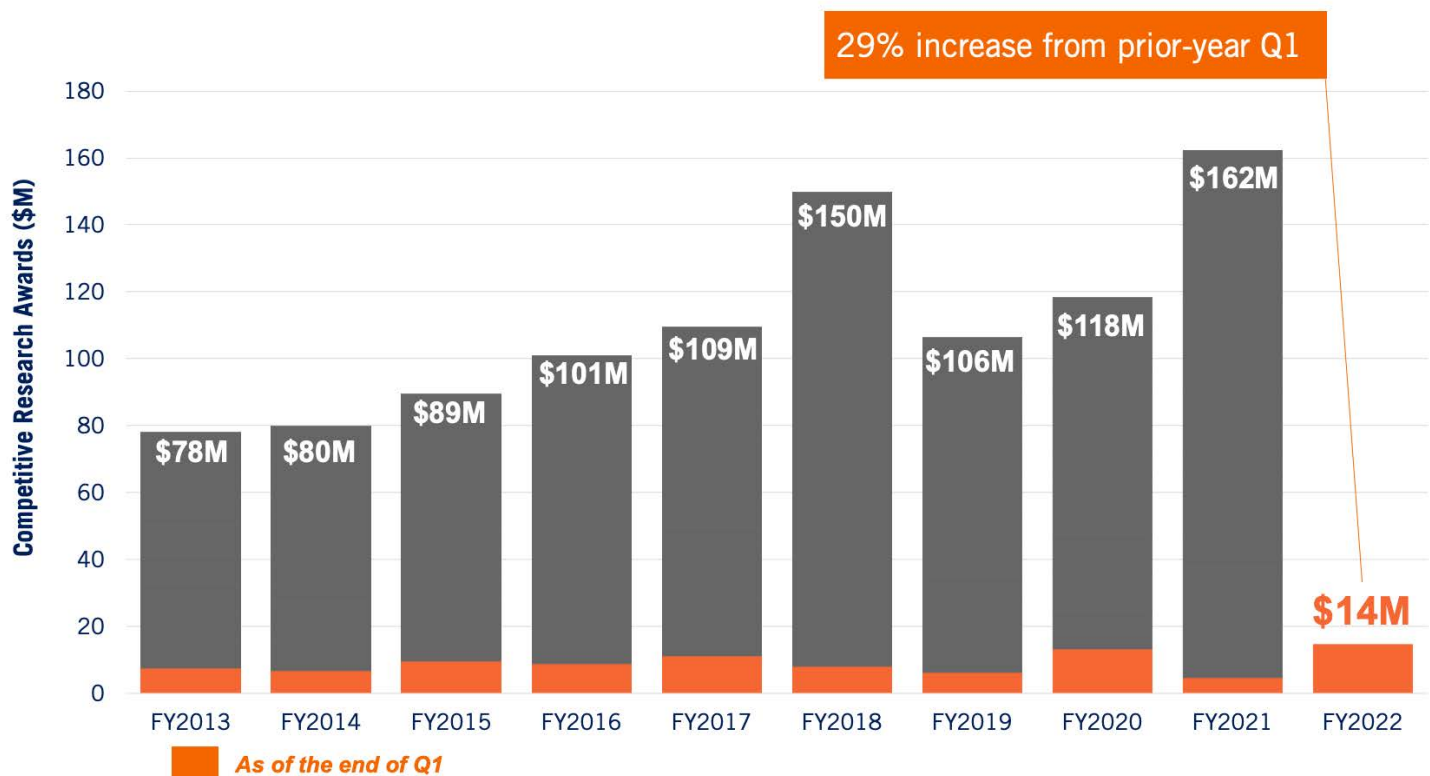


Clemson faculty are increasingly going big, submitting proposals for grants valued \$1 million and above, as shown in the chart below.



Research awards up 29% from prior year

Funding agencies continue to reward high-quality proposals and ideas from Clemson faculty. In particular, Clemson faculty are earning higher value awards of \$2 million and more, as shown in the graphic at the bottom of the page. This is fueling an ongoing upward trajectory in research awards received, as shown in the chart below. FY2021 was particularly strong with awards up 37 percent from the prior year. FY2022 is off to strong start, as awards are up 29% in the first quarter.



Earning High-Dollar Awards

68

RESEARCH AWARDS
OF AT LEAST \$2M
WON SINCE 2015

THE TOTAL
VALUE OF THESE
PROJECTS IS

\$309
MILLION

Top Competitive Research Awards

Received between June 8, 2021 and Jan. 3 2022

Stephen Lance, director of the Youth Learning Institute (YLI), received \$5.9 million from the S.C. Department of Health and Human Services (DHHS) to support quality assurance on South Carolina Medicaid-funded long-term care services. The project will evaluate activities with the goal of improving Medicaid services and reducing the rate of rising costs. YLI will provide training and plan, coordinate, and host a statewide two-day conference for 300 DHHS staff, service contractors and others.



Lance



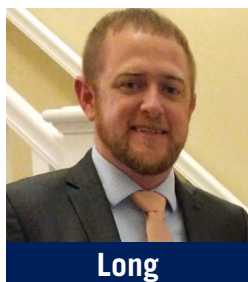
Pilla

Srikanth Pilla, the Jenkins endowed professor of automotive engineering, received \$5.8 million from the U.S. Department of Energy to redesign a new multi-material vehicle component that is lighter and more fuel efficient. The project will seek to make new lighter components cost-effective and easily mass produced while meeting or exceeding current component fit, function, performance, durability and safety. Major participants include Honda R&D Americas, Clemson Composites Center, Ohio State University, Huntsman Advanced Materials, Zoltek Corp., Altair Engineering, MSC Corp., Moldex3D, Siemens USA, Carbon Conversions Inc. and Proper Group.

Joe Watkins, chair of General Engineering, received \$5 million from the U.S. Army to support the development of next-generation diode laser systems to be used for national defense. This project will utilize Clemson University's Center for Optical Materials Science and Engineering Technologies (COMSET). The multidisciplinary team includes experts from materials science and engineering, electrical and computer engineering, chemistry and physics.



Watkins



Long

Steven Long, assistant director of Regulatory Services, received \$3 million from the U.S. Department of Agriculture to help eradicate infestation of the Asian longhorned beetle in Charleston and Dorchester counties. This non-native pest has the potential to spread to other areas of the United States and cause extensive loss to ornamental and commercial tree species and forested areas, along with associated industries that either utilize wood or its products or depend on tourism related to tree species.

Corey Kalbaugh, assistant professor of Public Health Sciences, received \$2 million from the Hutchinson Cancer Research Center to assess the efficacy of certain vaccines in preventing the spread of the SARS-CoV-2 virus. Clemson has been selected as a site to participate in a randomized clinical trial to test the efficacy of the Moderna vaccine in preventing SARS-CoV-2 infection in U.S. college students ages 18-26.



Kalbaugh

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Top Competitive Research Awards

Received between June 8, 2021 and Jan. 3 2022

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Kaminski

Rebecca Kaminski of the Department of Education and Human Development received \$2 million from the U.S. Department of Education to research the best approach for teachers working with English learners. Researchers will spend the next five years working with school districts in the South Carolina Midlands to discover effective approaches that K-12 educators studying literacy and English for Speakers of Other Languages (ESOL) can use to improve their teaching practices, student outcomes and parent/caregiver involvement in student learning.

Leslie Hossfeld, dean of the College of Behavioral, Social and Health Sciences, received \$1.8 million from DHHS to support the Clemson Rural Health Program. Clemson Rural Health is the organizing framework for the University's preventive and primary health care services delivered in underserved and rural communities statewide. Through the program, Clemson partners with a wide range of stakeholders to expand access to quality health care, improve health outcomes, and promote healthy behaviors and overall wellness of individuals, families, and communities.



Hossfeld

James Hollis, director of the S.C. Meat Poultry Inspection Department with Clemson Livestock-Poultry Health, received \$1.8 million from the U.S. Department of Agriculture. The Meat Poultry Inspection Department works to protect the health of consumers by providing a comprehensive inspection service to assure that meat and poultry products are safe, wholesome and accurately labeled.



Chowdhury

Mashrur "Ronnie" Chowdhury, Eugene Douglas Mays Chair of Transportation, received \$1.4 million from the U.S. Department of Transportation in support of the Center for Connected Multimodal Mobility (C2M2). Through this project, an interdisciplinary research team is working to develop new technologies that support safe, efficient, cost-effective, connected, cyberphysical multimodal transportation systems that will improve the mobility of both people and goods.

Kasra Sardashti, assistant professor of physics and astronomy, received \$1.3 million from the National Science Foundation to study new technologies for use in quantum computing. Quantum computing, an emerging computing technology, surpasses the performance and speed of classical computing systems. In place of the bits used in classical computers, quantum computers make use of quantum bits or qubits that are capable of greater computing capacity using less energy. Clemson University leads a research team, including faculty from Virginia Tech, Cal Tech and NYU, focused on developing specialized hybrid architectures to enhance the connectivity of qubits.



Sardashti

Research Report Card (through First Quarter FY2022)

