



**CLEMSON**  
DIVISION OF RESEARCH

*A Carnegie **R1** Research University*



*2nd Quarter FY2020*

# RESEARCH REPORT

## *TRACKING EFFICIENCY*

**Research and Economic  
Development Committee**

Board of Trustees | Feb. 6, 2020

What's this photo?



# From the Vice President for Research

Dear Board of Trustees Members,

I am excited to share that Clemson is one of the fastest growing research universities among our peers of Carnegie R1 institutions. The bar graph below compares the percentage growth of competitive federal expenditures for similar public Carnegie R1 institutions without medical schools. We are posting extraordinary growth, and we have accomplished this with great efficiency and without a significant increase to the size of our faculty body.

This growth has been noticed nationally. In December, we were contacted by a PhD student from Pennsylvania who is trying to understand “whatever special” is going on at Clemson. The student visited campus to interview me and others. I wanted to share with you what I told him. You can read that on [page 4](#).

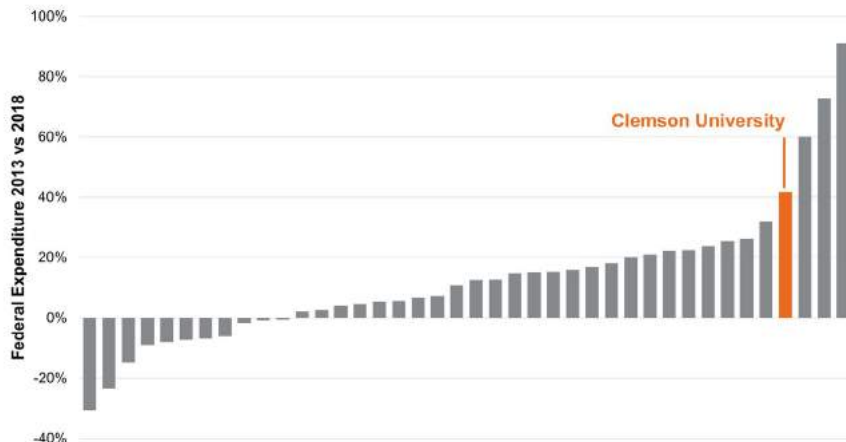
I also would like to discuss in more detail the efficiency of our research enterprise. Our per-capita research productivity has increased significantly during the past five years ([see page 6](#)). To analyze our efficiency as a research institution, we reviewed research productivity (awards and expenditures) at similar public Carnegie R1 institutions. We have found Clemson to be efficient. When analyzing our peers, for example, we find that institutions with higher levels of research expenditures also have some combination of larger faculty bodies or more space for conducting research ([see page 5](#)).

While Clemson’s research enterprise is comparatively efficient, we continue to seek improvements. The Division of Research, for example, has invested in new digital management solutions and implemented new operational procedures designed to save faculty members time so they can focus on their research ([see page 8](#)).

Of course, we remain committed to increasing our research portfolio. We have provided funding through the Clemson University Research Foundation to help faculty move their discoveries from the lab to the marketplace ([see pages 26-27](#)), and we are also investing strategically in faculty research through our R-Initiative funding programs ([see pages 29-30](#)).

I am proud of our continued growth, but I am even more proud of the impact our faculty members are having. For the Board of Trustees Research and Economic Development Committee meeting, I have invited Darren Linvill, associate professor of communication, to discuss internationally recognized research he has conducted with Patrick Warren, associate professor of economics. They are garnering press around the world for decoding foreign entities’ use of social media and disinformation to fuel political polarization in the United States ([see pages 24-25](#)).

I also invite you to read about faculty from across the Clemson footprint to learn about the great impact they are having ([see pages 35-56](#)). I hope you will agree that will have some exceptional faculty members and a solid research foundation from which to build. I am excited to see what the future holds.



Respectfully submitted,

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

Vice President for Research, Clemson University





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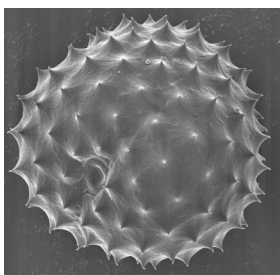
### 1. RESEARCH METRICS

### 3. NEWS

### 2. TOP COMPETITIVE GRANTS

### 4. FOCUS ON FACULTY

#### On the Cover



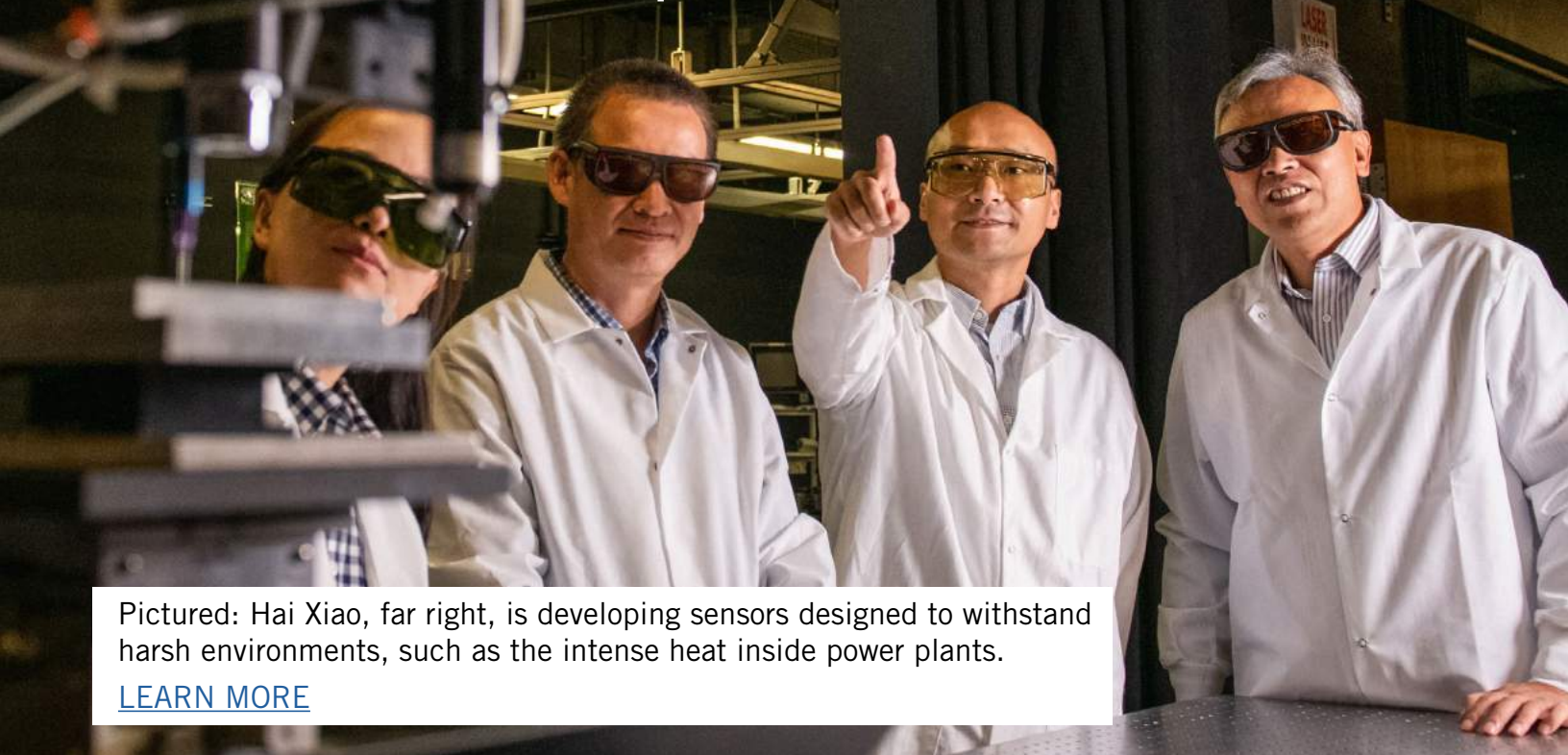
The cover photo is an image of ragweed pollen taken with Hitachi's SU5000 Variable Pressure Scanning Electron Microscope at the Clemson University Electron Microscopy Facility. This is one of four unique new microscopes added at the facility this year. The SU5000 allows for samples to be analyzed for a long duration with a stable and finely tuned electron beam. This microscope also comes with a large chamber that is highly useful for irregularly shaped specimens that couldn't be imaged elsewhere.

Among the four new microscopes added, EMF also added the world's most advanced scanning electron microscope: Hitachi's SU9000 Ultra-High Resolution Scanning Electron Microscope with Electron Energy Loss Spectroscopy (EELS) capability is the highest resolution scanning electron microscope in the world and the only advanced microscope of its kind in the United States. This microscope will be ideal for catalysis, biological and pharmaceutical research, polymer and fiber analysis, life sciences and medicine, electronics, and advanced nanotechnology materials.

These additions make Clemson home to one of the most advanced electron microscopy labs in the United States.



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



Pictured: Hai Xiao, far right, is developing sensors designed to withstand harsh environments, such as the intense heat inside power plants.

[LEARN MORE](#)

## EXECUTIVE SUMMARY

- Clemson's growth and success in the Carnegie Classification is gaining national attention ([see pages 4-7](#)).
- To support ongoing efficient growth, we have invested in time-saving and cost-saving digital workflow solutions, such as the new iLab Core Facility Management system to manage scheduling and billing at our core research facilities ([see page 8](#)).
- Competitive research expenditures topped \$100 million in FY2019, a key goal of the ClemsonForward strategic plan, and are on pace to reach \$100 million in FY2020 ([see page 9](#)).
- Total Clemson research expenditures, which are used in the Carnegie R1 classification, reached \$213 million in FY2018 ([see page 10](#)). Preliminary data for FY2019 will be reported in April.
- Competitive research awards reached \$65 million by the end of the second quarter of FY2020, an increase of 10 percent from the same period in FY2019 ([see page 11](#)).
- We have been successful securing large awards, receiving 6 awards valued above \$2 million in during the first two quarters of FY2020 for a total of \$27 million.
- Proposal submissions were \$292 million at the end of the second quarter in FY2020 ([see page 12](#)).
- A detailed look at proposals, awards and expenditures by college and business unit are provided in the Research Report Card ([see pages 14-17](#)).

# Something “Special” Going On

A note from the Vice President for Research

**Clemson’s research progress is being noticed.** In December, President Jim Clements was contacted by a PhD student studying higher education management at the University of Pennsylvania. The student is researching Carnegie R2 universities who achieved R1 status in 2015 and had that status reaffirmed in 2018. Clemson, of course, fits the bill. “And, in looking at the research trends over time, Clemson didn’t just cross the line, Clemson jumped over it and is forging ahead. Hence my interest in studying whatever special is going on at the university,” the student wrote in his request.

To better understand what is making Clemson’s research enterprise special, the student visited Clemson in January to interview administrators and faculty members, including me. Here are the points I made:

**1. An ongoing culture shift has set greater expectations, establishing a belief that Clemson can win big.** The ClemsonForward strategic plan set an institutional goal for Clemson to become a perennial R1 institution. In the past five years, Clemson administrators have encouraged faculty members to think big, to pursue big ideas and large granting opportunities. Since fiscal year 2015, we have secured 43 major research grants valued above \$2 million, bringing a total of \$208 million to Clemson. During the first two quarters of this fiscal year, we have received 6 awards valued above \$2 million for a total of \$27 million. One way we nurtured this success was by supporting faculty through internal funding programs (R-Initiatives). R-Initiatives stimulate and support research across the university and encourage research collaboration that leads to bigger, higher-impact research projects that will increase expenditures. R-Initiatives also provide funds to hire research faculty members and help PhD candidates graduate. Research expenditures, research faculty counts, and PhD productivity are all tracked by Carnegie. Clemson’s position among Carnegie R1 universities has improved in those metrics (see right).

**2. Clemson has taken advantage of its eligibility to pursue high-value grants** under the Established Program to Stimulate Competitive Research (EPSCoR) and the Institutional Development Award (IDeA) program of the National Institutes of Health. These programs stimulate research activity in states where federal funding had been low, and Clemson has worked strategically the past four years to increase its competitiveness for these projects. Clemson recently received its third Centers of Biomedical Research Excellence (COBRE) grant. Each COBRE (part of IDeA) provides up to \$30 million in funding over a period of 10 to 15 years. We are now assembling a research team to

Think Big, Win Big

Since fiscal year 2015, Clemson secured 43 major research grants valued above \$2 million, bringing a total of \$208 million to the university.

Carnegie Metrics	Clemson 2015	Clemson 2019	Improvement in Average Rank*
Science & Engineering Expenditures	\$116,871,000	\$160,361,000	+11
Non-Science & Engineering Expenditures	\$44,199,000	\$53,097,000	+3
Postdocs & Non-Faculty Researchers	65	173	+30
PhD Humanities	2	4	+6
PhD Social Sciences	9	21	+49

\*Carnegie does not rank schools; this is based on an internal analysis of Carnegie data.