INDEX

CAAH: College of Architecture, Arts & Humanities

CAFLS: College of Agriculture, Forestry & Life Sciences

CBSHS: College of Behavioral, Social & Health Sciences

CECAS: College of Engineering, Computing & Applied Sciences

COE: College of Education

COB: College of Business

COS: College of Science

CCIT: Clemson Computing & Information Technology

PSA: Public Service & Agriculture

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 1st Quarter	
a. Proposal Submissions by Number		1,414	1,443	1,489	1,478	1,529	1,451	1,417	1,729	1,583	297	
1	CAAH	38	51	65	62	69	64	69	76	61	7	
2	CAFLS	235	230	224	222	241	229	377	473	401	64	
3	CBSHS	81	93	102	104	112	101	105	143	151	30	
4	CECAS	549	555	582	617	618	587	562	672	596	131	
5	COE	51	54	39	45	46	37	39	42	37	9	
6	COB	7	15	13	15	7	10	5	11	14	2	
7	COS	242	247	263	239	230	227	186	219	229	38	
8	CCIT	12	12	6	3	5	1	1	1	-	-	
9	PSA	88	90	118	97	170	163	33	37	26	6	
10	VP for Res & Interdisc Inst	31	17	7	17	14	12	25	29	29	7	
11	All Other	80	79	70	57	17	20	15	26	39	3	
b. Proposal Submissions by Dollar Value (in millions)		\$386M	\$547M	\$507M	\$510M	\$559M	\$470M	\$594M *	\$734M	\$762.4M	\$172.1M	FY2022 Targets
12	CAAH	N/A	N/A	\$9.4	\$8.6	\$3.1	\$5.7	\$4.4	\$5.9	\$5.6	\$2.1	\$7.7
13	CAFLS	N/A	N/A	\$42.6	\$23.8	\$43.4	\$37.1	\$68.4	\$92.9	\$84.1	\$14.1	\$70.9
14	CBSHS	N/A	N/A	\$28.4	\$40.1	\$41.4	\$25.9	\$87.5	\$41.1	\$64.3	\$13.9	\$53.1
15	CECAS	N/A	N/A	\$260.5	\$281.2	\$306.4	\$235.5	\$255.3	\$405.9	\$342.9	\$86.7	\$338.7
16	COE	N/A	N/A	\$13.8	\$14.7	\$18.1	\$19.1	\$10.1	\$18.9	\$22.4	\$4.8	\$16.5
17	COB	N/A	N/A	\$7.5	\$4.3	\$2.8	\$1.8	\$2.1	\$2.9	\$4.2	\$1.9	\$2.5
18	COS	N/A	N/A	\$100.2	\$111.3	\$95.9	\$100.4	\$73.8	\$129.3	\$175.4	\$35.9	\$106.5
19	CCIT	N/A	N/A	\$4.3	\$2.0	\$4.0	\$0.9	\$4.6	\$3.0	\$0.02	-	-
20	PSA	N/A	N/A	\$23.3	\$10.4	\$31.3	\$25.8	\$11.4	\$6.4	\$5.6	\$5.6	\$17.2
21	VP for Res & Interdisc Inst	N/A	N/A	\$5.6	\$7.7	\$6.0	\$12.7	\$68.5	\$19.8	\$22.3	\$6.6	
22	All Other	N/A	N/A	\$11.4	\$5.6	\$6.0	\$5.0	\$7.4	\$7.7	\$35.7	\$0.5	

*This figure includes a large \$107M proposal

Research Report Card (through First Quarter FY2022)

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 1st Quarter
c. Research Awards (in millions)		\$78.0M	\$79.7M	\$89.3M	\$100.9M	\$109.5M	\$149.8M	\$106.3M	\$118.3M	\$162.2M	\$39.8M
23	CAAH	\$0.2	\$0.6	\$0.7	\$1.4	\$0.5	\$1.9	\$2.0	\$1.4	\$1.4	\$0.2
24	CAFLS	\$7.3	\$6.7	\$14.1	\$8.6	\$10.9	\$13.9	\$14.2	\$22.3	\$24.2	\$6.1
25	CBSHS	\$2.7	\$3.4	\$4.8	\$5.1	\$4.6	\$8.1	\$5.9	\$7.7	\$17.4	\$1.7
26	CECAS	\$34.2	\$37.7	\$48.2	\$45.5	\$54.0	\$80.8	\$50.4	\$48.0	\$75.0	\$19.8
27	COE	\$2.6	\$4.1	\$3.2	\$2.9	\$2.8	\$4.5	\$3.3	\$2.3	\$5.1	\$1.5
28	COB	\$2.0	\$1.1	\$1.3	\$0.8	\$1.2	\$1.1	\$0.8	\$1.2	\$0.2	\$0.7
29	COS	\$10.3	\$7.8	\$9.9	\$15.6	\$19.9	\$14.7	\$18.7	\$14.2	\$25.4	\$5.2
30	CCIT	\$1.6	\$5.7	\$0.7	\$0.8	\$0.5	\$1.3	\$0.1	\$0.3	\$0.7	-
31	PSA	\$14.8	\$12.3	\$9.6	\$13.0	\$7.9	\$6.6	\$4.0	\$4.1	\$5.8	\$3.7
32	VP for Res & Interdisc Inst	\$1.8	\$0.3	\$0.6	\$5.1	\$5.0	\$15.1	\$6.2	\$14.6	\$5.1	\$0.2
33	All Other	\$0.3	\$0.2	\$1.2	\$2.0	\$1.2	\$1.7	\$0.7	\$2.2	\$1.9	\$0.7
d. National Young Investigator Awards		4	3	4	7	9	8	6	10	10	
34	NSF CAREER Awards (by start date)	4	1	3	5	7	7	4	6	9	-
35	NIH KO1	-	-	-	-	1	1	-	1	-	-
36	Air Force Young Investigator Awards	-	-	1	2	1	-	1	-	-	-
37	Army Young Investigator Awards	-	-	-	-	-	-	-	1	-	-
38	DARPA Young Investigators Awards			-	-		-	-	1	-	-
39	EPA Earley Career Awards	-	-	-	-	-	-	1	-	-	-
40	DOE Early CAREER Awards	1	-	-	-	-	-	-	-	1	-
41	Department of Homeland Security	-	1	-	-	-	-	-	-	-	-
42	Dept. of Ed. Inst. of Educational Sciences	-	-	-	-		-	-	1	-	-
e. Supporting Workforce											
43	Graduate Student Enrollment	4,206	4,372	4,670	4,664	4,425	4,985	5,282	5,627	5,538	5,716
44	Sponsored Graduate Research Assistants	822	745	707	693	696	761	558	637	546	715
45	Postdoctoral Fellows	48	64	83	85	90	97	98	98	106	113
46	Research Faculty: Permanent 100% Non-E&G Funded	6	6	6	11	17	14	11	18	12	6
47	Research Faculty: Temporary 100% Non-E&G Funded	18	18	15	14	24	27	29	54	45	35

Research Report Card (through First Quarter FY2022)

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 1st Quarter
f. Sponsored Research Expenditures by Business Unit (in millions)		\$75.4M	\$70.0M	\$73.3M	\$79.5M	\$89.5M	\$94.2M	\$104.5M	\$105.3M	\$114.4M	\$31.8M
48	CAAH	\$0.5	\$0.4	\$0.4	\$1.1	\$1.3	\$1.4	\$1.7	\$1.6	\$1.1	\$0.3
49	CAFLS	\$8.8	\$7.7	\$6.8	\$8.6	\$11.1	\$11.0	\$14.1	\$16.4	\$15.0	\$3.5
50	COB	\$1.2	\$1.2	\$1.1	\$1.0	\$0.9	\$0.8	\$0.8	\$0.7	\$0.7	\$0.2
51	CECAS	\$35.0	\$35.0	\$35.0	\$37.5	\$42.9	\$45.1	\$50.3	\$46.4	\$54.4	\$16.6
52	CBSHS	\$3.1	\$2.8	\$3.7	\$4.1	\$4.4	\$4.9	\$5.3	\$6.7	\$9.0	\$2.6
53	COE	\$3.3	\$3.3	\$3.8	\$2.5	\$2.6	\$2.2	\$2.5	\$2.4	\$2.3	\$0.7
54	COS	\$13.2	\$10.5	\$9.3	\$11.3	\$14.8	\$16.7	\$17.2	\$17.3	\$15.9	\$4.1
55	CCIT	\$2.0	\$1.6	\$3.4	\$2.8	\$0.4	\$0.6	\$0.2	\$0.1	\$0.2	\$0.2
56	PSA	\$4.7	\$4.9	\$5.8	\$5.6	\$5.7	\$5.9	\$3.7	\$3.9	\$5.5	\$1.7
57	VP for Res & Interdisc Inst	\$1.9	\$1.3	\$1.9	\$3.5	\$3.9	\$3.9	\$7.1	\$9.5	\$9.6	\$1.7
58	All Other	\$1.7	\$1.7	\$2.2	\$1.5	\$1.5	\$1.6	\$1.5	\$0.4	\$0.7	\$0.3
g. Sponsored Research Expenditures by Innovation Cluster (in millions)		\$75.4M	\$70.0M	\$73.3M	\$79.5M	\$89.5M	\$94.2M	\$104.5M	\$105.3M	\$114.4M	\$31.8M
59	Advanced Materials	\$14.3	\$11.3	\$10.7	\$10.4	\$10.7	\$12.1	\$15.4	\$13.5	\$14.3	\$4.5
60	Cyberinfrastructure & Big Data Science	\$10.3	\$10.5	\$10.1	\$8.9	\$8.1	\$9.6	\$6.9	\$4.4	\$5.5	\$2.4
61	Energy, Trans. & Advanced Manufacturing	\$4.7	\$5.7	\$7.2	\$7.6	\$17.8	\$16.8	\$17.1	\$14.5	\$19.9	\$6.1
62	Health Innovation	\$13.1	\$10.2	\$10.2	\$12.5	\$16.3	\$17.8	\$23.8	\$27.1	\$27.1	\$6.4
63	Human Resilience	\$8.2	\$7.7	\$9.7	\$9.8	\$7.8	\$8.6	\$9.0	\$9.7	\$12.7	\$3.1
64	Sustainable Environments	\$18.3	\$16.9	\$17.9	\$21.7	\$18.9	\$19.5	\$20.6	\$23.9	\$21.3	\$5.7
65	Other	\$6.5	\$7.6	\$7.4	\$8.6	\$9.9	\$9.6	\$11.7	\$12.1	\$13.6	\$3.6
h. Sponsored Research Expenditures by Funding Source (in millions)		\$75.4M	\$70.0M	\$73.3M	\$79.5M	\$89.5M	\$94.2M	\$104.5M	\$105.3M	\$114.4M	\$31.8M
66	Federal Government	\$62.9	\$56.9	\$58.5	\$65.1	\$74.6	\$78.2	\$85.1	\$85.2	\$95.1	\$28.1
67	Foundations, Societies, and Associations	\$4.2	\$4.3	\$4.7	\$4.1	\$4.7	\$5.1	\$7.4	\$6.9	\$6.2	\$0.8
68	Industry/Other	\$4.9	\$5.6	\$6.1	\$6.9	\$6.8	\$6.3	\$5.3	\$5.5	\$4.8	\$1.2
69	International	\$0.8	\$0.6	\$0.8	\$0.8	\$0.5	\$0.4	\$0.3	\$0.3	\$0.4	\$0.1
70	Local Government	\$0.6	\$0.6	\$0.6	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.8	\$0.2
71	State Government	\$1.9	\$1.9	\$2.7	\$2.0	\$2.4	\$3.7	\$5.7	\$6.8	\$7.3	\$1.4

Research Report Card (through First Quarter FY2022)

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 1st Quarter
i. Sponsored Research Expenditures per T/TT Faculty by College											
72	CAAH	\$3,299	\$2,264	\$2,343	\$5,841	\$8,177	\$8,945	\$10,159	\$10,003	\$6,912	\$2,099
73	CAFLS	\$88,570	\$81,120	\$69,612	\$84,618	\$105,396	\$103,814	\$134,555	\$137,438	\$131,195	\$28,266
74	COB	\$14,415	\$13,047	\$11,510	\$9,683	\$8,855	\$8,269	\$8,200	\$6,991	\$7,132	\$1,603
75	CECAS	\$169,754	\$160,698	\$163,406	\$163,685	\$194,323	\$214,280	\$225,620	\$201,553	\$223,843	\$67,117
76	CBSHS	\$27,982	\$26,853	\$33,764	\$42,376	\$34,751	\$39,532	\$40,301	\$50,495	\$67,202	\$19,559
77	COE	\$54,779	\$51,688	\$62,195	\$38,037	\$44,483	\$40,197	\$47,371	\$47,742	\$48,805	\$14,206
78	COS	\$95,724	\$72,421	\$61,912	\$77,589	\$95,956	\$110,206	\$118,600	\$116,020	\$107,258	\$26,045
79	Clemson Average	\$83,858	\$75,089	\$78,826	\$85,753	\$84,297	\$103,706	\$99,125	\$96,497	\$103,187	\$31,707
j. Additional information											
80	NIH R01-Equivalent Awards (by start date)	-	-	2	2	2	3	6	1	3	-
81	Doctorates Awarded (August and December)	187	217	237	233	231	234	301	249	225	144
82	STEM Doctorates Awarded (August and December)	118	153	165	138	156	171	174	162	159	108
83	Disclosures	102	129	70	60	65	51	62	68	44	14
84	Patents	16	15	15	14	18	11	18	12	15	9
85	Licenses/Options	9	7	7	5	10	11	19	13	13	3
86	Licensing Revenue		\$762,811	\$360,131	\$354,827	\$539,490	\$461,755	\$398,136	\$315,578	\$239,074	\$91,006
87	Start-up Companies (based on licenses/options)	1	4	4	2	3	3	5	1	1	1

RESEARCH NEWS

This section highlights research news and accomplishments of Clemson faculty and students

Executive Summary

- *Clemson University Researchers of the Year Lior Rennert and Rhondda Thomas are having considerable impact on society ([pages 24-25](#)). They are prepared to present their research at the upcoming Research and Economic Development Committee meeting.*
- *Derek Dalton is one of the world's top accounting researchers ([page 26](#)). He is prepared to present his research at the upcoming Research and Economic Development Committee Meeting.*
- *Clemson faculty and students continue to have great impact through research and are earning accolades:*
 - » *A group of students designed and built an autonomous vehicle ([page 27](#)).*
 - » *A biochemistry major became the first Clemson student to become a Rhodes Scholar ([page 28](#)).*
 - » *An interdisciplinary team is helping manufacturers modernize machinery ([page 28](#)).*
 - » *A Clemson artist's work will be displayed in a movie ([page 30](#)).*
 - » *Two students developed new equipment to improve farm operations ([page 32](#)).*
 - » *A Clemson faculty member received a lifetime achievement award in recognition of her impact to the state's life sciences industry ([page 35](#)).*
 - » *Another faculty member was named among the nation's rising stars ([page 35](#)).*



President Clements, center, poses for a group photo with Researcher of the Year nominees and recipients of the University Research, Scholarship and Artistic Achievement Awards.

Researcher of the Year

An infectious disease expert and a humanities scholar who has helped tell the story of African Americans in America were named Researchers of the Year at Clemson University. Rhondda Thomas, Calhoun Lemon Professor of Literature, was named senior Researcher of the Year, and Lior Rennert, assistant professor of public health sciences, was named junior Researcher of the Year. They are prepared to present to the Board of Trustees Research and Economic Development Committee this month, time permitting.

The awards were presented at the annual Clemson University Research Symposium in May. The Symposium brings together faculty from all colleges and disciplines to share ideas and form research collaborations, as well as to celebrate successes. More than 200 people attended the event either in person or online.



Rhondda Thomas

A recipient of the prestigious Whiting Foundation fellowship, Thomas has garnered national and international recognition for her interdisciplinary, multifaceted Call My Name Project. The project documents and shares the stories of African Americans in the history of Clemson University and local communities from freedom in Africa through activism in South Carolina.

Her book *Call my Name, Clemson*, published in November 2020, was recognized in the 2021 book award competition by the National Council on Public History. She is editing a collection of 10 essays on The Rhetorics of Campus History and has completed two projects that analyze the origins of the African American literary tradition with Cambridge University Press. Additionally, with funding from the National Endowment for the Humanities, she is working to complete the Call My Name traveling museum exhibit, scheduled to begin touring in early 2023. Thomas is a faculty member in the College of Architecture,

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Researcher of the Year

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Arts and Humanities.

“I’m so honored to receive this recognition of my research as a humanities professor,” Thomas said. “Thank you to the committee for selecting me from such an accomplished group of nominees. And I’m grateful to work at Clemson where I can pursue my research interests with support from my department, college, and the administration.”

Rennert – a faculty member in the College of Behavioral, Social and Health Sciences – is an internationally recognized infectious disease scholar.

Rennert’s research involves the implementation of data science to inform and improve decision making.

His main research focus areas are: 1) Infectious disease epidemiology, 2) Development of mathematical and statistical models, 3) Policy evaluation, and 4) Data-informed decision making.

As the lead public health strategist for Clemson University on Covid-19, Rennert’s research has helped inform decision making at the highest levels. For example, his surveillance-based informative testing (SBIT) strategy in the Fall 2020 semester substantially drove down disease prevalence through doubling the efficiency of SARS-CoV-2 testing kits. This work led to the first publication from a Clemson team in a Lancet family journal.



Lior Rennert

Currently, using funds from National Institutes of Health, Rennert is evaluating vaccine protection against infection from different SARS-CoV-2 variants. In addition to establishing how vaccine effectiveness changes over time, this work will help determine the optimal time to receive Covid-19 boosters and inform public health modeling.

Additionally, he is working with Prisma Health, the Medical University of South Carolina and the S.C. Department of Health and Environmental Control to develop simulation models for real-time emergency resource allocation to reduce health disparities in South Carolina. This will help deliver essential health care resources to underserved communities that are at the highest risk.

Among numerous other research projects, Rennert also is supporting work on neurodegenerative disease and opioid addiction.

“I am honored to receive this prestigious award, and am extremely grateful to my department, college, and the university for their consistent support that put me in position to succeed here at Clemson,” Rennert said.

For Researcher of the Year, each college nominated a junior faculty member who received their terminal degree within the past 10 years and a senior faculty member. Winners were selected by an interdisciplinary faculty committee. Nominees from each college are posted [online here](#).





Derek Dalton, professor of accounting

Professor Derek Dalton joined the School of Accountancy at Clemson University in August 2010 and is ranked as one of top accounting researchers in the world. He received his Ph.D. in accounting from Texas Tech University (May 2010) and is a Certified Public Accountant (inactive) in the state of Iowa. Prior to doctoral work, he was employed in public accounting in Sioux Falls, SD, primarily working on corporate and partnership tax issues. As someone who grew up in the northern Midwest region, he greatly appreciates the mild climate and natural beauty of South Carolina.

Dalton teaches graduate courses in Corporate Taxation and Managerial Accounting. He is incredibly grateful for the opportunity to teach such bright, respectful, and energetic students, and he wholeheartedly believes that his students are one of the best parts of his job. He received the 2018-2019 MBA Professor of the Year Award within the College of Business.

Dalton's research primarily focuses on work-life balance issues and turnover in the accounting profession. His work appears in leading journals including: *Accounting, Organizations, and Society*, *Auditing: A Journal of Practice & Theory*, and the *Journal of the American Taxation Association*. Over the past six years, Dalton is ranked No. 60 of accounting researchers worldwide across all methods and topics. Within the College of Business at Clemson University, he received the 2013-2014 Emerging Scholar Research Excellence Award and the 2017-2018 Senior Scholar Research Excellence Award. He also recently received an appointment as a Powers Distinguished Fellow within the College of Business. Professor Dalton sincerely credits his many excellent coauthors within the School of Accountancy at Clemson for his research success.

Dalton has served as the president of the Gender Issues and Work-life Balance (GIWB) Section and has previously served as the vice president of research for the GIWB Section of the American Accounting Association. He has received two KPMG Best Paper Awards for the GIWB Section. He also serves (or has recently served) on the editorial boards of several leading accounting journals including, *Contemporary Accounting Research* and *Auditing: A Journal of Practice & Theory*.

Dalton is incredibly proud to be a Clemson Tiger and is prepared to discuss his research at the upcoming Board of Trustees Research and Economic Development Committee meeting.

Impacts, Honors and Achievements

Clemson reveals first student-engineered autonomous prototype.

Creating innovations for the future and driving advancements in mobility requires a workforce of dedicated engineers, designers and creators passionate and knowledgeable about our industry. That's why Ford teamed up with Deep Orange, a student-driven vehicle prototype program within the Department of Automotive Engineering. Housed at the University's International Center for Automotive Research (CU-ICAR), the two-year master's program empowers students to design and build fully-functional concept vehicles from the ground up.



Deep Orange autonomous prototype

For the program's tenth iteration, the students designed the University's first self-driving electric vehicle prototype for passengers. Throughout the project, Ford's role was to guide and advise students. The student team's hard work resulted in an inventive prototype: a self-driving, battery electric vehicle experience with human-centered design at the forefront.

To bring this autonomous vehicle to life, the students started from the ground up to imagine use cases for self-driving vehicles. Using the human-centered design lens, the students focused on: giving time back to families during a commute or while traveling; connecting college students who might not have a vehicle; and maximizing productivity for business professionals on the go. Driven by these personas, the final design features a vehicle experience focused on passenger comfort and intuitive controls.

Spacious ride: For use as a personal vehicle, the interior feels like a living room on wheels, with seats facing each other, low floor clearance and sliding swing-out doors for maximum accessibility. The team also envisioned a semi-transparent display screen on the windshield to show navigation and entertainment options.

Touchless experience: With intuitive controls like voice and gesture commands, a rider can direct the vehicle to make a decision. For example, by pointing to a parking space or by voicing a direction, the car could self-navigate to the indicated destination. This could be extremely helpful in a post-COVID world, minimizing contact with high touch surfaces.

Passenger comfort: The team also wanted to gauge passenger comfort via wearable devices that detect any passenger discomfort and modify the car's driving behavior such as speed and driving style to mitigate discomfort for things like motion sickness.

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Impacts, Honors and Achievements

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Upstate biochemistry senior was named Clemson's first Rhodes Scholar.

Louise Franke, a Clemson senior from Spartanburg, made University history when she became the first Clemson student named a Rhodes Scholar.

Franke, an Honors College student majoring in biochemistry with minors in political science and philosophy, is one of 32 American Rhodes Scholars selected through an intensive application and interview process.

“The Rhodes community is an intellectual community where people care about ideas, about action and about the world,” said Franke. “It’s a group of people that fight the world’s fight, and the fact that I’m now part of that blows my mind. It’s a dream come true.”