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# Something “Special” Going On

*A note from the Vice President for Research*

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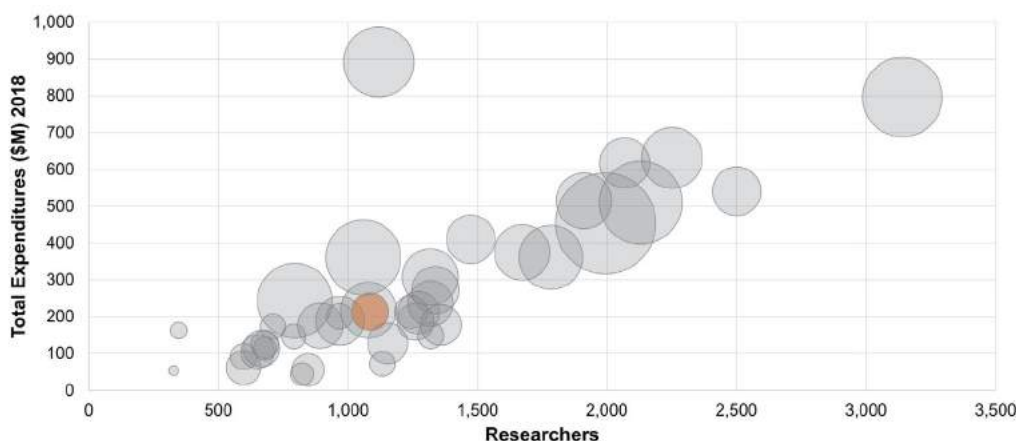
submit for a fourth COBRE project. We have also earned major EPSCoR grants at Clemson in recent years, including a \$20 million project to [research advanced materials](#) and a [\\$7 million project focused on radionuclide waste disposal](#). We also have received large EPSCoR grants valued \$6 million each for [biopharmaceutical research](#) that could reduce the cost of prescription medicines, for [optogenetics research](#) that could lead to treatments for seizures and illnesses, and for [agricultural research](#) focused on developing superior crops. These are large, long-term federal investments that stimulate hiring, expenditure growth and PhD productivity, all metrics tracked by Carnegie.

**3. Clemson is beginning to bear the fruits of legacy investments** in young innovation campuses and sites. The Clemson University Restoration Institute in North Charleston received a \$23 million contract in 2018 to test the world’s largest wind turbine drivetrain and is in the process of adding a second major grant. The Clemson University International Center for Automotive Research has continuously increased research expenditures to approximately \$4 million in 2019. The Center for Human Genetics in Greenwood recently opened in 2018 and has already secured major research awards.

**4. Clemson has built a cohesive, collaborative, customer-focused team** at the Division of Research. The Division of Research is working more efficiently than ever to help faculty members pursue, secure and manage research projects. We have invested in digital tools for tracking lab safety and using core facility equipment that are reducing paperwork, improving operational efficiencies, and allowing faculty more time to focus on research. Additionally, the Division is unlocking new opportunities. The Clemson University Research Foundation (CURF), which reports to the Division of Research, has new leadership and new strategic initiatives designed to bring additional funding to Clemson, to nurture technology development, and to create more opportunities for Clemson faculty to pursue private partnership and entrepreneurship.

## FURTHER RESEARCH GROWTH

Here I also would like to take the opportunity to make a brief analysis of what it may take to further grow our research. When analyzing our Carnegie R1 peers, we see that universities with higher expenditures have some combination of larger faculty bodies and more space. The chart below shows expenditures (y axis) and the size of faculty body (x axis), along with research space (the size of the bubble). Clemson is the orange bubble.



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# Something “Special” Going On

A note from the Vice President for Research

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If we want to grow our research enterprise considerably from here, we need to invest strategically. Currently, Clemson’s annual competitive research expenditures are ~\$100 million with nearly 1,000 faculty members. Consider that about 30 percent of faculty at Clemson account for about 80 percent of our expenditures. So to grow expenditures, we would need to hire faculty members in strategic disciplines. To provide an example: Let’s say we want to double our competitive expenditures to \$200 million **annually** (This will bring our total expenditures to about \$300 million annually). I estimate that we would need to hire around 350 faculty members and/or research scientists, each of whom would need to generate, on average, \$300,000 in annual expenditures. These hires need to be a combination of research faculty and tenure-track faculty, ranging from junior faculty members to experienced endowed professors and chairs.

This would be a significant investment (see chart at right). Each new faculty member would need space and start-up funding to get their research off the ground. And, as these new faculty members successfully secure grants, we would need funds available to offer incentives to retain them. This could be salary increases, additional lab space, or new equipment, for example.

I hope this provides the framework for a discussion on where we want to go and what it will take to get there. I am proud of all that we have accomplished to reach our ClemsonForward goal of \$100 million in expenditures. At our current staffing and space levels, I think this should be our goal each year. If we aspire for something bigger, investment will be required.

### Investment to add and retain 350 Faculty

Recurring	Salary (\$125,000 average)	\$43.75M
One-Time	Space 1,000 sq. ft. each at \$350 per sq. ft.	\$122.5M
One-Time	Start-up \$750,000 each	\$262.5M
One-Time	Retention Costs	\$100M
Total Cost		~\$500M

### A CLOSER LOOK AT RESEARCH EFFICIENCY

Finally, I would like to give a closer look at our research efficiency. We have grown with incredible efficiency, and I believe we are now operating at the upper limits of our capacity. Consider the growth in our research output. It has been extraordinary during the past five years without significant increases to the size of our body of tenure and tenure-track faculty or an expansion to our research space. The chart on the right demonstrates the significant increases in per-capita output from 2013 (the purple bar) to 2019 (the orange bar).

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### Efficiency: Output Ratios



\*Researchers include tenured/tenure-track faculty, research faculty and post-doctoral fellows

# Something “Special” Going On

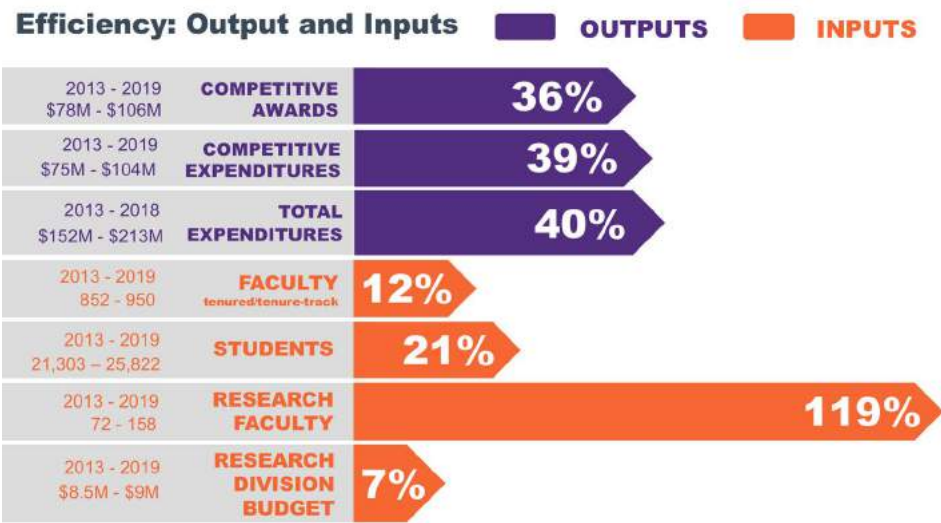
A note from the Vice President for Research

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This is a tremendous accomplishment by our faculty members, who are fueling growth in output (expenditures) that far exceeds our increases in input (faculty, students, space, etc.), as shown in the chart at the right. As you can see, we have been able to hire more research faculty as we have secured more competitive grants that fund such positions. On the other hand, our number of tenured and tenured-track faculty members who typically serve as principle investigators on the awards has increased just modestly.

Clemson has grown its research enterprise considerably and efficiently in recent years thanks to well-defined strategies supported by administrators and faculty members across our footprint. We are now a Carnegie R1 institution, solidly positioned to meet our ClemsonForward goal of becoming a *perennial* Carnegie R1 university.

*The nation is taking notice.*



A Carnegie **R1** Research University



# Improving Efficiency

To improve operational efficiency, the Clemson University Division of Research has invested in new digital management solutions and implemented new operational procedures designed to save faculty members time so they can focus on their research.

## 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, allowing more time to focus on research while incorporating safety into their daily activities.



## 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 will integrate with our existing PeopleSoft system for billing, allows credit card payments for external users, and allows users to track their usage and budgets across multiple cores. iLab will roll out through the Spring and Summer semesters.

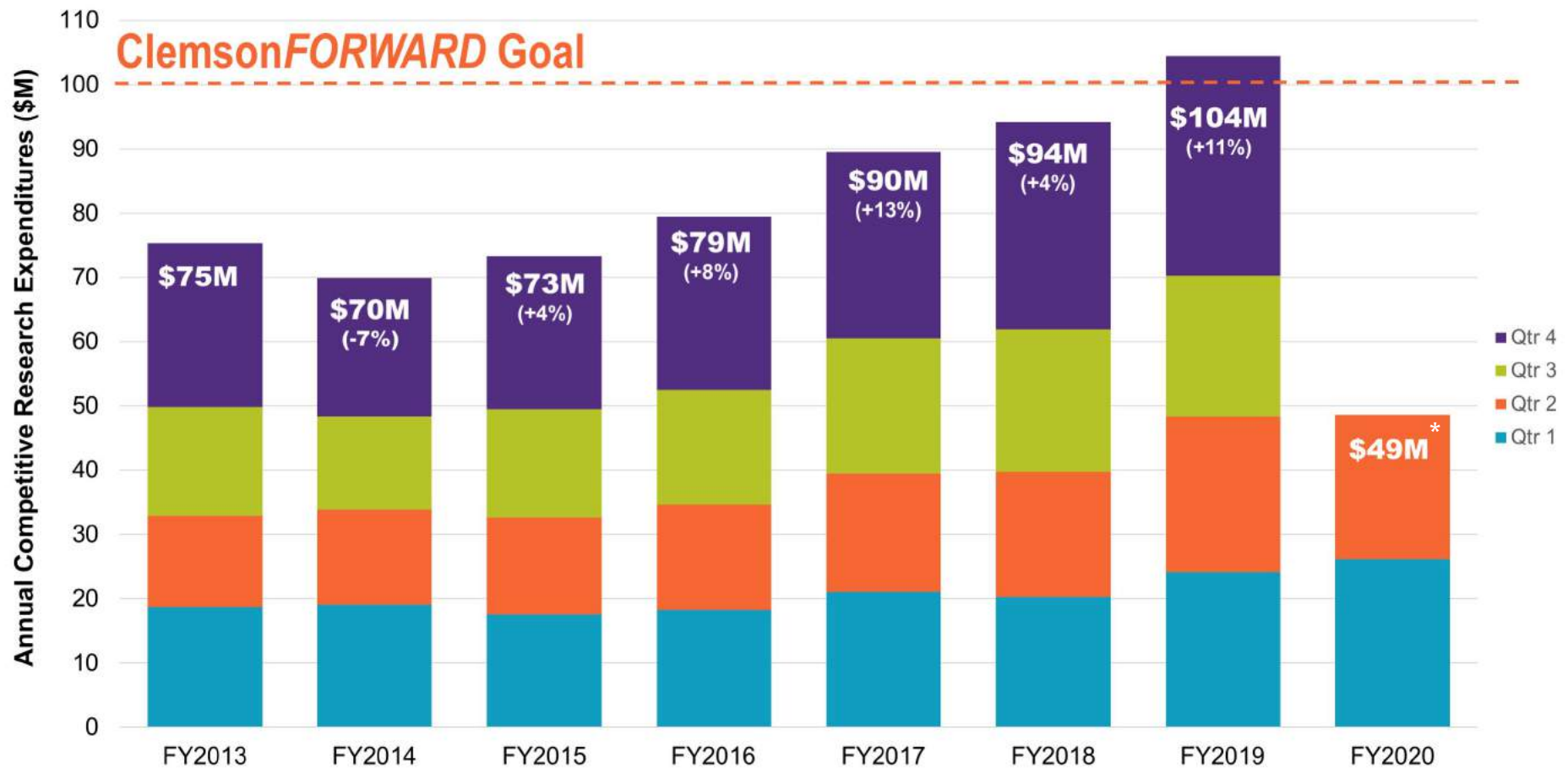
## Online Compliance Review

The Office of Research Compliance is implementing online submission modules into the InfoEd digital administration platform faculty use for submitting grant proposals. Currently, researchers manually submit research protocols via email to the compliance committees for regulatory review. When received, ORC manually enters the data into InfoEd and manually updates it for the life of the project. Online submission will allow researchers to review their submissions and the approval progress. It will also eliminate the need for substantial data entry by Research Compliance. This should increase transparency and make the review process more efficient.