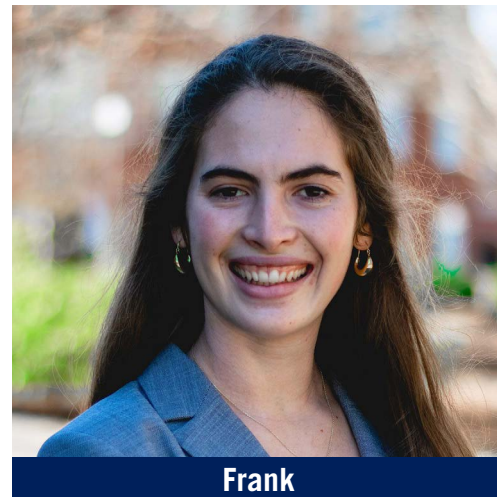
The Rhodes Scholarship provides for study at the University of Oxford and is recognized worldwide as the top undergraduate award for college students.

Clemson has had six Rhodes finalists since 2006, including two this year, but Franke is the first to be named a Rhodes Scholar.

Franke plans to pursue a B.A. in philosophy, politics and economics at Oxford before earning a joint M.D. and Ph.D. in bioethics. Her goal is to practice as a physician while forging a career as a bioethicist in the public policy and academic realms.

The Rhodes Scholarship is the oldest and most prestigious scholarship available to American college students. The award provides financial support for students as they complete postgraduate degrees at the University of Oxford.

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Frank



From left: Gang Li, Srikanth Pilla and Mark Johnson are among the Clemson University researchers working to help South Carolina manufacturers upgrade to Industry 4.0.

Clemson University is leading a statewide group that will help manufacturers modernize machinery.

The team also will develop a workforce to operate it as part of a project that researchers said could boost South Carolina’s economy, create high-tech jobs and become a model for the nation.

Researchers said that over the next three years they will turn their focus to machinery that was installed before artificial intelligence, wireless connectivity, cloud computing and other smart technologies were embedded in manufacturing equipment.

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Impacts, Honors and Achievements

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The idea is to bring legacy equipment and processes up to speed with newer machines that have the ability to gather massive amounts of data about their performance and then communicate that information to each other and their operators.

Giving machines the ability to communicate and infusing them with smart technology bring a host of benefits, such as greater quality products and the ability to predict when machines need maintenance. When coupled with artificial intelligence, the capability could even allow machines to diagnose their own problems and make their own repairs, researchers said.

The principal investigator on the project is Srikanth Pilla, the Jenkins Endowed Professor of Automotive Engineering and founding director of the Clemson Composites Center.

“In a few years, you could see the entire manufacturing system in the state being connected and having smart technologies in their systems,” he said. “This will help increase energy efficiency and decarbonization, while introducing more smart technologies to manufacturing. All of these are interrelated, and we see the state becoming a leader in this effort.”

The project is funded with \$1.8 million from the South Carolina Research Authority and \$2.2 million in cost share and brings together several partners, including the University of South Carolina, the Medical University of South Carolina, South Carolina State University, Greenville Technical College, Trident Technical College, BMW, Savannah River National Laboratory, CESMII-The Smart Manufacturing Institute, 3D Systems, Maher Advanced Manufacturing, Kistler, Behrtech, CGF, IBM, Cisco and Inductive Automation.

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A Clemson scientists' research could help unleash the power of quantum computing.

Quantum computers could revolutionize the future of science and technology by solving complex problems that are beyond the reach of even the best current classical supercomputers.

Unlike conventional computers that store information in binary form (1s and 0s), quantum computers exploit the strange properties of quantum physics to store information in multiple forms known as qubits. By leveraging two key phenomena — quantum superposition and entanglement — quantum computers can explore multiple solution pathways simultaneously, allowing them to solve problems that would take a traditional computer too long to calculate.

“They are like supercomputers on steroids,” said Kasra Sardashti, an assistant professor in the College of Science’s Department of Physics and Astronomy.



Kasra Sardashti

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Impacts, Honors and Achievements

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There's no single physical platform to perform quantum computing and each of the physical platforms used as a quantum processor prototype has advantages. But they also have limitations that prevent their scalability.

Sardashti, Clemson professor Lin Zhu and collaborators from Caltech, Virginia Tech and New York University aim to integrate two physically distinct information processing platforms into a hybrid quantum computing system to realize quantum random access memory for the first time.

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Todd Anderson

Artwork of a Clemson faculty member will set the mood in the 'Dear Evan Hansen' movie.

The artwork of Todd Anderson, associate professor of art at Clemson University, will make an appearance on the sets of the new Universal Pictures film adaptation of the hit Broadway musical, "Dear Evan Hansen."

"His work was so beautiful, I loved every single thing about it," said Lauren Adams Jones, who purchased set decoration for the film. "The somber nature of the pieces was good for the movie, because it does have sort of a somber nature."

The artwork in the film is from a set of prints Anderson created for the The Last Glacier project, which chronicles the retreat of glaciers in U.S. national parks due to climate change. Along with Old Main Gallery in Bozeman, Montana, and the Metropolitan Museum of Art's Mezzanine Gallery Store in New York City, Anderson's work is currently on display at Kai Lin Art in Atlanta, which is where the connection to the movie was made.

For Anderson, every opportunity for the art's exposure serves the purpose of his project, which was motivated by his ongoing research on glacial retreat and the global climate crisis, which began in 2009 at Glacier National Park in Montana.

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Kumar Venayagamoorthy of Clemson University is among the newest Fellows of the Asia-Pacific Artificial Intelligence Association (AAIA).

Venayagamoorthy serves as Clemson's Duke Energy Distinguished Professor of Power Engineering and Professor of Electrical and Computer Engineering.

AAIA's Fellows hail from some of the world's leading universities, including the Massachusetts Institute of Technology, Stanford University, and the California Institute of Technology. The Hong Kong-incorporated association brings together



Venayagamoorthy

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Impacts, Honors and Achievements

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top scientists from different disciplines to drive innovation, development and application of artificial intelligence.

Venayagamoorthy's research contributions have primarily focused on the development and implementation of advanced computational methods and artificial intelligence-based algorithms for smart grid applications.

He has recently studied the development of synchrophasor applications and situational awareness and intelligence systems for electric power control center operations and management.

His other research activities include applications of computational methods in sensor networks, cybersecurity and signal processing.

Venayagamoorthy is Fellow of three organizations in addition to AAIA: the Institute of Electrical and Electronics Engineers (IEEE), the Institution of Engineering and Technology (IET) and the South African Institute of Electrical Engineers (SAIEE).



Richardson

Elaine Richardson has been named Fellow of a national education council.

Richardson, professor emerita of Animal and Veterinary Sciences and former director of the Academic Success Center, was honored virtually at the National College Learning Center Association's (NCLCA) annual conference as a Fellow of the Council of Learning Assistance and Developmental Education Associations (CLADEA).

Richardson was the first director of the Academic Success Center, which received numerous national awards. She continues to publish and present on learning assistance collaborations across campus; much of her earlier work focused on Universal Design and building programs to enhance academic performance and retention.

After serving as president of NCLCA, Richardson led the development of NCLCA's Centers of Excellence Certification program. She continues to serve NCLCA as a certification reviewer and on the Past Presidents Council. In 2019, Richardson received the NCLCA Lifetime Achievement Award and, in 2020, was named to Clemson's Emeritus College.

The vision of the CLADEA is to "provide leadership and a unified voice to advance the profession of postsecondary learning assistance and developmental education." The naming of CLADEA Fellows is the organization's way of formally recognizing the excellence of the very best practitioners, policymakers, researchers, teachers and administrators within postsecondary learning assistance, developmental education and tutoring. Selection as a Fellow represents the highest honor conferred upon professionals in this field.

Although there are approximately 100,000 educators in the field, only 67 have been named Fellows since 2000.

1/67

Only 67 educators since 2000 have been named Fellows of the Council of Learning Assistance and Developmental Education Associations.

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Impacts, Honors and Achievements

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A Clemson University graduate student is working to advance the understanding of a congenital disorder that has no current treatment.

Clemson University Ph.D. candidate in genetics Rebecca MacPherson uses the common fruit fly *Drosophila melanogaster* to better understand how genetic modifiers contribute to the severity and presentation of diseases in humans.

Genetic modifiers are genes that can enhance or suppress the severity of a disease condition without being the direct cause of the disease. MacPherson's research could shed light on how specific mutations cause specific diseases and how mutant genes function within the human body, and could lead researchers to a fuller understanding of the complex roots of many congenital diseases.

MacPherson recently received a Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship grant for her project titled "Drosophila Models of Rare Mendelian Disorders of Chromatin Modification." The three-year grant will provide \$46,036 annually. The Eunice Kennedy Shriver National Institute of Child Health and Human Development awarded the grant.

MacPherson's research at the Clemson Center for Human Genetics deals specifically with the causes of Coffin-Siris syndrome, a congenital disorder that causes varying degrees of intellectual disability, digit abnormalities and neuromuscular issues, and for which there is currently no treatment.

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MacPherson



Agrus

Two Clemson University students have developed a machine they say can minimize crop waste during harvest and help farmers save money.

The GPS-guided, unmanned ground vehicle (UGV), Agrus, was developed by students Megan Io Ariadne "Mia" Abenina and Jake Menloe as an entry into the 3rd Annual SICK TiM\$10K Challenge. Contest entries were judged based on creativity and innovation, ability to solve a customer problem, commercial potential to produce and market the application, team entrepreneurship and reporting. The Clemson entry was

selected as a feature for the SICK USA blog.

Composed of two main components, a SICK TiM781 LiDAR sensor and a Husky UGV from Clearpath Robotics, Agrus travels down crop rows taking reliable and autonomous measurements of plant density and volume. It also records 2-D scans of surrounding crops.

"The Agrus UGV scans a field multiple times before harvest to inform farmers of missing or

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Impacts, Honors and Achievements

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underperforming crops so they can replace the crops or provide an intervention such as apply nutrients as needed,” said Abenina, a master’s degree student in Plant and Environmental Sciences from the Philippines. “This technology is beneficial to owners of small farms because it saves time and money and allows the farmers to work on areas that require attention.”

The students work under the guidance of Joe Mari Maja, an assistant professor and research sensor engineer housed at the Edisto Research and Education Center in Blackville, South Carolina.

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A Clemson University English alumnus has written an award-winning novel — in his second language.

Greg Khezrnejat, '07, has won the Kyoto Literature Award for his novel, “Kamo River Runner,” which was released Oct. 27 by Kodansha, Japan’s largest publishing house.

Khezrnejat entered his novel into the competition in the category only for international writers who are not native Japanese speakers. However, he not only won the international category, but the competition judges were so impressed with his work that he also won the overall first prize.

After graduation from Clemson, Khezrnejat moved to Japan as part of the Japan Exchange and Teaching Programme (JET), teaching English to elementary students in rural Kyoto. He pursued graduate degrees at Doshisha University while keeping in touch with his Clemson professors.

His novel, “Kamo River Runner,” centers on an American living in Japan, struggling to learn the language. The story grew directly from Khezrnejat’s own journal, which he began to keep as a way to practice Japanese.

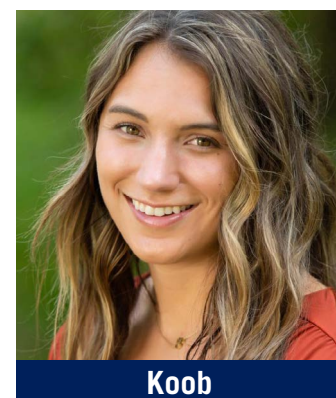
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A Clemson University Ph.D. student studying disabilities in children has been selected for a state leadership program.

Caitlin Koob seemed destined for the field of occupational therapy, but her interest in the research side of the field only revealed itself during her experience as a graduate student. A faculty mentor during her master’s program and a short-term study opportunity in Seattle, Washington, ignited her interest in research and made it a priority when she later searched for Ph.D. programs.

The Applied Health Research and Evaluation Ph.D. Program offered by the Clemson University Department of Public Health Sciences was a natural choice for Koob, and she was drawn to how enthusiastic the faculty were about their doctoral students’ research endeavors.

With help from Sarah Griffin, professor in the Department of Public Health Sciences and Koob’s faculty adviser, she applied and was selected for the South Carolina Leadership Education in



Koob

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Impacts, Honors and Achievements

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Neurodevelopmental and Related Disabilities (SC LEND) program offered by the Medical University of South Carolina and Prisma Health-Upstate.

Koob plans to work with marginalized, underserved populations of children, so SC LEND is giving an already dedicated public health professional even more tools to improve the health of young people with disabilities.

[READ MORE](#)



Researchers from Clemson University are using grant funding from the National Science Foundation to create and examine the impact of a program that helps to foster science, technology, engineering and math (STEM) identity in Black youth.

The program, I Am a Scientist, is community-based and explores the role of racial identity in Black youths as it pertains to their commitment to STEM learning. Harrison Pinckney, associate professor in the Department of Parks, Recreation and Tourism Management, leads the project while undergraduate students and community members serve

as role models and mentors implementing the curriculum at four locations across the Upstate.

According to Pinckney, many Black youth grow up feeling their narrative is already written – especially when their views about life and self are limited to the context of their surroundings. I Am a Scientist was born from higher education and the community recognizing the need for more diverse learning opportunities – and with the understanding that Black youth develop race-related beliefs through racial socialization.

“I believe one of the main reasons we don’t see more Black youth pursuing STEM is because they aren’t exposed to real-life examples,” Pinckney said. “If their perception of science is limited to the work done in labs by older white men, they will never view it as a realistic path for themselves.”

The program will use community gardens as a vehicle to deliver STEM experiences to Black youth from sixth to eighth grade. Students will have an opportunity to use engineering, math and plant science to address specific needs within their own community – one of which is food scarcity. They will also learn how the diets of Black people have evolved over time and how diets directly impact their health.

Developed by a team of professors from the College of Behavioral, Social and Health Sciences; College of Agriculture, Forestry and Life Sciences; and College of Engineering, Computing and Applied Sciences; along with Clemson Cooperative Extension agents, I Am a Scientist is interdisciplinary in its design, delivery and scope.

[READ MORE](#)

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Impacts, Honors and Achievements

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LaBerge

Martine LaBerge of Clemson University received InnoVision's Dr. Charles Townes Individual Lifetime Achievement Award.

LaBerge joined Clemson University in 1990 and has served as chair of the bioengineering department for more than 19 years. Colleagues credit her with building the department into a powerhouse of translational research and education that creates the leaders and innovators who are crucial to South Carolina's life sciences industry.

The Charles Townes award honors individuals who have exhibited a sustained commitment to the advancement of technology and the community through their technology-oriented and innovative contributions.

"It's an individual award, but in reality it should be a team award because no one is ever alone on that stage, especially for this prestigious award," LaBerge said. "I'm very honored because I'm following the best and the brightest in South Carolina."

[READ MORE](#)

Suyi Li's origami research earned him national recognition as a rising star in adaptive structures.

A Clemson University mechanical engineer who is researching how origami could be used to make better buildings and robots is winning an award that recognizes his contributions to the field of adaptive structures and material systems.

Suyi Li, an assistant professor of mechanical engineering, is this year's recipient of the Gary Anderson Early Achievement Award from the Aerospace Division of the American Society of Mechanical Engineers.

Many standard structures, such as car and house frames, are built to carry a load, but adaptive structures go a step further. Some, for example, can change shape or heal their own damage.

Li's contribution to the field has been to show that origami is a solution in the creation of adaptive structures. He has demonstrated that origami structures can not only carry a load but also absorb energy vibrations, a potential step toward buildings that are more resilient to earthquakes.

Li and his students have more recently pivoted to using origami to make next-generation robots that can transform into different shapes, depending on the scenario. The team is working with simple materials, such as paper and polymer sheets.

[READ MORE](#)



Li (left)

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Impacts, Honors and Achievements

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Kumar

A College of Science postdoctoral fellow has earned the Distinguished Postdoctoral Award.

Rohit Kumar has been named the recipient of the Clemson University Postdoctoral Association's 2021 Distinguished Postdoctoral Award for his efforts to understand how to extend the productive life of food crops.

Kumar works in the laboratory of Rajandeep Sekhon, an associate professor of genetics and biochemistry in the University's College of Science. In his application for the award, Kumar described his overall research focus as applying "the multi-omics approach to understand the genetics of complex traits underlying nutritional value and abiotic stress tolerance to develop climate-resistant crop plants."

Kumar's research at Clemson has focused on understanding the regulatory systems that govern senescence and stalk lodging in corn. Senescence is the process of biological aging. Lodging refers to stalk breakage below the corn ear. Lodging reduces the U.S. corn crop by as much as 25 percent annually.

[READ MORE](#)

Faculty from the Clemson University College of Behavioral, Social and Health Sciences and College of Business are part of a multidisciplinary team of researchers developing digital literacy tools to help curb the negative effects of online disinformation.

Darren Linvill, associate professor in the Department of Communication, and Patrick Warren, associate professor in the Department of Economics, join a team of researchers led by Siwei Lyu, Empire Innovation Professor of Computer Science and Engineering at the University of Buffalo. They have received a \$750,000 grant from the National Science Foundation's Convergence Accelerator, a program that builds upon basic research and discovery to accelerate solutions toward societal impact.

Linvill and Warren will aid in the creation of content and lessons that help all audiences identify online disinformation. While others on the research team will focus on delivering the content to younger audiences, Linvill and Warren will spearhead its delivery to an older audience once the tools



Warren (left) and Linvill (right)

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Impacts, Honors and Achievements

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are ready to be disseminated. He said the data concerning online disinformation clearly shows that both groups are equally important and should be addressed in different ways.

“Even many experts who study disinformation haven’t internalized the fact that older Americans spread disinformation seven or eight times more often than younger Americans,” Linvill said. “Essentially, my students’ grandparents need these tools more than my students do.”

The research team includes experts in artificial intelligence, the humanities, information science and other fields. In addition to the University of Buffalo and Clemson, they hail from the University of Illinois Urbana-Champaign, Lehigh University and Northeastern University.

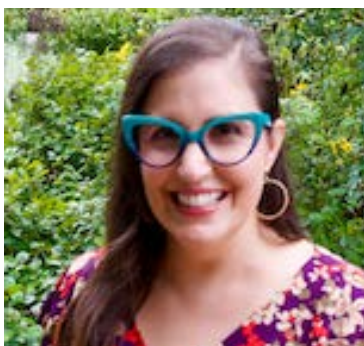
The project — titled Disinformation Range to Improve User Awareness and Resilience to Online Disinformation — centers on developing a suite of digital literacy tools and advanced educational techniques to reduce the harmful effects of online disinformation. Researchers plan to have a prototype ready in June, when they will share it with senior citizens and teenagers.

[READ MORE](#)

“ ... older Americans spread disinformation seven or eight times more often than younger Americans. Essentially, my students’ grandparents need these tools more than my students do.



Darren Linvill,
associate professor,
communication



Van Puymbroeck

Faculty member named Distinguished Fellow by the American Therapeutic Recreation Association

Marieke Van Puymbroeck, professor and graduate coordinator in the Department of Parks, Recreation, and Tourism Management, was named a Distinguished Fellow by the American Therapeutic Recreation Association.

Her research focuses on the use of yoga and other complementary health practices as a therapeutic intervention for individuals with chronic disease and their caregivers. She has published 15 articles in the past two years and has another in press.

Van Puymbroeck received the 2020 Excellence in Innovation award from the College of Behavioral, Social, and Health Sciences and received the 2019 Best Research Poster from the American Therapeutic Recreation Association. She also was the 2017-2020 Roy Distinguished Professor in Health Innovation Research at Clemson.

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Impacts, Honors and Achievements

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A Clemson-led cotton genome study is bound for the International Space Station.

Clemson researcher Chris Saski admits sending the University's iconic Tiger Paw to space aboard a SpaceX Dragon spacecraft is, quite literally, "an out-of-this-world experience." But it's the potential for the experiments in the flight hardware to which the Paw is attached that truly excites him.

Saski's cotton regeneration research, adorned with Clemson stickers, took off Dec. 21 from NASA's Kennedy Space Center in Florida bound for the International Space Station (ISS). Upon arrival, Saski's research project titled "Unlocking the Cotton Genome to Precision Genetics" will be conducted in

microgravity with the goal of facilitating the ability to directly edit the genome of elite cotton varieties, quickly adding traits like disease resistance or drought tolerance without the need for the lengthy conventional breeding process that can take over a decade.

Understanding gene function and subsequent genome engineering technology has the potential to change the lives of everyone and everything on the planet. With no solution yet in place to satisfy a growing demand for fuel, food and fiber as the global population continues to expand, Saski believes this research "is a large step in the right direction" toward solving that problem.

"Conducting these experiments in microgravity gives us a unique environment to disentangle the genetics of somatic embryogenesis — regenerating a whole plant from a single cell — and we believe we can translate this research into application," he said. "This project will lead to new understanding of the genes involved. As we understand it now, this genetic program is encoded in all crop genomes, but it is suppressed. This research could ultimately allow us to switch on this genetic program in other crops and be able to do genome editing and engineering more readily and directly on commercial varieties ... and eventually provide an accelerated path to food, fuel and fiber for a growing population of people on Earth."