## 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 last 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.

# Competitive Research Expenditures FY2013-2020

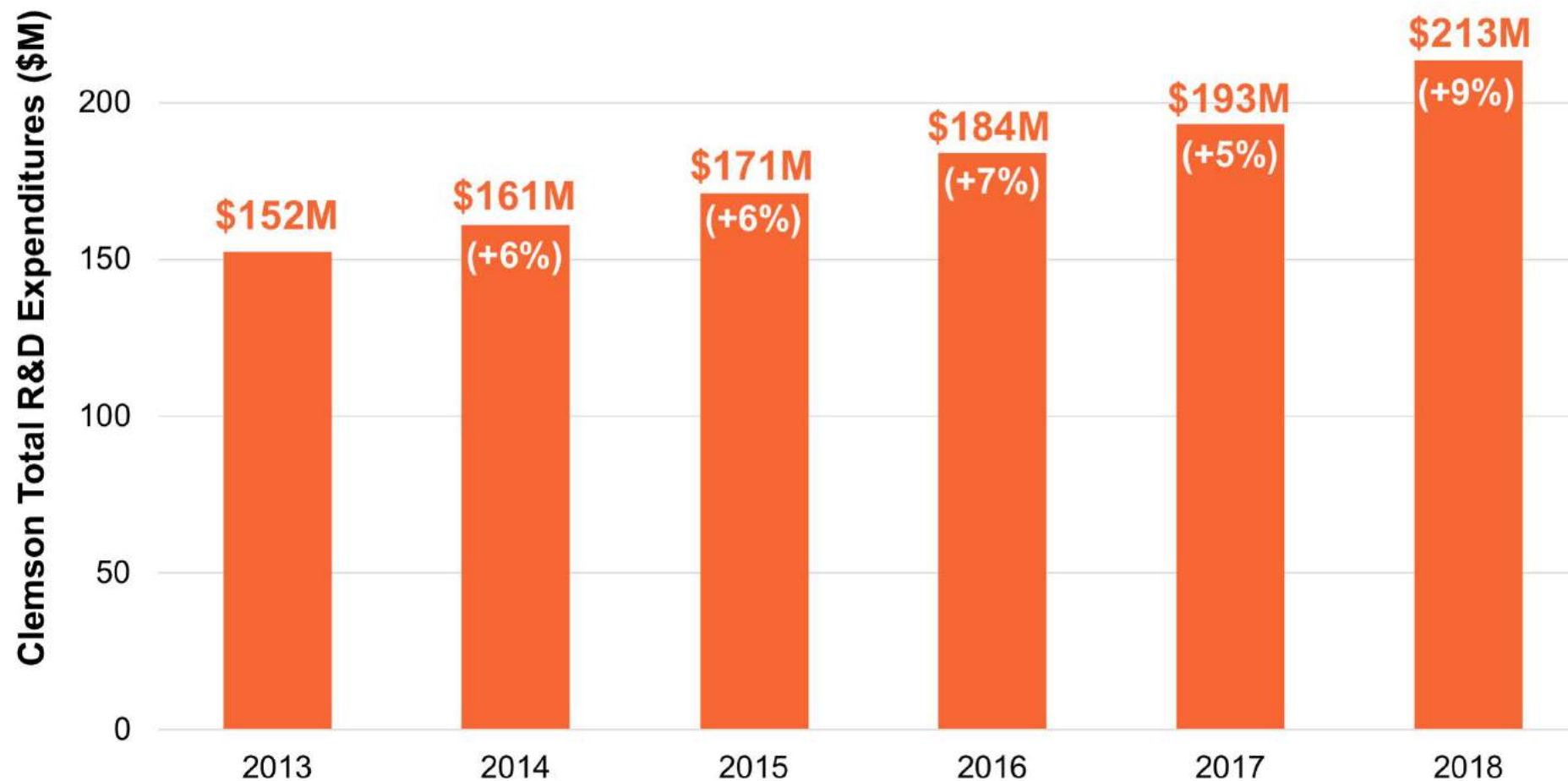


\* Fiscal Year 2020 data as of the end of the second quarter



# Total R&D Expenditures 2013-2018

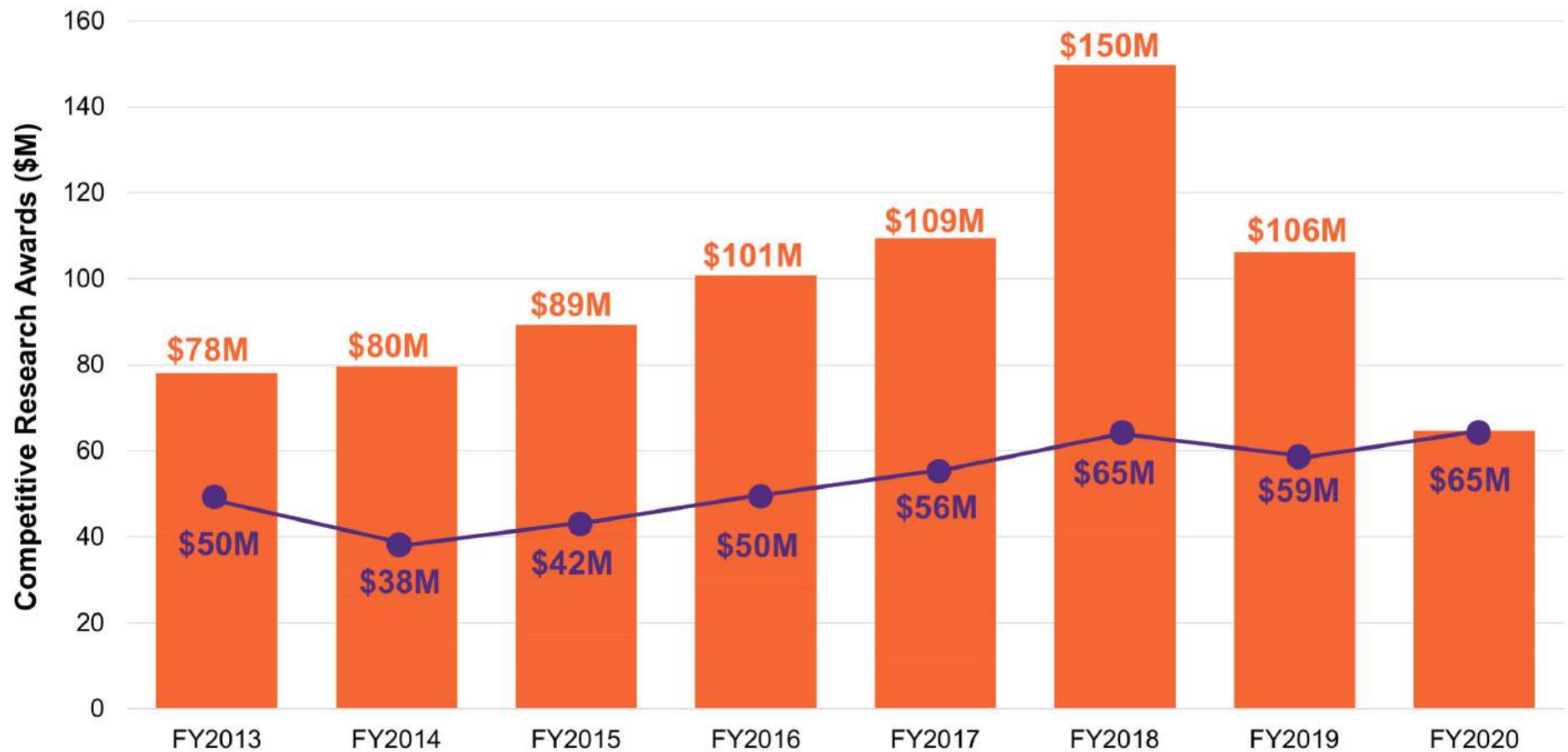
Total expenditures include competitive research awards, external research services, research gifts, institutional research support, state research support, etc., reported to the NSF. These totals are used for the Carnegie R1 classification.



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

\* Preliminary 2019 data will be released in April.

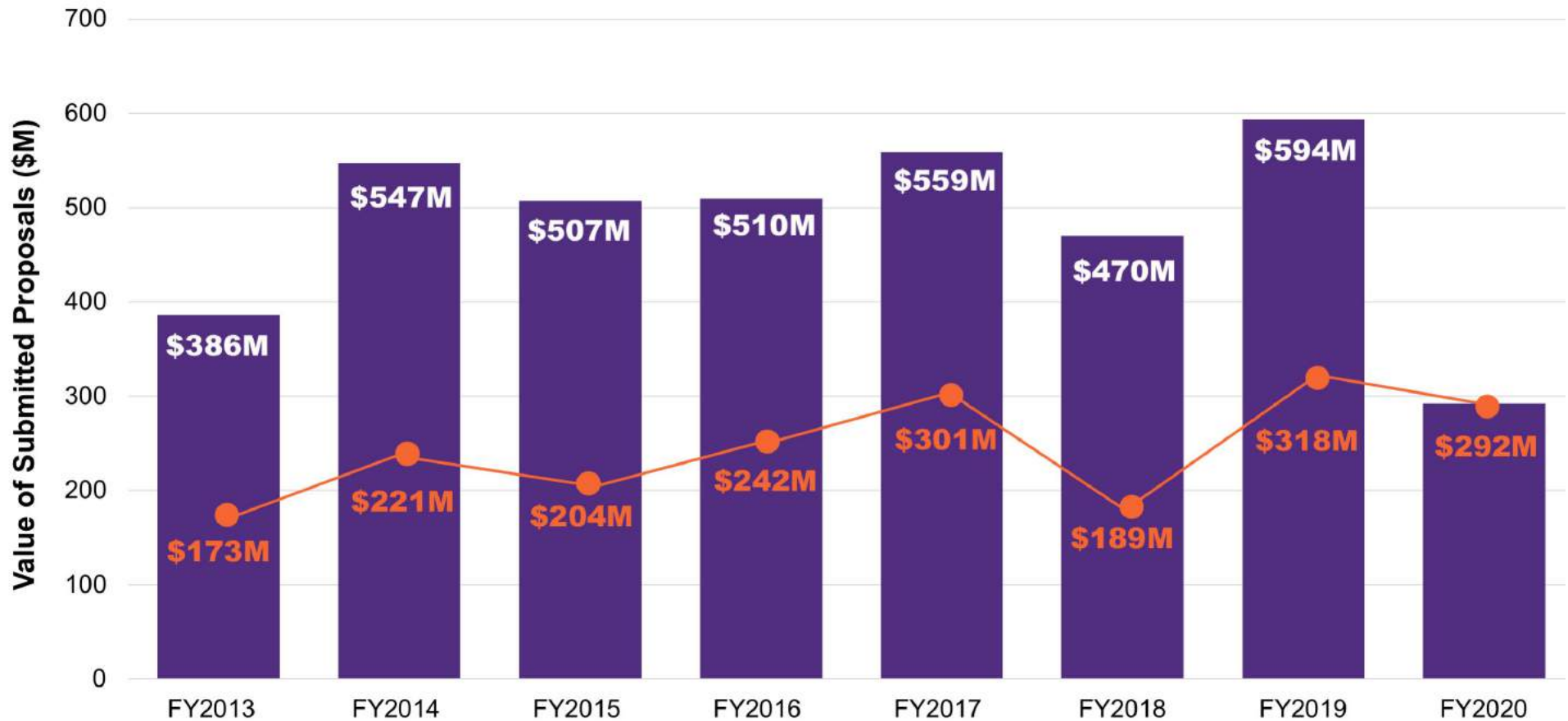
# Competitive Research Awards FY2013-2020



\* Data on the purple line as of the end of the second quarter for each fiscal year

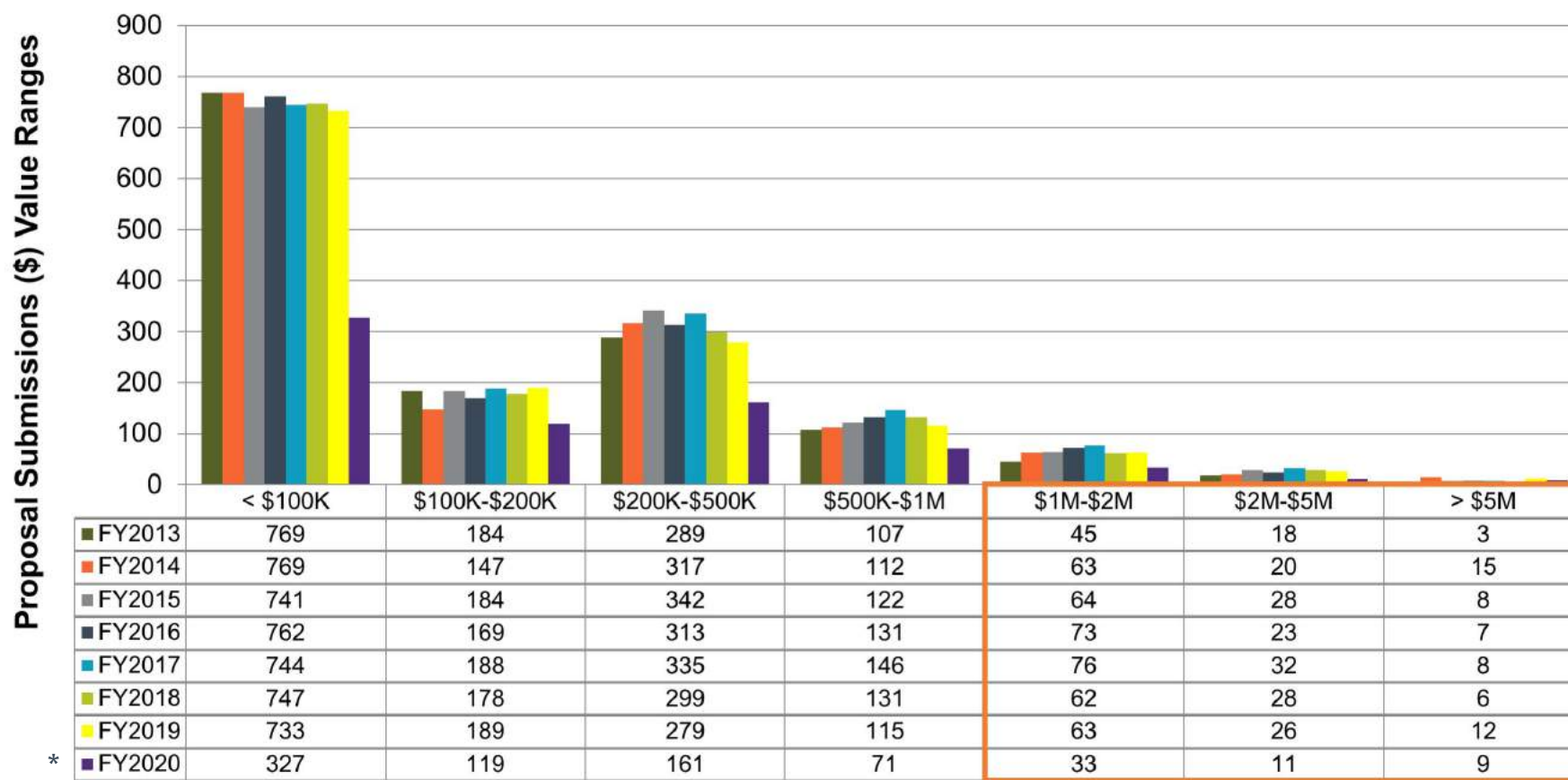


# Proposal Submissions: \$ Value FY2013-2020



\* Data on the orange line as of the end of the second quarter for each fiscal year