But if potentially addressing issues such as global hunger wasn't enough, the possibilities go far beyond, said Saski, who admitted he never imagined space missions would one day be part of his work.

"When I started my position as a researcher here at Clemson, I quickly realized that there really are no boundaries to the questions that one can ask," he said. "I just created a vision, worked hard and tried to set the bar high. I envision that translation of this research into application could enable deep space exploration missions, it could allow for plants to be stored as single cells and you could store and supply a diversity of plant species for astronauts that are doing research or even living on another planet."



Saski and postdoctoral research scientist Sonika Kumar

FOCUS ON FACULTY

This section highlights achievements of three faculty members from each college. Entries were submitted by the colleges.

Executive Summary

- *Click the links below to read about faculty from the respective college.*
 - » [*College of Agriculture, Forestry and Life Sciences \(pages 40-42\)*](#)
 - » [*College of Architecture, Arts and Humanities \(pages 43-45\)*](#)
 - » [*College of Behavioral, Social and Health Sciences \(pages 46-48\)*](#)
 - » [*College of Business \(pages 49-51\)*](#)
 - » [*College of Education \(pages 52-54\)*](#)
 - » [*College of Science \(pages 55-56\)*](#)



College of
**AGRICULTURE, FORESTRY
AND LIFE SCIENCES**

Richard E. Boyles, PhD

Assistant Professor

Plant and Environmental Sciences



Boyles is a researcher, crop breeder and geneticist who develops new plant varieties and hybrids that have improved productivity, quality, and resiliency for farmers in South Carolina and the greater southeastern U.S. Leading the Cereal Grains Breeding & Genetics Program, he also works to build innovative technologies in genomics and plant science that help increase the efficiency and impact of plant breeding and cultivar development globally. Boyles currently supervises a postdoctoral fellow, two PhD students, one MS student, two research technicians, and various temporary workers and undergraduates who work collectively to support cultivar development and make applied scientific discoveries to increase the yield and value of cereal grain crops in the region.

Select Accomplishments

- Lead investigator on a \$1.7 million Foundation for Food and Agricultural Research 2021 Seeding Solutions proposal that will be funded in full to optimize sorghum grain for improved human and animal health.
- Sole investigator on a funded United States Department of Agriculture (USDA) proposal that was awarded in the full amount of \$299,748 to accelerate wheat cultivar development.
- Lead investigator on a \$169,200 project funded by the USDA U.S. Wheat and Barley Scab Initiative to develop wheat cultivars with improved Fusarium Head Blight resistance.
- His PhD student, AJ Ackerman, was awarded the prestigious Borlaug Scholarship in 2021 by the National Association of Plant Breeders.
- Released two oat lines, 'SCLA0100214' and 'SCOP 85-8', that were approved by the Variety Review & Release Committee ('SCLA0100214' exclusively licensed to AgSouth Genetics). Oat lines were purified and increased by the SC Crop Improvement Association.
- Published 12 peer-reviewed journal articles since 2020 in the following journals: *Agronomy*, *Crop Science* (2), *Frontiers in Plant Science*, *G3* (2), *Genes*, *Genetics*, *Journal of the Institute of Brewing*, and *Journal of Plant Registrations* (3).
- Co-founded a Clemson startup 'Carolina Seed Systems' as part of a \$10 million U.S. Department of Energy-funded project to establish technology-to-market and commercialize new plant products.



College of
**AGRICULTURE, FORESTRY
AND LIFE SCIENCES**

Felipe de Figueiredo Silva, PhD

Assistant Professor

Agricultural Sciences



Silva is an agricultural economist who studies topics related to agricultural production and the trade-off between agriculture and the environment. Currently, he is studying the socio-economic impact of diseases on the production of fruits (bananas) and vegetables (cucumbers and kale). He is also researching the effect of Downy Mildew in cucumber and Alternaria Leaf Spot in organic kale production in South Carolina. On the environmental side, he has investigated stakeholder engagement in water use in agricultural production, estimated the opportunity cost of preserving the Amazon Forest, and is currently investigating the environmental impact of public policies designed to control inflation on society.

His current research projects are supported by the United States Department of Agriculture – National Institute of Food Agriculture (NIFA). He has also raised funds in the past from the Southern IMP Center, sponsored by the USDA. Silva teaches four courses per year in Regional, Development and Production Economics, co-advises three master students, and has advised two undergraduate students in their honors theses. He is also hosting an Economics visiting professor from the Federal University of Viçosa, Brazil, for a year (Sept 2021-Sept 2022). He serves on the department's Faculty Advisory Committee and has participated in three search committees for lecture and assistant professors.

Select Accomplishments

- Received a \$500,000 research grant from the Organic Transitions (ORG) - USDA/NIFA as Principal investigator.
- Received a \$30,000 research grant from the Southern Region IPM Enhancement Center - USDA/NIFA as principal investigator.
- Published six peer-reviewed journal articles and one book chapter in the last two years.
- Served as co-topic leader for the Agricultural & Applied Economics Association Section “Productivity Analysis and Emerging Technologies” in 2019 and 2020.



College of
**AGRICULTURE, FORESTRY
AND LIFE SCIENCES**

Elena A. Mikhailova, PhD

Professor

Forestry and Environmental Conservation



Mikhailova is internationally recognized for her highly collaborative, multidisciplinary research in the areas of soil science and soil science education. She has conducted research in/on various countries: the United States, Honduras, Russia, China, and Libya. She is the author and co-author of 124 publications: 101 peer-reviewed articles, 3 peer-reviewed conference proceedings, 2 book chapters, and 20 technical publications (including 3 teaching laboratory manuals, and 2 technical manuals). She has published broadly in 48 journals in soil science, agriculture, environment, and education.

Mikhailova has been the recipient of numerous awards and honors: Recipient of the North American Colleges and Teachers of Agriculture (NACTA) Educator Award (2020); Recipient of NACTA Teaching Award of Merit (2019); Recipient of the College of Agriculture, Forestry and Life Sciences Undergraduate Teaching Award of Excellence for more than 6 years (2019); One of Clemson's Outstanding Professors, Student Government and the Undergraduate Student Body (2010); Recipient of the College of Agriculture, Forestry and Life Sciences Undergraduate Teaching Award of Excellence for less than 6 years (2010); Clemson University Board of Trustees Award for Faculty Excellence (2009).

Select Accomplishments

- Published 9 peer-reviewed articles in 2021.
- Recipient of the North American Colleges and Teachers of Agriculture (NACTA) Educator Award in 2020.
- Received an externally funded USDA grant (\$143,265) to promote cyber-learning in higher education.
- Conducted peer-review for more than 13 journals in 2021 alone.
- Accumulated 185 citations to date in 2021 and a three-year sum of 629 citations (departmental median is 230 citations over past three years).
- Co-authored a peer-reviewed article for Scientific Reports – Nature Research Journal.
- Mentored a Clemson University Honors undergraduate student to co-author a peer-reviewed article in Laws journal. Student is applying to a Law School.
- Mentored a Clemson University undergraduate student to co-author a peer-reviewed teaching article, which was published in the North American Colleges and Teachers in Agriculture (NACTA) journal.



College of
**ARCHITECTURE, ARTS
AND HUMANITIES**

Stephanie L. Barczewski, PhD

Professor

English



A specialist in modern British history, Barczewski has been at Clemson since 1996. Her latest book is *Heroic Failure and the British*, published by Yale University Press in 2016.

Barczewski is currently engaged in two research projects. The first is titled *Englishness and the Country House: A British, European and Global History*. Country houses are often interpreted as embodiments of Englishness, but a closer examination raises questions about aligning them so neatly with national identity, and about what that national identity actually encompasses. This book will seek to interrogate Englishness and to posit that the arguments that country houses have been significantly influenced by external influences emanating both from within and without the British Isles and the argument that they are nationally distinctive are not mutually exclusive. In his much-praised recent history of England, Robert Tombs recently observed that English history “has to be written simultaneously at several levels: English, British, international and imperial.” But does admit that these essential dimensions exist differ from regarding them as constitutive and inseparable? This study will attempt to answer that key question about the nature of English national identity.

Select Accomplishments

- Publications include *Country Houses and the British Empire, 1700-1940* (Manchester University Press, 2014); *Antarctic Destinies: Scott, Shackleton and the Changing Face of Heroism* (Bloomsbury, 2007); *Titanic: A Night Remembered* (Palgrave Macmillan/Hambledon and London, 2004) and *Myth and National Identity in Nineteenth-Century Britain: The Legends of King Arthur and Robin Hood* (Oxford University Press, 2000), as well as numerous articles and book chapters.
- Co-author and editor of the textbook *Britain since 1688: A Nation in the World* (Routledge, 2014).
- Awarded the Gentry Award, Clemson’s highest honor for teaching in the humanities, as well as a Faculty Award of Distinction for student mentoring from the Clemson National Scholars Program.



College of
**ARCHITECTURE, ARTS
AND HUMANITIES**

Joe Burgett, PhD

Associate Professor

Construction Science and Management



Burgett is a tenured faculty member in the Nieri Family Department of Construction Science and Management at Clemson University. He has been in university-level academics since 2010 and teaches both undergraduate and graduate-level courses. By trade, Burgett is a general contractor and has spent many years teaching online courses for the trade unions. His primary area of research is in applied drone technology and has worked extensively with the S.C. Department of Transportation. His research area focuses heavily on using unmanned aircraft systems (UAS) technology for bridge inspections and creating 3-D models to support field operations. He has published multiple peer-reviewed articles on UAS technology, including titles such as *Accuracy of Drone Image-Based Volumetric Surveys*; *Evaluating the Use of Unmanned Aerial Systems (UAS) to Perform Low-Slope Roof Inspections*; and *SCiDUC: Solution to Address Common Challenges of State Agency Drone Deployment*. Burgett was named Clemson University's 2018 Master Teacher, the University's highest teaching honor. He currently serves as the president and director of the South Carolina Interagency Drone Users Consortium (SCiDUC). SCiDUC is the state's only 501(c)3 nonprofit drone association exclusive to South Carolina government agencies. Burgett is also an accomplished speaker. He is a familiar presenter at Associated Schools of Construction and American Institute of Constructors conferences. He has also spoken at the International Symposium on Automation and Robotics in Construction and the International Conference on Construction Applications of Virtual Reality.