# Proposal Submissions: \$ Range FY2013-2020



\* Figures for FY2020 are as of the end of the second quarter



# Research Report Card

		2013	2014	2015	2016	2017	2018	2019	2020	
<b>RESEARCH INPUTS</b>									<b>as of Dec. 31</b>	
<b>a. Proposal Submissions by Number</b>		1,414	1,443	1,489	1,478	1,529	1,451	1,417	731	
1	CAAH (College of Architecture, Arts & Humanities)	38	51	65	62	69	64	69	53	
2	CAFLS (College of Agriculture, Forestry & Life Sciences)	235	230	224	222	241	229	377	172	
3	CBSHS (College of Behavioral, Social & Health Sciences)	81	93	102	104	112	101	105	54	
4	CECAS (College of Engineering, Computing & Applied Sciences)	549	555	582	617	618	587	562	276	
5	COE (College of Education)	51	54	39	45	46	37	39	21	
6	COB (College of Business)	7	15	13	15	7	10	5	5	
7	COS (College of Science)	242	247	263	239	230	227	186	112	
8	CCIT (Clemson Computing & Information Technology)	12	12	6	3	5	1	1	-	
9	PSA (Public Service & Agriculture)	88	90	118	97	170	163	33	15	
10	VP for Res & Interdisc Inst	31	17	7	17	14	12	25	18	
11	All Other	80	79	70	57	17	20	15	5	
<b>b. Proposal Submissions by Dollar Value (in millions)</b>		\$386	\$547	\$507	\$510	\$559	\$470	\$486.4 *	\$292.4	<b>FY 2020 Targets</b>
12	CAAH	N/A	N/A	\$9.4	\$8.6	\$3.1	\$5.7	\$4.4	\$2.0	<b>\$5.5</b>
13	CAFLS	N/A	N/A	\$42.6	\$23.8	\$43.4	\$37.1	\$64.1	\$39.7	<b>\$66.4</b>
14	CBSHS	N/A	N/A	\$28.4	\$40.1	\$41.4	\$25.9	\$47.9	\$12.5	<b>\$49.6</b>
15	CECAS	N/A	N/A	\$260.5	\$281.2	\$306.4	\$235.5	\$255.3	\$140.0	<b>\$283.1</b>
16	COE	N/A	N/A	\$13.8	\$14.7	\$18.1	\$19.1	\$10.1	\$9.9	<b>\$12.2</b>
17	COB	N/A	N/A	\$7.5	\$4.3	\$2.8	\$1.8	\$2.1	\$0.6	<b>\$2.2</b>
18	COS	N/A	N/A	\$100.2	\$111.3	\$95.9	\$100.4	\$73.8	\$60.5	<b>\$84.7</b>
19	CCIT	N/A	N/A	\$4.3	\$2.0	\$4.0	\$0.9	\$0.4	\$1.5	
20	PSA	N/A	N/A	\$23.3	\$10.4	\$31.3	\$25.8	\$11.4	\$5.0	<b>\$13.4</b>
21	VP for Res & Interdisc Inst	N/A	N/A	\$5.6	\$7.7	\$6.0	\$12.7	\$9.5	\$16.9	
22	All Other	N/A	N/A	\$11.4	\$5.6	\$6.0	\$5.0	\$7.4	\$3.6	

**N/A - Data per college and unit was unavailable for FY2013 and FY2014.**

**\*This figure excludes a large \$107 million proposal from a multi-disciplinary collaborative between Clemson and Prisma Health.**

# Research Report Card

		2013	2014	2015	2016	2017	2018	2019	2020
<b>RESEARCH INPUTS continued</b>									<b>as of Dec. 31</b>
c. Research Awards (in millions)		\$78.0	\$79.7	\$89.3	\$100.9	\$109.5	\$149.8	\$106.3	\$64.6
23	CAAH	\$0.2	\$0.6	\$0.7	\$1.4	\$0.5	\$1.9	\$2.0	\$0.6
24	CAFLS	\$7.3	\$6.7	\$14.1	\$8.6	\$10.9	\$13.9	\$14.2	\$10.0
25	CBSHS	\$2.7	\$3.4	\$4.8	\$5.1	\$4.6	\$8.1	\$5.9	\$5.4
26	CECAS	\$34.2	\$37.7	\$48.2	\$45.5	\$54.0	\$80.8	\$50.4	\$23.7
27	COE	\$2.6	\$4.1	\$3.2	\$2.9	\$2.8	\$4.5	\$3.3	\$1.3
28	COB	\$2.0	\$1.1	\$1.3	\$0.8	\$1.2	\$1.1	\$0.8	\$0.03
29	COS	\$10.3	\$7.8	\$9.9	\$15.6	\$19.9	\$14.7	\$18.7	\$7.1
30	CCIT	\$1.6	\$5.7	\$0.7	\$0.8	\$0.5	\$1.3	\$0.1	\$0.3
31	PSA	\$14.8	\$12.3	\$9.6	\$13.0	\$7.9	\$6.6	\$4.0	\$4.3
32	VP for Res & Interdisc Inst	\$1.8	\$0.3	\$0.6	\$5.1	\$5.0	\$15.1	\$6.2	\$11.1
33	All Other	\$0.3	\$0.2	\$1.2	\$2.0	\$1.2	\$1.7	\$0.7	\$0.7
d. Notable Awards									
34	NSF CAREER Awards (by start date)	4	1	3	5	7	7	4	2
35	EPA CAREER Awards (by start date)	-	-	-	-	-	-	1	-
36	Air Force Young Investigator Awards	-	-	1	2	-	-	1	-
37	DOE Early CAREER Awards	1	-	-	-	-	-	-	-
38	NIH R01-Equivalent Awards (by start date)	-	-	2	2	2	3	6	1
e. Supporting Workforce									
39	Graduate Student Enrollment	4,206	4,372	4,670	4,664	4,425	4,985	5,282	5,627
40	Sponsored Graduate Research Assistants	822	745	707	693	696	761	558	637
41	Postdoctoral Fellows	48	64	83	85	90	97	98	86
42	Research Faculty: Permanent 100% Non-E&G Funded	6	6	6	11	17	14	11	18
43	Research Faculty: Temporary 100% Non-E&G Funded	18	18	15	14	24	27	29	54



# Research Report Card

		2013	2014	2015	2016	2017	2018	2019	2020
<b>RESEARCH PROCESS</b>									<b>as of Dec. 31</b>
f. Sponsored Research Expenditures by Business Unit (in millions)		\$75.4	\$70.0	\$73.3	\$79.5M	\$89.5	\$94.2	\$104.5	\$48.6
44	CAAH	\$0.5	\$0.4	\$0.4	\$1.1	\$1.3	\$1.4	\$1.7	\$0.8
45	CAFLS	\$8.8	\$7.7	\$6.8	\$8.6	\$11.1	\$11.0	\$14.1	\$7.5
46	COB	\$1.2	\$1.2	\$1.1	\$1.0	\$0.9	\$0.8	\$0.8	\$0.4
47	CECAS	\$35.0	\$35.0	\$35.0	\$37.5	\$42.9	\$45.1	\$50.3	\$21.4
48	CBSHS	\$3.1	\$2.8	\$3.7	\$4.1	\$4.4	\$4.9	\$5.3	\$2.8
49	COE	\$3.3	\$3.3	\$3.8	\$2.5	\$2.6	\$2.2	\$2.5	\$1.2
50	COS	\$13.2	\$10.5	\$9.3	\$11.3	\$14.8	\$16.7	\$17.2	\$8.0
51	CCIT	\$2.0	\$1.6	\$3.4	\$2.8	\$0.4	\$0.6	\$0.2	\$0.03
52	PSA	\$4.7	\$4.9	\$5.8	\$5.6	\$5.7	\$5.9	\$3.7	\$1.9
53	VP for Res & Interdisc Inst	\$1.9	\$1.3	\$1.9	\$3.5	\$3.9	\$3.9	\$7.1	\$4.3
54	All Other	\$1.7	\$1.7	\$2.2	\$1.5	\$1.5	\$1.6	\$1.5	\$0.2
g. Sponsored Research Expenditures by Innovation Cluster (in millions)		\$75.4	\$70.0	\$73.3	\$79.5	\$89.5	\$94.2	\$104.5	\$48.6
55	Advanced Materials	\$14.3	\$11.3	\$10.7	\$10.4	\$10.7	\$12.1	\$15.4	\$6.8
56	Cyberinfrastructure & Big Data Science	\$10.3	\$10.5	\$10.1	\$8.9	\$8.1	\$9.6	\$6.9	\$2.0
57	Energy, Transportation & Advanced Manufacturing	\$4.7	\$5.7	\$7.2	\$7.6	\$17.8	\$16.8	\$17.1	\$6.5
58	Health Innovation	\$13.1	\$10.2	\$10.2	\$12.5	\$16.3	\$17.8	\$23.8	\$12.6
59	Human Resilience	\$8.2	\$7.7	\$9.7	\$9.8	\$7.8	\$8.6	\$9.0	\$4.1
60	Sustainable Environments	\$18.3	\$16.9	\$17.9	\$21.7	\$18.9	\$19.5	\$20.6	\$11.3
61	Other	\$6.5	\$7.6	\$7.4	\$8.6	\$9.9	\$9.6	\$11.7	\$5.3
h. Sponsored Research Expenditures by Funding Source (in millions)		\$75.4	\$70.0	\$73.3	\$79.5	\$89.5	\$94.2	\$104.5	\$48.6
62	Federal Government	\$62.9	\$56.9	\$58.5	\$65.1	\$74.6	\$78.2	\$85.1	\$38.8
63	Foundations, Societies, and Associations	\$4.2	\$4.3	\$4.7	\$4.1	\$4.7	\$5.1	\$7.4	\$3.8
64	Industry/Other	\$4.9	\$5.6	\$6.1	\$6.9	\$6.8	\$6.3	\$5.3	\$2.6
65	International	\$0.8	\$0.6	\$0.8	\$0.8	\$0.5	\$0.4	\$0.3	\$0.2
66	Local Government	\$0.6	\$0.6	\$0.6	\$0.5	\$0.5	\$0.5	\$0.5	\$0.2
67	State Government	\$1.9	\$1.9	\$2.7	\$2.0	\$2.4	\$3.7	\$5.7	\$3.0

# Research Report Card

		2013	2014	2015	2016	2017	2018	2019	2020
	<b>RESEARCH PROCESS continued</b>								<b>as of Dec. 31</b>
	<b>i. Sponsored Research Expenditures per T/TT Faculty by College</b>								
68	CAAH	\$3,299	\$2,264	\$2,343	\$5,841	\$8,177	\$8,945	\$10,159	\$5,097
69	CAFLS	\$88,570	\$81,120	\$69,612	\$84,618	\$105,396	\$103,814	\$134,555	\$63,338
70	COB	\$14,415	\$13,047	\$11,510	\$9,683	\$8,855	\$8,269	\$8,200	\$3,487
71	CECAS	\$169,754	\$160,698	\$163,406	\$163,685	\$194,323	\$214,280	\$225,620	\$93,099
72	CBSHS	\$27,982	\$26,853	\$33,764	\$42,376	\$34,751	\$39,532	\$40,301	\$21,049
73	COE	\$54,779	\$51,688	\$62,195	\$38,037	\$44,483	\$40,197	\$47,371	\$23,893
74	COS	\$95,724	\$72,421	\$61,912	\$77,589	\$95,956	\$110,206	\$118,600	\$53,599
75	CU average (Total exp/Total T/TT faculty)	\$83,858	\$75,089	\$78,826	\$85,753	\$84,297	\$103,706	\$99,125	\$51,315
	<b>RESEARCH OUTPUTS/ OUTCOMES</b>								
76	Doctorates Awarded (Aug, Dec, May)	187	217	237	233	231	234	301	152
77	STEM Doctorates Awarded (Aug, Dec, May)	118	153	165	138	156	171	174	105
78	Disclosures	102	129	70	60	65	48	61	38
79	Patents	16	15	15	14	18	11	18	5
80	Licenses/Options	9	7	7	5	10	10	16	5
81	Licensing Revenue	\$1,134,289	\$762,811	\$360,131	\$354,827	\$539,490	\$388,751	\$398,136	\$104,231
82	Start-up Companies (based on licenses/options)	1	4	4	2	3	3	5	1



# STRATEGIES

## 1 INVEST IN PEOPLE

- Incentivize research investment, activity and doctoral productivity.
- Hire world-class faculty.
- Support faculty competitiveness through proposal development support from the Office of Research Development and external reviews of proposals.
- Pursue high-value, high-quality research grants with help from external consultants.
- Continue to implement R-Initiative funding programs to invest in high-quality research ideas.

## 2 INCREASE PROPOSAL SUBMISSIONS

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

- Provost has set goals with college deans, establishing submission targets in order to reach ClemsonForward goals, and we are providing quarterly reports to help track progress ([see Report Card on page 14](#)).
- Vice President for Research meets regularly with college deans and associate deans for research to discuss research strategies.
- The Office of Research Development continues to support faculty in the development of large, complex proposals.
- We have hired an associate vice president for research development to lead research development efforts ([see page 34](#)).
- CURF is working to support growth in federal and industry-funded research.
- The Office of External Affairs developed strategic initiatives to attract new industry research funding.

## 3 OPTIMIZE CAPACITY

- Complete the research space utilization study with the EVP for Finance and Operations to more efficiently utilize research facilities and equipment.
- Optimize the use of facility space and reduce downtime by incentivizing faculty use of equipment through our Clemson University Core Incentivized Access program.
- Implement new software solutions that will allow us to better manage facility usage and laboratory risk. This will greatly reduce workplace inconsistencies, redundancies and workloads, while helping to achieve safe, efficient laboratories.
- Align efforts with priorities and opportunities of federal funding agencies and industry, and pursue high-value grant projects, such as Centers of Biomedical Research Excellence (COBRE), Engineering Research Centers (ERC), and Science and Technology Centers (STC).
- Invest in research equipment that will be relevant to industry and funding agencies.

# TOP COMPETITIVE GRANTS

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



Pictured: Dil Thavarajah, Clemson associate professor of pulse crop quality and nutrition, will co-lead a new Feed the Future laboratory. [LEARN MORE](#)

## EXECUTIVE SUMMARY

### CONSISTENTLY EARNING HIGH-VALUE AWARDS

- In the first two quarters of FY2020, Clemson faculty have earned six awards of at least \$2 million in value, for a combined value of \$27 million.
- Clemson has consistently earned large awards over the past five years. Since 2015, Clemson has received 43 major research projects with a combined value of \$208 million.
- These large grants are significant contributors to the growth of the university's research enterprise. As such, we continue to assemble faculty teams to strategically pursue high-value grant opportunities.
- FY2020 started with a significant award: Hunter Endowed Chair of Bioengineering Naren Vyavahare received news that his NIH-funded Center for Biomedical Research Excellence has been approved for an additional \$5.7 million and will be advanced to a third phase. This is significant in that it allows Clemson to pursue another COBRE grant. Trudy Mackay, director of the Center for Human Genetics, is leading the development of our proposal.

## 1 Naren Vyavahare: \$5.7 million from the National Institutes of Health

**Project Title:** NIH-COBRE: SC COBRE Bioengineering Center for Regeneration and Formation of Tissues (SCBioCRAFT) – Phase III

**Summary:** The award of Phase III of this NIH COBRE supports the continued development of SC BioCRAFT, building capacity and expertise in South Carolina centering on advancing biomaterial design and application, in situ tissue repair with targeted therapies, and applying the principles of normal developmental biology to regenerative medicine. This COBRE project has recruited 10 new faculty, mentored and trained 23 target faculty and developed two core facilities.



## 2 Stephen Kresovich: \$5.4 million from the U.S. Department of Energy

**Project Title:** The 3P Program: Phenotyping x Prediction = Productivity

**Summary:** Supported by expertise from Bloomfield Robotics, Hi Fidelity Genetics, Carolina Seed Systems and Carnegie Mellon, the Clemson research team will employ robotics, computing and genomics to generate a real-time phenotyping of Sorghum genetics to produce plant variants that will improve crop productivity and yield stability.



## 3 Hai Xiao: \$3.8 million from the U.S. Department of Energy

**Project Title:** Fossil Energy: Test and Validate Distributed Coaxial Cable Sensors In Situ Condition Monitoring of Coal-Fired Boiler Tubes

**Summary:** Clemson leads a team including researchers from University of Cincinnati, Electric Power Research Institute and General Electric to develop novel sensor technologies to improve the monitoring boilers in power plants. Boiler failures are difficult to predict and account for 60% of unplanned power plant outages. Researchers will develop sensing technologies that can function reliably in extreme environments.



## 4 Paula Agudelo: \$3.4 million from the U.S. Department of Agriculture

**Project Title:** A Multi-State Effort to Contain and Manage the Invasive Guava Root Knot Nematode (GRKN) in Vegetable Crops

**Summary:** Land-grant universities in Florida, Georgia and North Carolina join a team from Clemson University in assessing risk for and determining treatment plans for Guava Root Knot Nematodes, an aggressive pest that attacks root systems in sweet potato, cucumber, watermelon and tomato crops. Leveraging the extension networks of these universities, researchers will communicate research findings on management and containment strategies.





## 5 Stephanie Davis: \$2.8 million from the Health Resources and Services Administration

**Project Title:** Advanced Nursing Education Workforce (ANEW)

**Summary:** South Carolina ranks above the national average for premature deaths, poor or fair health, adult obesity, uninsured population and violent crime. South Carolina, a predominantly rural state, ranks 42nd in overall health ranking with 42 of 46 counties experiencing primary care shortages. Partnering with Prisma Health, Clemson researchers will develop training programs aimed at increasing the numbers of family and adult-gerontology nurse practitioner primary care providers in the Upstate of South Carolina.



## 6 Mark Blenner: \$1.8 million from the National Institutes of Health

**Project Title:** Enabling Plant Natural Product Biosynthesis by Debugging Heterologous Protein Expression in Yeast

**Summary:** The Blenner lab at Clemson has been using yeast, *Yarrowia lipolytica*, to synthesize biochemicals used in the production of a wide variety of novel materials and compounds. Supported by the NIH, investigators will use CRISPR-Cas9, genetic editing technologies, to enhance the productive capabilities of *Yarrowia lipolytica* with the goal of efficiently producing large quantities of compounds used in pharmaceuticals.



## 7 Xiao Hai: \$1.6 million from the Department of Energy

**Project Title:** All-digital Sensor System for Distributed Downhole Pressure Monitoring in Unconventional Fields

**Summary:** Oklahoma and Oklahoma State University will join Clemson University in exploring low-cost, all-digital pressure sensing technologies for locating unconventional oil and gas resources. Unconventional oil and gas extraction will contribute approximately 70% of total oil production and more than 76% of natural gas production in the United States by 2050. These technologies will increase the production efficiency in the extraction of these natural resources.



8

**Anand Gramopadhye: \$1.5 million from the U.S. Navy via MIT**

**Project Title:** A Virtual Manufacturing Lab (VM-Lab): A Multimedia Design House for Digital Learning in Manufacturing-USA Workforce Education

**Summary:** Clemson's Center for Workforce Development (CWD) and the Center for Optical Materials Science and Engineering Technologies (COMSET) will join researchers at the AIM Photonics Academy at MIT to develop a modern online workforce education platform to train engineers



9

**Robert Powell: \$1.3 million from the National Science Foundation**

**Project Title:** Advancing Informal STEM Learning

**Summary:** Day-long school field trips are a critical mechanism for the delivery of both formal and informal STEM-related environmental education. Field trips offer an opportunity for youth to participate in experiential STEM education; however, very few empirical studies have collected learning outcomes from this important educational activity. UNC Wilmington and Virginia Tech join Clemson to study the program characteristics and learning outcomes in 800 single-day environmental education field trips for youth in grades 5-8.



10

**Xiao Hai: \$1.3 million from the Department of Energy**

**Project Title:** Additive Manufacturing of Circumferentially Embedded Optical Probe Modules for In Situ Monitoring of Coal-Fueled Steam Turbines

**Summary:** General Electric Power and Clemson University will work to develop, test and validate the Smart Ring, a thin instrumentation track hosting various sensor modules for monitoring key operation parameters for the turbines in coal fueled electric power plants. This project will combine the Smart Ring concept developed by GE with micromachined optical fiber sensors developed at Clemson University.



This section recaps university research news.



Massachusetts Institute of Technology and Clemson University have teamed up to close the education gap in manufacturing light-based technologies.

[LEARN MORE](#)

## EXECUTIVE SUMMARY

### RECOGNIZING EXCELLENCE AND NURTURING RESEARCH GROWTH

- Research by Clemson University professors Patrick Warren and Darren Linvill has caught the eye of U.S. national security agencies and numerous media outlets around the world ([see pages 24-25](#)).
- The Clemson University Research Foundation is investing in moving Clemson technologies to market ([see pages 26-27](#)).
- We have strategically invested nearly \$6 million in faculty research through our R-Initiatives ([see pages 29-30](#)).
- We held our Faculty Awards Banquet in December ([see pages 31-32](#)) and are planning our annual Research Symposium for May 6 to connect faculty to establish interdisciplinary research collaborations ([see page 33](#)).
- We have hired an associate vice president of research development ([see page 34](#)).



**Speaker Spotlight**

Dr. Linvill will be presenting at the BOT Research & Economic Development Committee meeting in February.



# *The War on U.S. Elections*

Clemson's Patrick Warren, left, and Darren Linvill are decoding foreign entities' use of social media and misinformation to fuel political polarization in the United States.

**R**esearch by two Clemson University professors on Russian social media trolling has drawn the interest of U.S. agencies charged with protecting the country's national security.

Patrick Warren, associate professor in the John E. Walker Department of Economics, and Darren Linvill, associate professor in the department of communication, have shared their extensive research on Russian social media disinformation campaigns with the U.S. Senate Intelligence Committee, the Department of Homeland Security, other federal law enforcement agencies and more recently, U.S. Army Cyber Command.

A spokesman for U.S. Army Cyber Command confirmed that Linvill and Warren have provided the Army's cyber unit with valuable information on their research into foreign cyber saboteurs' social media campaigns aimed at influencing U.S. political discourse and electoral processes.

"Clemson professors Linvill and Warren provided

a great professional development presentation to the Army Cyber team. It was an excellent exchange of information with our developers and operational planners," said Charlie Stadtlander, communications director for the unit. "Clemson's cutting-edge research in cyberspace and social media information activities is well-recognized. With valuable input from professors Warren and Linvill and leading thinkers from other leading U.S. academic institutions, Army Cyber Command will exhaust all avenues in defending our military networks and critical U.S. infrastructure against global cyber threats."

Since late 2017, the Clemson researchers have been compiling and analyzing the tactics and strategy of social media accounts created by a Russian agency whose goal is to interfere in the U.S. electoral process. The Russians' "troll factory" is housed in St. Petersburg in the now-famous government-linked Internet Research Agency (IRA).

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“What the IRA is attempting to do through social media channels is create a one-sided agenda through a marketing campaign,” Warren said. “It’s not espionage, it’s essentially a guerrilla marketing campaign.”

Linvill said their exchange with the Army’s “cyber soldiers,” about 150 total, focused on how they analyzed the strategies and behavior of the Russians’ trolling.

From the university’s Social Media Listening Center in Daniel Hall, the Clemson researchers have probed the Russian agency’s Twitter archive and they continue to monitor accounts linked to the agency. They have compiled approximately 3 million tweets through more than 3,000 Russian government-backed Twitter accounts before and after the 2016 election.

It is estimated the IRA has used social media platforms since 2013 to spread propaganda favorable to the Russian government. It is also believed that as early as 2015, the Russians launched a campaign through social media to interfere in the 2016 presidential election.

The deputy commanding general of the Army Cyber Command lauded Warren and Linvill for tailoring a presentation to benefit his team’s mission.

“Professors Linvill and Warren’s presentation to my senior leaders and their follow-up discussions with us have been invaluable,” said Brig. Gen. Joe Hartman. “We are thankful for the insights on tactics and techniques they presented that will contribute significantly to the mission challenges we face.”

Linvill’s and Warren’s work has been well chronicled by leading national and global media outlets. In addition, their research on the Russians’ social media meddling has caught the interest of Homeland Security and the Senate Intelligence Committee.

Linvill estimates the pair’s research has been written about in more than 100 international, national and regional news stories. His favorite: the Italian version of Rolling Stone magazine.