Select Accomplishments

- FAA Part 107 Remote Pilot Certificate; Licensed General Contractor; US Green Building Council LEED AP; American Institute of Constructors Certified Professional Constructor
- Burgett, Joseph, Lytle, Blake, Bausman, Dennis, Shaffer, Scott, Stuckey, Eric. (2021). *So How Accurate are Drone Based Surveys Anyway? A Structured Evaluation of a UAS Based Land Survey*. *Journal of Infrastructure Systems*; ASCE.
- Bausman, Dennis, Burgett, Joseph, Jadhav, Ajay, Shaffer, Scott & Stuckey, Eric. (2020). *State Department of Transportation sUAS Program Development and Operational Deployment*. *Professional Constructor*; *Journal of the American Institute of Constructors*.



College of
**ARCHITECTURE, ARTS
AND HUMANITIES**

Gabriela Stoicea, PhD

Associate Professor

German



Stoicea research falls under the general umbrella of German literature, culture, and intellectual history from the late 18th century to the present, with an emphasis on theories of narrativity and visuality, film, translation as intercultural communication, as well as the interplay between science and culture, and between politics and culture. Her Ph.D. is from Yale.

Her first monograph uses a cultural studies approach to offer a constellation of ideas and polemics surrounding the readability of the human body. By including discussions from the medical sciences, epistemology, semiotics, and aesthetics, *Fictions of Legibility* draws out the multifaceted permutations of corporeal legibility, as well as its relevance for the development of the novel and for facilitating interdisciplinary dialogue.

Gabriela has also published articles on Fritz Lang, Claude Lanzmann, and Sophie von La Roche, and she is the recipient of many competitive research grants. At Clemson, she has been teaching all levels of German, as well as courses in the Honors College and in the World Cinema program. In 2016, she received the CAAH Dean's Award for Excellence in Teaching and returns to the classroom every semester with renewed dedication and enthusiasm.

Select Accomplishments

- Book, *Fictions of Legibility: The Human Face and Body in Modern German Novels from Sophie von La Roche to Alfred Döblin*. Transcript, 2020. <https://cup.columbia.edu/book/fictions-of-legibility/9783837647204>
- This book was reviewed by two prestigious journals, the German Studies Review and the German Quarterly.
- *Moosbrugger and the Case for Responsibility in Robert Musil's Der Mann ohne Eigenschaften*, The German Quarterly, vol. 91, no. 1, 2018, pp. 49-66.
- *When History Meets Literature: Jonathan Israel, Sophie von La Roche, and the Problem of Gender*. The Radical Enlightenment in Germany: A Cultural Perspective, edited by Carl Niekerk, Brill/Rodopi, 2018, pp. 211-37.
- *Re-Producing the Class and Gender Divide: Fritz Lang's Metropolis*, in Women in German Yearbook, vol. 22, 2006, pp. 21-42.



College of
**BEHAVIORAL, SOCIAL
AND HEALTH SCIENCES**

Matthew H.E.M. Browning, PhD

Assistant Professor

Parks, Recreation and Tourism Management



Browning's research encompasses three domains -- nature, health, virtual reality -- and the intersections between them. He is the founding director of the Virtual Reality & Nature lab (2016-present), which has two foci: (1) conducting basic and applied research on the therapeutic effects of simulated natural environments on human health, wellbeing, and community resilience; and (2) enhancing the frequency, richness, and meaningfulness of nature-based connections and interactions. The lab has a strong commitment to the land grant mission and provides no-cost products for community partners (i.e., a virtual tour of the South Carolina Botanical Garden for the Master Gardener Program).

Browning's teaching encompasses undergraduate and graduate classes in research methods, grant writing, and technological impacts on society and health, as well as mentorship to high school and undergraduate interns, graduate student assistants, and postdoctoral affiliates from Clemson and across the country.

Browning arrived at Clemson in 2019 after 4 years as an assistant professor at the University of Illinois at Urbana-Champaign.

Select Accomplishments

- Published 16 peer-reviewed articles in 2020 and 15 (as of Nov. 23) in 2021.
- Tripled citations to his articles from 450 in 2019 to 1,700 as of Nov. 23 2021.
- Interviewed on his COVID-19 research by the Washington Post and Deutsche Welle (the BBC of Germany).
- Awarded \$1 million from 2 internal grants and 5 external grants since fall 2019.
- Graduated 1 doctoral student in 2019 and advising/serving on committees of 7 more Ph.D. students
- Recruited 8 notable PhD applicants for fall 2022 matriculation.
- Enabling more than 1,000 undergraduate students to meet their Science and Technology in Society requirement through teaching PRTM 2110.



College of
**BEHAVIORAL, SOCIAL
AND HEALTH SCIENCES**

Virginia S. Harrison, PhD

Assistant Professor

Communication



Harrison is a mixed-methods social scientist who studies public relations and sports communication. She is specifically interested in how organizations build relationships with supporters, including donors, volunteers, and sports fans. Her research has examined three key areas of relationship management in communication: how stewardship builds bonds between organizations and supporters; how corporate social responsibility affects nonprofits and other corporate stakeholders; and how sport fans perceive strategic messages and initiatives from sports organizations. Harrison's work has been published in top public relations and sports communication journals, including *Public Relations Review*, *Journal of Communication Management*, *Corporate Communications: An International Journal*, *Communication & Sport*, and *European Sport Management Quarterly*. Her work has been presented at international and national communication conferences, where she has won a number of awards.

Harrison teaches graduate courses in the MA in Communication, Technology, and Society program and undergraduate courses in the Communication and Sports Communication majors. Her courses include Public Relations Theory (graduate level), Public Relations for Nonprofits, Survey of Sports Communication, and Communication for Sports Organizations.

Select Accomplishments

- Published 6 peer-reviewed journal articles during academic year 2020-21.
- Received first place in the teaching paper award competition in the Public Relations Division at the Association for Education in Journalism and Mass Communication (AEJMC) 2021 conference.
- Invited to contribute a book chapter on "Sports and COVID-19" for Crisis Communication and COVID-19: Case Studies, part of the Scholarsourcing book project from AEJMC and Peter Lang.
- Invited to co-author two additional book chapters, both due out in 2022-23.
- Recipient of Robert H. Brooks Sports Science Institute "Signature Project grant" to study messaging from Healthy Clemson and Unity campaigns. Paper currently under review with the International Communication Association (ICA) 2022 conference.
- Featured expert on "stewardship during the pandemic" in forthcoming blog from Graham-Pelton fundraising consultants.



College of
**BEHAVIORAL, SOCIAL
AND HEALTH SCIENCES**

Marissa L. Shuffler, PhD

Associate Professor

Industrial-Organizational Psychology



Shuffler is an applied research scientist with more than a decade of experience investigating teamwork and leadership challenges in the workplace. Her driving goal is to not only study but to solve these challenges, using the science of teaming and organizational dynamics to develop innovative, evidence-based interventions and tools that will improve current and future workplaces. She also serves as an advisor and instructor for professional team science development efforts at Clemson, partnering with programs such as Grad360, Office of Research Compliance, Creative Inquiry, Watt Innovation Center, Student-Athlete Development, College of Engineering, Computing and Applied Sciences, and the Clemson University School of Health Research. Her research has largely concentrated on addressing teamwork issues in high-stress, high-risk environments such as spaceflight, disaster response, the military, manufacturing, construction, and healthcare.

One notable example of this applied research approach has been the design and implementation of an innovative “rapid cycle” toolkit for identifying and addressing burnout and well-being needs of Emergency Medicine physicians, advanced practice providers, residents, and registered nurses at Prisma Health. Launched in March 2020, this effort was rapidly scaled from a single site pilot study to being administered monthly to monitor the well-being and burnout needs more accurately of over 700 clinicians across nine sites. Now in its 26th cycle, this monthly assessment and reporting process provides critical and timely insight to healthcare leaders. Furthermore, this project has created a unique learning experience, resulting in three doctoral dissertations, two honors theses, over a dozen student-led conference presentations, and an award-winning master’s thesis.

Select Accomplishments

- Research on virtual work, team meetings, and Zoom fatigue has been highlighted in national and international media outlets throughout the COVID-19 pandemic (BBC World News, the Wall Street Journal, Smithsonian Magazine, Forbes).
- Awarded an inaugural CBSHS Research Innovation Fellowship (2021) to expand research on interventions that can support or improve teamwork in scientific research collaborations.
- Recently appointed as a Roy Distinguished Professor (2021-2024), Clemson University.
- Selected for the 2021-2022 President’s Leadership Institute (PLI), Clemson University.
- Recipient of the Board of Trustees Award for Excellence (2019), Clemson University.
- Over \$13 million in funding secured to date.



College of

BUSINESS**Vincent J. Intintoli, PhD***Associate Professor***Finance**

Intintoli's research is in the area of empirical corporate finance, with an emphasis on corporate governance. He has published research on the consequences of CEO turnover and succession decisions, the underpricing of seasoned equity offers, and institutional investors' impact on firm decisions. His current research focuses on the effects of director gender diversity mandates on public firms and the influence of social connections on the effectiveness of director monitoring and advising activities.

Intintoli currently teaches an undergraduate, upper-level spreadsheet applications in finance course and has also taught the second course of a two-course sequence in financial management. In his spreadsheet applications course, Intintoli incorporates real world examples to teach topics such as capital budgeting and valuation using Microsoft Excel. Through his course, students gain proficiency in Excel applications, which is a skill that recruiters often cite as being necessary for success. Intintoli also teaches the finance portion of an introductory finance and accounting course in Clemson's MBA program.

Select Accomplishments

- Received various departmental research productivity awards.
- Published in top-tier finance journals.
- Has been cited in the press by publications including the Wall Street Journal, New York Times, USA Today, Bloomberg, Time, the Los Angeles Times, The Sacramento Bee, and San Francisco Chronicle.



Carol Jones

Senior Lecturer, Internship Coordinator

Graphic Communications



When Jones first came back to Clemson in 1990, she was an Industry Training Specialist delivering week-long workshops for beginning and advanced techniques in flexographic printing, offset lithographic printing and screen printing. She is primarily interested in prepress operations, packaging structure and design, advanced techniques in flexographic printing for pressure-sensitive/narrow-web and folding carton printing. Her experience and contacts in the industry have allowed her to successfully place many students in excellent internships and also aid in their successful employment upon graduation.

Jones has been a consultant to the envelope printing industries for prepress and pressroom audits for conversion from offset lithographic printing to flexographic printing. She has delivered numerous presentations to forums and symposia held by the Department of Graphic Communications at Clemson University. Her education includes a Bachelor of Science in Graphic Communications and a Masters in Human Resource Development.

Select Accomplishments

- Developed and executed two successful virtual intern employer days during the pandemic with more than 60 companies and 500 students participating.
- Became lead instructor in GC 4060 lecture and lab sections and spearheaded significantly updated course structure and approach
- Maintained solid internship student placement during the pandemic requiring a great deal of time, new and flexible approaches to company needs, and patience in dealing with students and parents.



Jeremy Vinson, PhD

Assistant Professor

School of Accountancy



Vinson is an assistant professor in the School of Accountancy. His research is focused on two areas: auditor judgment and accounting firm liability. His primary focus is on investigating auditors' judgment of account risk following a face-to-face client inquiry in a financial statement audit. He has a publication and multiple projects in which he manipulates factors likely to affect attention and memory and examines the impact these have on resulting judgments, a necessary component of auditing. He also has a publication and two projects examining the liability audit firms face when an audit fails to detect misstatements that cause harm to investors/creditors. Specifically, he investigates whether factors related to a regulator of audit firms increase or decrease the amount of liability.

Vinson teaches three courses throughout the accounting curriculum including intermediate accounting (3000 level), auditing (4000 level), and international accounting (graduate level). In his classes, Vinson utilizes his prior work experience, academic research, and cases to help students understand and apply the underlying concepts of the material. In summer 2019, Vinson led a two-week study abroad program to Oxford University in the U.K., which involved 24 students from the graduate-level international accounting course. In summary, Vinson hopes that his research and teaching contribute to the development of accounting professionals ready to impact the business world.

Select Accomplishments

- Published three peer-reviewed journal articles in high quality accounting journals.
- Served as an ad hoc reviewer for multiple accounting journals including *European Accounting Review* and *Issues in Accounting Education*.
- Named the Charles D. and Katrina M. Way Faculty Fellow for 2018-2019 and again in 2019-2020. Each award included \$6,500 in research funding to be used on the proposed research project.
- Served as program director for the MPAcc in Oxford Program for summer 2019 and summer 2020 (which was canceled due to COVID).
- Served as chair of the Scholarships and Awards Committee for the Wilbur O. and Ann Powers College of Business for 2019-2021.



College of

EDUCATION**Shanita N. Anderson, EdD***Lecturer***Teaching and Learning**

Anderson began her career in 2001 as a middle grades social studies teacher in Fayetteville, N.C. Since that time, she has served and supported the children and teachers of North Carolina as a classroom teacher, an AIG coordinator, a literacy coach, instructional coach with the North Carolina Department of Public Instruction, and most recently as a new teacher support coach with the University of North Carolina at Pembroke. She obtained her bachelor's degree in Middle Grades Education from East Carolina University and is certified in English Language Arts, Reading K-12, Social Studies, AIG, and Literacy Coaching. She has a master's degree in Language Arts through Fayetteville State University as well as a Master's of School Administration from the University of North Carolina at Pembroke. Anderson earned her doctorate in Curriculum and Instruction from the University of North Carolina at Wilmington. Her doctoral work primarily focused on trust and coaching practices geared to elicit instructional improvement. Anderson's coaching philosophy is grounded in aligning effective "best practices" in professional development with individual teacher needs to improve educator efficacy and effectiveness in an effort to increase student achievement.

Anderson is an active member of professional and academic organizations in her field, such as American Educational Research Association (AERA) and American Association of Colleges for Teacher Education (AACTE).

Select Accomplishments

- Awarded the Award of Excellence in Teaching, Clemson University.
- ADR Co-PI Grant Recipient "Perfecting Your Roar".
- Moderated and Host, Inclusive Excellence.
- CoE Inclusive Excellence Taskforce, Member.
- Serves as a Mentor within the College of Education.
- CoE Community and Diversity, Member.
- Teaching Fellows Advisory Committee, Member.
- Online M.Ed. Award Committee, Member specializing in Instructional Coaching.
- Director of Teacher Residency, Search Committee Member.
- Distance Learning Advisory Board, Member.



College of

EDUCATION

Angela D. Carter, EdD*Assistant Professor***Educational & Organizational Leadership
Development**

Carter excels in helping individuals build learning and leadership capacity. Carter's excitement for learning and development encourages her students to apply knowledge, challenge assumptions, and increase their own capacity for learning, growth, and change so that they can train and develop others. Her "real-world" experience working with learning and leadership development in both large national companies and entrepreneurial start-ups in retail property management, aerospace engineering, and healthcare software technology allows her to bring practical application in alignment with theory. Carter teaches, facilitates, consults, and researches on topics including leader and leadership development, executive coaching, career development, workplace learning, organization development, inclusion and equity, and critical human resource development.

Carter is an active member of the professional and academic societies associated with the field of human resource development and workplace learning, including roles in the Academy of Human Resource Development (AHRD) and the Association for Talent Development (ATD). In addition, she is active in the coaching and leadership development communities, with memberships in International Coaching Federation (ICF) and the International Leadership Association (ILA).

Select Accomplishments

- Director and Co-Lead of Tigers ADVANCE, Provost's gender equity leadership development and mentoring program for faculty.
- International Coaching Federation (ICF) ACC Certified Executive Leadership Coach.
- Executive Coach for the President's Leadership Institute.
- Program Coordinator for the Masters of Human Resource Development.
- Co-editor of Special Issue: Women of Color in Leadership. *Advances in Developing Human Resources*. Sage.
- Professor of the game, Clemson University Football, September 2018.



College of

EDUCATION

Luke J. Rapa, PhD*Assistant Professor***Education and Human Development**

Rapa's research examines how contextual, sociocultural, and sociopolitical factors shape key developmental and psychological processes and promote or constrain adolescent's development and academic success. Rapa has particular interest in the development of youth navigating adversity, marginalization, and inequitable societal conditions, with much of his research focused on: (1) how adolescents critically analyze societal inequities and develop the motivation and agency to redress such inequities, or develop "critical consciousness"; and (2) how youth navigate structural constraints or marginalizing systems (e.g., discrimination, stereotypes in school, the juvenile justice system) to achieve success and well-being. Rapa has co-edited one journal special issue, recently published in the *Journal of Applied Developmental Psychology* (2020). He also has three edited book volumes currently under contract (forthcoming in 2022 and 2023). Rapa's scholarship has been published in top outlets in his field, with recent manuscripts appearing in journals such as *Applied Developmental Science*, *Journal of Applied Developmental Psychology*, and *Psychological Bulletin*.

Rapa is an active member of academic societies central to his research, including the American Educational Research Association (AERA); the American Psychological Association (APA), and the Society for Research on Adolescence (SRA). For example, he is currently chair of AERA's Adolescence and Youth Development Special Interest Group and serves as the Awards Committee Outstanding Mentor Award Chair for SRA.

Select Accomplishments

- Program coordinator for the PhD in Learning Sciences.
- Guest co-editor of *Journal of Applied Developmental Psychology* special issue. Critical consciousness: New directions for understanding its development during adolescence (2020).
- Associate editor of *Applied Developmental Science*.
- Co-PI, Clemson University's STEM Teacher Learning Progression Program, funded by US Department of Education (\$3,068,160.00 award).
- Co-Director, Clemson University's Center for the Recruitment and Retention of Diverse Educators (CREDE).
- Program Chair / Chair Elect (2020-2021), AERA Adolescence and Youth Development Special Interest Group.



Joseph Kolis, PhD

Professor

Chemistry



Kolis joined the Clemson faculty in August 1985 and has been active in research and teaching since that time. His research interests focus on the area of solid state inorganic chemistry. He pioneered the technique of High Temperature Hydrothermal Chemistry, which involves performing chemical reactions and crystal growth in water at extremely high temperatures and pressures (700°C and 25,000 psi). This is the method that Nature uses to grow most gems deep in the Earth, and Kolis's ability to transfer this process from deep Earth to the lab provided him with an international reputation in this specialized field. It also enabled him to grow a wide range of technologically important crystals for use in lasers, range finders, imaging, detection and many other applications. He was able to secure numerous patents and help start two small companies around this technology. More recently he was able to add a new wrinkle to this science by applying the same pioneering methods to the growth of new quantum materials. The development of next generation quantum computing, quantum communication, unbreakable cryptography and related technologies is dependent on radically new kinds of matter that were unimaginable 10 years ago. To make such unprecedented materials, profoundly original approaches are required, and Kolis's technology is showing exceptional promise in this regard. These efforts led to major external funding from the National Science Foundation, the Department of Energy, the Office of Naval Research and a number of other agencies. Most recently Kolis became a member of the High Power Laser Consortium, bringing a \$10 million center to Clemson funded by the Space and Missile Defense Command of the US Army.

Select Accomplishments

- Over 300 refereed publications.
- 14 Patents.
- Over 250 invited presentations.
- Founder of two startup companies.
- 32 Ph.D, 9 M.S students graduated, 17 Postdoctoral fellows mentored.
- Over \$14MM in external funding while at Clemson.
- Clemson University Alumni Award for Outstanding Achievements in Research.
- Clemson Provost's Award for Scholarly Achievement.
- NSF Award for Special Creativity.
- Alfred P. Sloan Fellowship (1990-92).



Xian Lu, PhD

Assistant Professor

Physics and Astronomy



Lu is a leading computational atmospheric and space scientist at Clemson University. The discovery of her research group has made significant impacts on the advancement of the numerical modeling and prediction of space weather. Space weather means “weather” of the Earth’s geospace, from 100 km to a few Earth radii, which supports satellite orbiting, GPS navigation, and radio propagation. Space weather originates from solar storms triggered by the Sun, and from terrestrial weather (like cyclones and thunderstorms) via atmospheric wave propagation. Using data assimilation which incorporates real-time information from observations, Lu’s work has improved the accuracy and precision of space weather prediction during storms. Her group is developing a new nested-grid module for space weather models, which enables the regional high-resolution simulation and saves computational expenses.

Lu has submitted 18 grant applications. Ten were funded including her NSF/CAREER award and two are pending. She won the NCAR Faculty Award in 2018, was nominated as the Junior Researcher of the Year in 2019, and selected as the Rising Star in Discovery by the College of Science in 2020. Her graduate student won the NCAR Newkirk fellowship in 2020. She has taught core physics, atmospheric physics, and numerical modeling classes. All received extremely positive evaluations. Lu has served the University Corporation for Atmospheric Research (UCAR) President’s Advisory Committee on University Relations (PACUR) and is the UCAR representative for Clemson University.

Select Accomplishments

- Receptient of NSF/CAREER award.
- Receptient of National Center for Atmospheric Research (NCAR) Faculty award.
- Receptient of Clemson University Rising Star in Discovery award.
- Led and parcipitated 10 granted projects funded by NSF, NASA, and Air Force (5 PIs and 5 Co-Is).
- Over \$4.5 million in extramural research funding (~\$2M for personal share).
- Published >40 peer-reviewed papers in prestigious journals and presented > 30 invited talks at international conferences.
- Advising 6 graduate students. Advised 4 postdocs. Advised >10 undergraduate students. Advised one high-school American African student.



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January 2022