“We’ve spent countless hours responding to these media requests. Each one of them requires at least an hour of preparation and delivery, and oftentimes there’s follow-up,” Linvill said. “But Patrick and I are both passionate about this and believe we need to engage the public on what’s happening. So it’s incredibly important to get the word out to the media. If we can do something to make people aware and diligent

about spotting disinformation and one-way conversations, then we’re going to do what we can to help.”

***They have compiled***

**3M tweets**

***from***

**3,000 accounts**

***backed by the Russian government on Twitter.***



# ***Moving Innovation to the Market***

Seven Clemson University researchers will be awarded fiscal year 2020 Technology Maturation Fund grants from the Clemson University Research Foundation to support the crucial last stage needed to move their technology from innovation to commercialization:

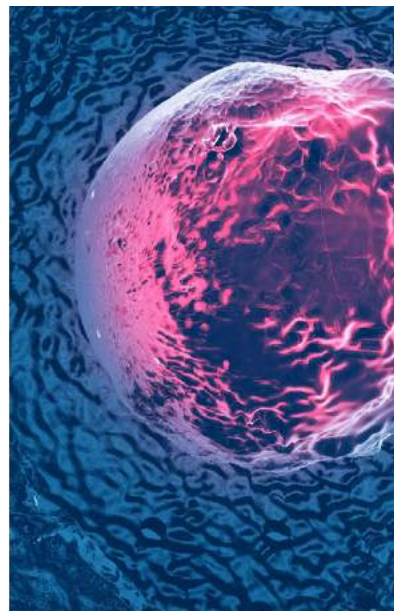
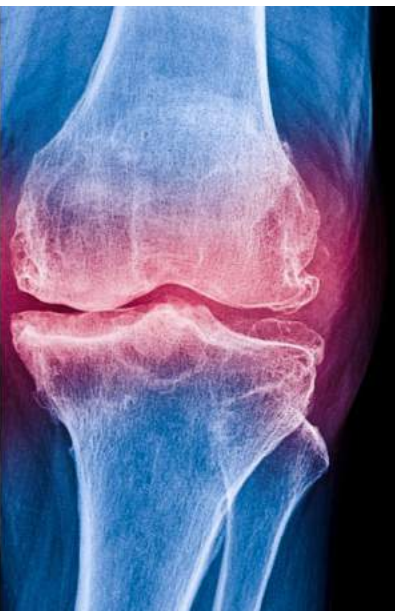
- Jeremy Mercuri, associate professor in the department of bioengineering, is working to develop a new biomimetic osteochondral construct to be used in the repair of damaged cartilage.
- Mark Roberts, associate professor in the department of chemical and biomolecular engineering, is developing a new type of electrode material for more efficient and inexpensive energy storage.
- Christopher Saski, associate professor in the department of plant and environmental sciences, is creating better technology for engineering superior plant varieties.
- Erica Walker, assistant professor in the department of graphic communications, in collaboration with Hudson Smith, research associate in analytical systems and applications, is developing technology that can automatically color-correct images when displaying brand colors on jumbotrons.
- Daniel Whitehead (pictured above), associate professor in the department of chemistry, is working on new treatments for neglected tropical disease.
- Dan Simionescu, professor in the department of bioengineering, is working on improvements to regenerative medical and cellular therapy techniques.
- Victor Zordan, professor in the School of Computing, is working on technology for computer-controlled embroidery design and stitching.

[Read more about these technologies](#)



***Since the Technology Maturation Fund program launched in 2014, CURF has awarded more than **\$870,000** in maturation funds to **Clemson researchers**.***





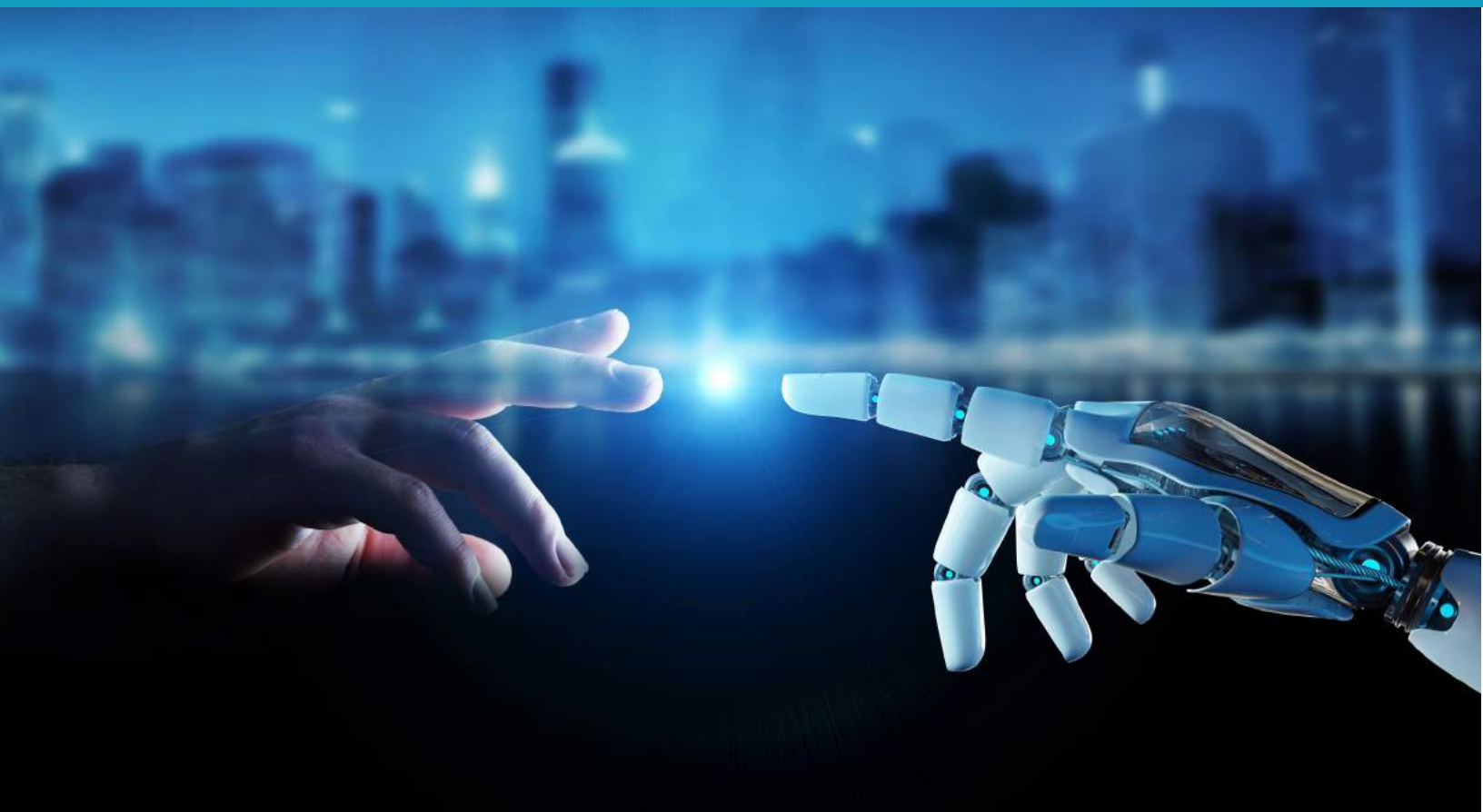
# New Innovation Maturation Fund

Three Clemson University-Prisma Health collaborations received investments from the recently created Innovation Maturation Fund, a joint effort between the Health Sciences Center (HSC) at Prisma Health and the Clemson University Division of Research. The program aims to advance the development and commercialization of innovative medical initiatives and translational science.



## Grants were awarded to:

- Brian Booth, assistant professor in the department of bioengineering, and Jeffery Edenfield, medical director at the Prisma Health Institute for Translational Oncology Research (ITOR), will further develop a collagen-type acid bead matrix that could greatly aid in breast tissue regeneration post-lumpectomy and prevent the recurrence of tumors.
- Goutam Koley, professor in the department of electrical and computer engineering, and Steve Snodgrass, pediatric pulmonologist, will develop a mobile sensor system that monitors environmental triggers for respiratory health issues that are especially prevalent in patients with respiratory illnesses. The monitoring system will utilize a battery powered miniaturized sensor system with cellular data connectivity that can be carried in person to continuously monitor specific environmental parameters for an individual.
- Robert Latour, McQueen-Quattlebaum Professor in the department of bioengineering, and Sudha Garimella, Clinical Assistant Professor in the School of Health Research and medical director of the Division of Pediatric Nephrology and Hypertension at Prisma Health-Upstate, will continue to develop ammonia breath-test sensors that can be used by patients with chronic kidney disease (CKD) to measure the ammonia concentration in their exhaled breaths. This technology would enable patients with CKD to monitor their physiologic status within the comfort of their own homes.



## CU-MUSC Artificial Intelligence Pilot Project

Recognizing the potential for Artificial Intelligence (AI) to accelerate research, transform society, and grow the American workforce, Clemson University and the Medical University of South Carolina jointly announced the CU-MUSC Artificial Intelligence Pilot Project Initiative.

This new funding opportunity is designed to serve as a mechanism to advance medical/health-focused technology innovations for follow-on research and commercialization, as well as serve as a catalyst for additional AI-related research collaborations between Clemson and MUSC faculty and graduate students. Total funding of \$50,000 is available to support two one-year projects to be co-led by a Principal Investigator from both Clemson and MUSC.

The first grants will be announced in April.



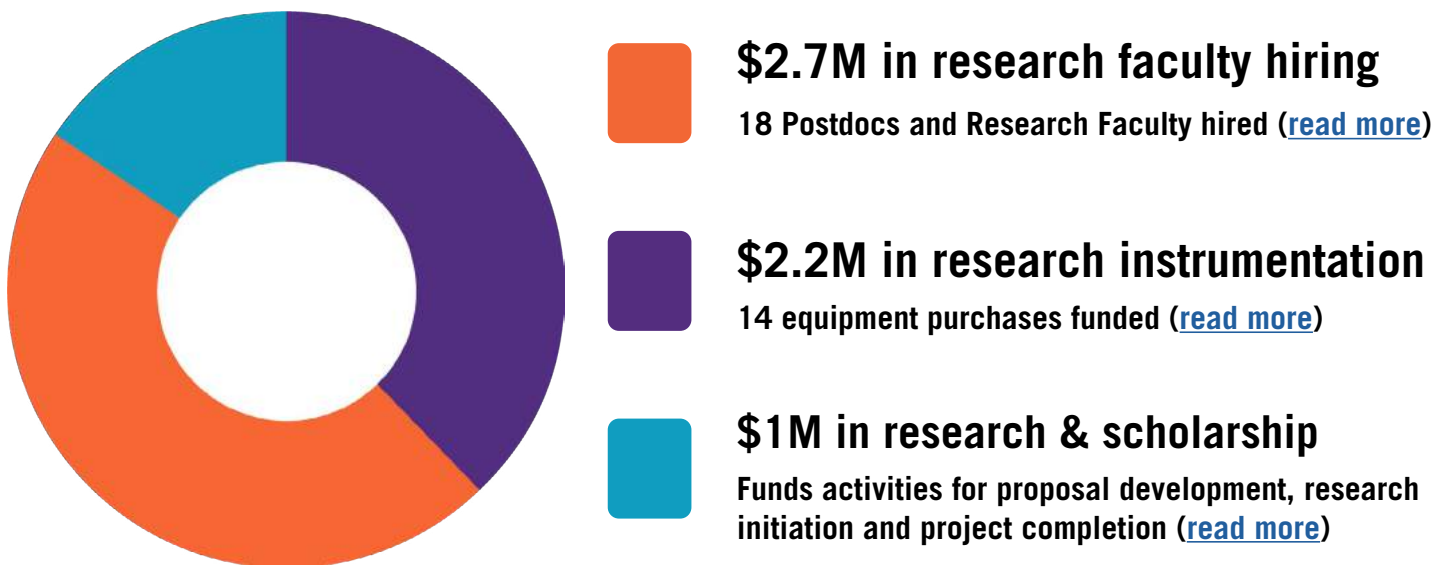
# R-Initiatives

*Investing in scientific discovery, scholarship and faculty development*

The R-Initiative programs provide strategic investments to spur research activity at Clemson, while helping faculty grow professionally. Programs provide funds for equipment purchases, for hiring research faculty, for initiating or completing research projects, and for competing for high-value external research funding. Funds also help PhD candidates complete their degrees. The Division of Research has also added funding support collaborative research with the private industry and to help faculty meet with officials at funding agencies to discuss research ideas and programs.

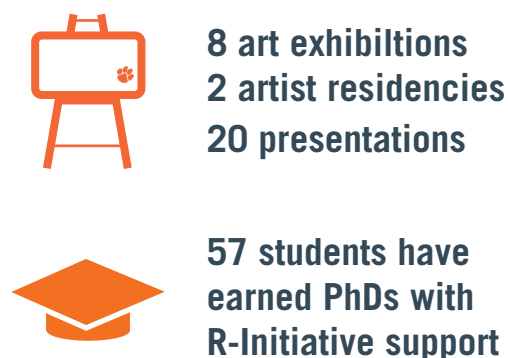
## ~\$6 million invested since 2017

*Supports 230 faculty members from 36 departments*



## The Early Returns

*The data below shows some of the output from the first R-Initiatives awarded in 2017 and 2018. Final reports have not been submitted to show results from all R-Initiative awards.*





# R-Initiatives *Success Stories*

*Investing in scientific discovery, scholarship and faculty development*

After receiving an R-Initiative grant in 2017, **Laine Mears** has published four journal articles and received nearly \$4 million in funding from the National Science Foundation (NSF) and the ARM Institute (Advanced Robotics for Manufacturing). Mears, the BMW SmartState Chair in Automotive Manufacturing, researches Intelligent Machining Systems, manufacturing process control and manufacturing equipment diagnostics. His program is the [first in the nation](#) to match graduate students with technical college students on an assembly line built for research.



Laine Mears

Art Department Chair **Valerie Zimany** received a 2020 South Carolina Arts Commission [Artist Fellowship](#) following the receipt of a CU-SEED R-Initiative grant in 2017. The SEED grant supports the initiation or completion of research or a scholarly product such as a book or artwork. Zimany, a two-time Fulbright award recipient and Japanese government scholar, digitally models and fabricates florals through 3D printing and mold-making to explore cross-cultural influences of Asian and European decorative patterns and the sometimes imperfect translation of cultural codes through ornament.



Valerie Zimany

**Sandra Linder**, associate professor of early childhood mathematics education, has presented at two national conferences, authored one journal article, with another in revision, and received a \$74,000 grant from the Skeebo Foundation since receiving a CU SEED R-Initiative grant in 2017. [Linder's research](#) centers on improving teacher quality, student understandings, and family interactions in mathematics for young children from birth to age 8. She has multiple national and international publications relating to early childhood mathematics.



Sandra Linder

**Brygg Ullmer**, after receiving an R-Initiative grant, earned a \$500,000 National Science Foundation grant to develop and test a customizable, hands-on virtual reality and advanced display system that could change how scientists across the country share information and collaborate, as well as how students learn. Ullmer, chair of the university's Human-Centered Computing Division, is leading an interdisciplinary team to pilot development of a collaborative visualization system they call "[Enodia](#)," which will be housed at the Watt Family Innovation Center. The system will allow groups of researchers to more easily apply the university's high-performance computing resources to visualize and share computational simulations.



Brygg Ullmer





## Faculty Awards Banquet

Clemson University honored the achievements of faculty members during the Faculty Awards Banquet at the WestZone Club at Memorial Stadium in December. The event recognized recipients of the University Research, Scholarship and Artistic Achievement Awards (URSAAA), as well as the Researchers of the Year.

Both of these award programs were led by the Vice President for Research's Faculty Advisory Board as a way to recognize and reward faculty achievement, as prioritized in the ClemsonForward strategic plan.

[View Photos of the Event](#)

*More details on next page*







## Faculty Awards Banquet *continued*



### URSAAA

In the past two years, University Research, Scholarship and Artistic Achievement Awards (URSAAA) have been given to about 90 faculty members. To be a member of this exclusive group, an URSAAA recipient should have accomplished one or more of the following:

- Authored a paper receiving over 1,000 citations
- Expended over \$1 million on research in a fiscal year
- Received the highest levels of recognition in their field

[Learn more about URSAAA and the recipients](#)



### Researcher of the Year

The Researcher of the Year awards recognize the efforts of high-achieving faculty whose work is improving society through the generation and dissemination of new knowledge. Each college nominates a senior faculty member and a junior faculty member who received his or her terminal degree within the past 10 years. Winners were selected by an interdisciplinary faculty committee and announced at the university's annual Research Symposium.

[Learn more about Researcher of the Year](#)

[Read about this year's winners](#)



Clemson University

# RESEARCH SYMPOSIUM

**CREATE | COLLABORATE | IMPACT**

Watt Family Innovation Center

**May 6, 2020**



The annual Research Symposium brings together researchers from across Clemson's footprint to discuss ideas, forge interdisciplinary collaborations and pursue impactful research. At the event, the Division of Research also announces the Research of the Year and presents the University Research, Scholarship and Artistic Achievement Awards, which recognize faculty members who achieved the highest levels of national and international recognition.



# Meet the Associate Vice President for Research Development

An experienced researcher, professor and leader at Michigan State University has been tapped to help generate more opportunities for the Clemson University research community.

Shelia Cotten will join Clemson University next fall as the associate vice president for research development and provost's distinguished professor. She will manage the university's Office of Research Development, which is part of the Division of Research under the leadership of Tanju Karanfil, vice president for research. She will also have a faculty appointment in the Department of Sociology, Anthropology and Criminal Justice and a joint appointment in the Department of Communication.

Cotten will collaborate with faculty and administrators across Clemson's footprint to:

- Establish and coordinate large multi-disciplinary research projects that seek to address society's grand challenges;
- Advance university-wide activities that support faculty training and development;
- And generate new streams of research support from federal, state, foundation and other private sources.

"I see my role as a catalyst and connector," Cotten said. "I am energized by bringing together diverse faculty, staff, and students to find common passions and develop synergies, so that they can solve important problems in society."

Cotten is an MSU Foundation

professor and associate chair for research in the Department of Media and Information at Michigan State. She served as director of the Sparrow/MSU Center for Innovation and Research, which built strategic research partnerships between MSU and the Sparrow Health System, and was the inaugural director of the MSU Trifecta Initiative for Interdisciplinary Health Research, a collaborative between the colleges of engineering, nursing, and communication arts and sciences.

"Dr. Cotten has experience coordinating multi-disciplinary teams, working on large-scale research projects, mentoring faculty members, working across diverse organizational cultures, securing research funding. I could go on," Karanfil said. "She is an innovative thinker who will bring great ideas and leadership to the Clemson research community."

A Carnegie R1 institution, Clemson's research enterprise has grown significantly, with annual competitive research awards increasing 36 percent the past seven years to \$106 million.

"We are working hard to continue that momentum and to generate more opportunities for our faculty and students. Dr. Cotten will help implement new strategies that will be key to that effort," Karanfil said.

Cotten is a Fellow of the Gerontological Society of America. She is a past chair of the Communication and Information Technologies Section of the American Sociological Association (CITASA) and the 2013 recipient of the Public Sociology Award from the CITASA section of the American Sociological Association.

Her research focuses on the social, educational, health, and workforce impacts of technology use.

Through her career, Cotten has authored more than 110 peer-reviewed journal articles, proceedings, and books and secured approximately \$14 million in external research funding. In 2016, she was awarded the William F.

Ogburn Senior Career Achievement Award from the Communication, Information Technologies, and Media Sociology (CITAMS) section of the American Sociological Association.

"I welcome Dr. Cotten to this important position at Clemson," said Clemson University Provost Robert H. Jones. "Research provides invaluable educational opportunities for students while creating vital new knowledge to benefit local, national and global societies. Enhancing and expanding our research endeavors are important to our mission at Clemson."



**Shelia Cotten**



# Focus on Faculty

**This section highlights the accomplishments of faculty members from each college, as provided by the colleges.**



Pictured: President James P. Clements presents the Researcher of the Year award to Chemistry Professor Ken Marcus. [READ MORE](#)



## Xiuping Jiang, PhD

### Professor

Department of Food, Nutrition  
and Packaging Sciences



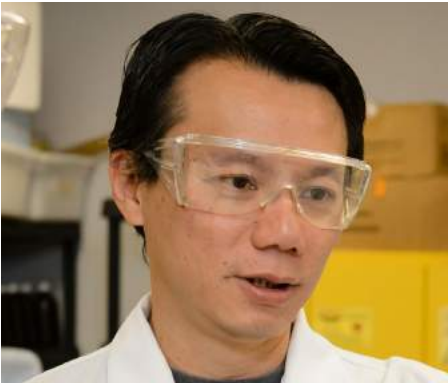
**X**iuping Jiang is a Food Microbiologist in the Department of Food, Nutrition, and Packaging Sciences, and has a joint appointment with Department of Biological Sciences, Clemson University. In addition to teaching both undergraduate and graduate level courses (MICR 4070/6070/4071/6071 and FDSC 8120) related to food microbiology and food safety, she runs a very productive and well-funded research program with competitive grants from NIH, USDA, S.C. Department of Agriculture, and the fresh produce and rendering industries. Her research focuses on understanding how foodborne pathogens persist in food and the pre-harvest environment, and developing strategies to detect and control these pathogens.

Jiang's most recent projects: investigate the thermal resistance of Salmonella and process validation of biological soil amendments used for fresh produce production; apply metagenomics tools to understand microbial community structure and functions of biological soil amendments; explore natural products to combat antibiotic resistant bacterial infection in poultry production; detect Human Norovirus in the food service environment using molecular biological technology; and develop standard methods for virus recovery and disinfection on soft surfaces. Through a recent NIH award, her group is closely working with researchers from other disciplines and research institutions on determining the efficacy of chemical-based and non-chemical-based disinfection strategies on contaminated carpet using norovirus surrogates and Clostridium difficile to solve urgent disinfection needs in long term care facilities. Since joining Clemson University, Dr. Jiang's research lab has graduated 10 Ph.D., 11 M.S., three post-doctoral fellows, and eight visiting scientists. Currently, she is the major adviser for three Ph. D. graduate students, and has also been heavily involved with the Creative Inquiry (CI) program for more than 12 years.

### **Selected Accomplishments**

- Received over \$10 million research grants from NIH, USDA, ACREC, ACRE, NRA, and fresh produce industry (>\$3 million as PI).
- Published 105 peer-reviewed research articles, and 160 abstracts.
- Invited as speaker for more than 60 domestic and international meetings.
- Invited to FDA Produce Safety Rule protocol development committee (2011-2013), expert panel of Biological Soil Amendment Summit (2015), and USDA ARS project review panel (2015-2016).
- Our research projects have been highlighted in Clemson Impacts, Render Magazine, South Carolina Farmer, Center for Produce Safety website, among others.
- My graduate students were awarded the 1st place in IAFP Developing Scientist poster award in 2010, NoroCore Graduate Fellowship in 2014 and an ASTM Scholarship in 2016.
- Nominated for SC Governor's Awards for Excellence in Science (2011).





## Alex Chow, PhD

### Associate Professor

Department of Forestry and  
Environmental Conservation



Since joining Clemson in 2009, Alex Chow has developed a well-recognized research program studying watershed perturbation and management on the fates of pollutants and drinking water quality. As the principal investigator, Chow has acquired nearly \$4 million in extramural research grants from US federal agencies including National Science Foundation (NSF), National Institute of Food and Agriculture (NIFA), and Environmental Protection Agency (EPA). Chow has established strong collaborations with scientists in the US Geological Survey and US Department of Agriculture, as well as national laboratories in the states of California, Colorado, Washington, and North and South Carolina.

Chow is a very productive researcher and has published over 90 research articles in top-tier peer review journals in the areas of soil and environmental science. Chow is well recognized internationally, and recently was selected as a visiting fellow in Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) through a global competition. He has conducted outreach activities in California, Colorado, and South Carolina to disseminate results of his studies, reaching targeted audiences that included utilities, state and local governments, and nonprofit environmental groups. Topics included sustainable forested watersheds, strategies to mitigate wildfire impacts, benefits of prescribed fire, and environmental biogeochemistry and fire adapted ecosystems.

Chow is also active in professional societies. He was an Associate Editor for both the Journal of Environmental Quality and Soil Science Society of America Journal between 2014 and 2019. Chow was nominated as the Outstanding Associate Editor of the Journal of Environmental Quality in 2015 and has been promoted to be a technical editor of Journal of Environmental Quality beginning in 2020.

### **Selected Accomplishments**

- Developed an internationally recognized research program in biogeochemistry & environmental quality, with a focus on watershed perturbation and management on soil and water quality.
- Secured over \$4 million (approximate \$5M collaboratively) in research, teaching, and extension projects, including eight NSF, four Department of Interior, three EPA, and two NIFA awards.
- Published more than 90 peer-reviewed journal articles with h-index of 27.
- Technical editor of Journal of Environmental Quality (2020 – 2023), Associate editor of Journal of Environmental Quality and Soil Science Society of America Journal (2013 - 2019).
- Visiting fellow at Swiss Federal Institute for Forest, Snow and Landscape Research (2019), outstanding associated editor of Journal of Environmental Quality (2015), best research paper in Journal of Irrigation and Drainage Engineering (2004), and Professor of the Future Award - National Institutes of Health Postdoctoral Career Development Program USA (2003).





## Heather Dunn, PhD

### Molecular Biologist

Department of Animal and  
Veterinary Sciences



Heather Dunn who currently teaches courses including vertebrate endocrinology, bioinformatics for cancer genomics, contemporary issues in animal science, anatomy and physiology of animals, and dairy techniques. Her teaching and multi-disciplinary research collaborations have exposed students to post-graduate and entrepreneurial opportunities. Dunn uses pig models to study mammary gland development and how breast cancers mimic early developmental events leading to metastasis. Of particular interest are racial disparities in triple negative breast cancers which is one of the most aggressive and deadliest type of breast cancer. She is heavily involved with the Creative Inquiry (CI) program and recruits females and underrepresented minorities to assist with her research, which was highlighted on Clemson's website. These undergraduate students were invited to present their results at the international Cancer Metastasis Gordon Research Conference in March of 2019 in Florence, Italy. Due to networking at these international opportunities, her research program has led to post graduate offers for her students at Penn, MIT, UCLA, and Georgetown to name a few. Her CI program in Bioengineering involves undergraduate students developing an innovative biopsy needle to be used in animals. This activity has led to disclosure filing through the Clemson University Research Foundation for a novel device. She serves as the AVS coordinator for study abroad programs and was instrumental in the establishment of the Clemson University/University of Glasgow Veterinary Programme FEEPASS agreement. She frequently travels with students internationally providing global exposure to the Clemson undergraduate experience.

### **Selected Accomplishments**

Dunn has received the CAFLS teaching award of excellence twice, the CAFLS advising award of excellence, and the Bradley Award for mentoring Creative Inquiry. She has received funding from the USDA, Dabo's All-In Foundation, Prisma/Clemson University collaborative grants and private donations through the Clemson University Foundation. Dunn has authored three books.

#### *Other Service:*

- Member of the Clemson University Institutional Animal Care and Use Committee (IACUC)
- Faculty advisor to the Animal & Veterinary Science Living Learning Community
- Collaborations with Prisma Health and Cold Spring Harbor Laboratory



## David Allison, M.Arch.

### Director of Graduate Studies

Architecture + Health



David Allison FAIA, FACHA is an Alumni Distinguished Professor and has been the Director of Graduate Studies in Architecture + Health [A+H] at Clemson University since 1990. The A+H program at Clemson is nationally recognized for the quality of its focused curriculum and consistent emphasis on design excellence within the discipline of healthcare architecture. It is committed to the integration of innovative design with academic scholarship and research in healthy community planning and design and healthcare environments, and it has won numerous national awards for its work, and the work of its students, under David Allison's direction.

Allison is a registered architect in California, South Carolina, and North Carolina, and is NCARB certified. His scholarly focus is centered on healthy community planning and design, design prototyping and research related to health care environments. He has served on numerous national health environments design award juries and is a founding member and Fellow of the American College of Healthcare Architects and the Coalition for Health Environments Research. He is also an active member of the AIA Academy of Architecture for Health where he served a three year term as an AIA/AAH National Advisory Board member. He was selected in 2007 as one of "Twenty Making a Difference" nationally by Healthcare Design Magazine and identified again in 2009, 2010 and 2012 by a national poll conducted by the magazine as "one of the most influential people in healthcare design." Design Intelligence Magazine named him one of the nation's 30 Most Admired Design Educators in 2013-14.

### **Selected Accomplishments**

David Allison was presented the American College of Healthcare Architects' highest honor, the ACHA Lifetime Achievement Award, at a luncheon held on Nov. 3 in conjunction with the 2019 Healthcare Design Conference in New Orleans. The award recognizes Allison's full body of work in the field and his lasting influence on the theory and practice of healthcare architecture. On Nov. 4, the Center for Health Design formally recognized Allison with its Changemaker Award, which is given to professionals who have demonstrated "an exceptional ability to make change happen in how healthcare facilities are designed and built, and whose work has had broad impact throughout the industry."



## Lee Morrissey, PhD

### Professor of English

Director, Humanities Hub



A member of the Clemson English faculty since 1995, Lee Morrissey has twice served as Department Chair (2007-2010, and 2013-2017), as Interim Associate Dean of the College of Architecture, Arts, and Humanities (2018-2019), and as a Fulbright Scholar at the National University of Ireland-Galway (2010-2011). A specialist in English-language literature written between the first half of the seventeenth century and the latter half of the eighteenth century, he is the author of two monographs, *From the Temple to the Castle: An Architectural History of British Literature, 1660-1760* and *The Constitution of Literature: Literacy, Democracy, and Early English Literary Criticism*. His current research focuses on archipelagic and transatlantic approaches to colonial plantations. He was appointed Alumni Distinguished Professor in 2009, and Founding Director of the Clemson Humanities Hub in 2016.

### *Selected Accomplishments*

Under Dr. Morrissey's direction, Clemson's Humanities Hub was awarded \$6,000 for its project titled "Preservation Across the Disciplines." The Humanities Hub will present a series of programs during the 2019-2020 academic year that focus on the theme "Preservation" from a variety of angles, including cultural preservation, textual preservation, biological preservation, preservation of history and the arts, and more. Speakers will include authors John Lane, Drew Lanham, Matthew Desmond (Pulitzer Prize Winner), Nikky Finney, and Christina Sharpe; Joy Bevens, Curator of the International African American Museum in Charleston; David Houston, former Curatorial Director of the Chrystal Bridges Museum in Arkansas; possibly Russel Townsend of the Eastern Band of the Cherokee; and possibly Gordon Hunter, editor of the *American Literary Review*. Events in the series will take place both on campus and around Pickens County through strategic partnerships with groups like Keowee Key and the Osher Lifelong Learning Institute. As the only humanities center in the State of South Carolina, Clemson's Humanities Hub is a center for the College of Architecture, Arts and Humanities to achieve national impact through outreach, scholarship and teaching in ways that advance cultural awareness and creativity for students, faculty, and the community of Clemson University.





## James H. Spencer, PhD

### Professor

City & Regional Planning and  
Geography



James H. Spencer is Professor of City & Regional Planning, and Past-Chair of Clemson's Department of City Planning and Real Estate Development. His current research focuses on international urbanization and planning issues, with a particular focus on water supplies, infrastructure and inequality. His research has been published in the Journal of the American Planning Association, Environment and Planning A, the Journal of Urban Health, Economic Development Quarterly, and elsewhere. His (2014) book titled Global Urbanization: The Global Urban Ecosystem is a part of the Rowman & Littlefield series on Globalization. His research has been supported by the Ford Foundation, the National Science Foundation, the National Institutes of Health and the Social Science Research Council, among others.

Prior to Clemson, he was an Associate Professor of Urban & Regional Planning, and of Political Science at the University of Hawaii, and has held staff positions at the Ford Foundation and non-profit organizations working on community development. He holds a B.A. from Amherst College, a Masters of Environmental Management from Yale University, and a PhD from UCLA in Urban Planning.

### **Selected Accomplishments**

- The Vietnam Urban Planning and Development Association has awarded its 2019 Bronze Medal for Regional Plans to a project led by James H. Spencer, associate dean of research and graduate studies in the College of Architecture, Arts and Humanities. Spencer and an international team, including Clemson Professors Robert Powell (PRTM) and Timothy Green (Planning) worked in partnership with the Vietnam Institute for Urban and Rural Planning (VIUP) to study the potential for tourism and economic development in the Dong Van Karst Plateau Geopark, and to design a development strategy and urban plan consistent with this potential.
- One of the UNESCO Global Geoparks, Dong Van is distinguished by dramatic mountains and valleys in an area populated by many separate ethnic groups. It also features diverse flora and fauna, a rich array of fossils and a colony of extremely rare Tonkin snub-nosed monkeys. The Dong Van plan was one of only 12 projects honored by the office of the Vietnamese prime minister in 2019. In Vietnam, a country of 95 million people and more than 200 cities, thousands of master plans, regional plans, urban design plans and zoning plans are commissioned by the government each year.
- "It is a tremendous honor to be recognized as part of an international collaboration between planners in Vietnam and the United States," Spencer said. "This project is, in many ways, a recognition of Vietnam's growth over the past 20 years into a leader in sustainable development as it develops new ways to approach the rapid urbanization and growth that has begun to affect even the most remote regions such as Dong Van. I would like to thank my U.S.-based project team, our Vietnamese partners at the VIUP, and all the local government and community supporters who helped us understand the history, culture and aspirations of the region's richly diverse population."



## Denise M. Anderson, PhD

### Professor, Associate Dean

Undergraduate Studies &  
Faculty Affairs



Denise Anderson is focused on undergraduate studies and faculty affairs in her position in the Dean's office with priorities related to ensuring inclusive excellence within the College, facilitating the development of graduates ready to serve the state of South Carolina and beyond in building people and communities, and supporting faculty development in the classroom and out. Her academic home is in parks, recreation, and tourism management where she studies girls and women's access to recreation as well as the role of leisure in college student development. As the graduate coordinator in PRTM, she developed the department's now extensive on-line M.S. degree and she has taken her knowledge related to curriculum development to her position working with undergraduate students. In addition, in her current role she has spearheaded the College's Strategic Plan for Inclusive Excellence, developed a cross-college mentoring program for faculty, and redesigned the student advisory board to focus on issues related to recruitment and retention, diversity, and development. Anderson recently completed a 2-year stint as the Director of the NSF TIGERS Advance program focused on achieving gender equity through institutional transformation; the program recently completed a successful 3-year site visit by a panel of NSF staff and faculty from 7 different institutions.

### **Selected Accomplishments**

- Director, TIGERS Advance
- Named Fellow, American Academy for Parks and Recreation Administration
- President, The Academy of Leisure Sciences
- Advisory Board, President's Leadership Institute
- College Representative, CONNECT for Inclusion
- Executive Mentor for Trailblazers Leadership Development program
- Student Engagement: In year 6 of Creative Inquiry project, Finding Your Voice, which offers a no-cost weekend camp for middle school girls in the Upstate focused on leadership, self-efficacy, and positive body image through outdoor recreation



## Harrison P. Pinckney IV, PhD

### Assistant Professor

Department of Parks, Recreation  
and Tourism Management



Harrison Pinckney is a social scientist whose research focuses on the factors that influence the development of black youth ages 12-18. Most specifically, through innovative research methods he looks at the impact programs, services, and institutions have on the development of black adolescents' racial identities. Examples of his novel research can be found in his recent collaboration with the Face Lab at Liverpool John Moores University, his 2018 outing with 70 black youth to a private screening and analysis of the blockbuster Marvel movie Black Panther, and his current involvement with local agencies to develop sustainable food systems designed and managed by black youth. Harrison is also working with faith-based institutions throughout the state of South Carolina to understand the range of programs and services offered by youth ministries, who takes advantage of those programs and services, and the outcomes youth experience as a result. Lastly, as a result of his recent publication 'Playing While Black', Harrison Pinckney has been sought out to speak nationally including recently serving as the opening keynote the 2019 Ithaca Children's Garden Play Symposium (Ithaca, NY) and 2019 Seeds for Urban Play Conference (Louisville, KY). The goal of all of Pinckney's work is to move beyond expanding the knowledge of the disciplines of youth development and recreation, to empowering black youth and their communities to develop meaningful systems that improve their well-being and future outlook.

### Selected Accomplishments

#### Courses:

- Philosophical Foundations of Recreation and Park Administration (Graduate-Level Philosophy course)
- Global Perspectives in Leisure, Recreation and Tourism (Undergraduate-Level Diversity course)

#### Research Activity:

- Principal Investigator on a project examining how racial socialization can encourage black youth to become scientists (National Science Foundation)
- Principal Investigator on projects exploring the role of Rites of Passage programs in the lives of youth of African descent (Templeton Foundation & Heinz Endowments)

#### Service:

- Associate Editor for Journal of Park and Recreation Administration
- Co-Director of The Academy of Leisure Sciences 2019 Conference on Research and Teaching
- Co-Chair of Clemson University's 2019 Symposium on Race Scholarship
- Reviewer, Leisure Sciences; Journal of Youth Development; Journal of Leisure Research





## Margaret A. Wetsel, PhD, RN

### Associate Director, Academic Programs

School of Nursing



**M**argaret Wetsel is a Professor in the School of Nursing and has been a member of the faculty since 1986. She holds a bachelor's, master's and PhD degrees in nursing. Her mental health nursing experience ranges from hospital-based care to emergency services, community mental health and an out-patient psychiatry practice. She served as Interim Director of the School of Nursing from 2014-2016 and co-led the expansion of the BS nursing program (doubled enrollment) and nurse practitioner track in the MS nursing program. From 2017-present, she's served as the School of Nursing Associate Director, Academic Programs. In this role, she is the primary liaison to Prisma Health-Upstate administration, nursing leadership and nursing staff for Clemson University nursing education programs. She co-led the Doctor of Nursing Practice program development, the first Clemson practice doctorate. Her leadership experience also includes serving as the Coordinator of the Master's Program (2005-2012) and RN/BS Completion Program (2012-2014). She served in a leadership role for the preparation of the 2005, 2010, 2015 (5-year interim report) and 2020 accreditation reports/site visits. Wetsel has chaired numerous master's nursing research committees, and five Health Care Genetics PhD dissertation committees (two in progress).

### **Selected Accomplishments**

- Awards & Honors: Thomas Green Clemson Award, CU School of Nursing Hall of Fame Inaugural Inductee, South Carolina Palmetto Gold Award, recognizing excellence in nursing practice and commitment to the nursing profession, and CU School of Health Research Scholar
- Courses: MS - Advanced Knowledge Development, Nursing Research Design and Methods, Mental Health and Illness in Primary Care; BS - Psychosocial Nursing and Mental Health Nursing
- Research Activity: PI on collaborative grant with Prisma Health-Upstate "Caring for Sexual Assault Survivors (C-SAS): Expanding the SANE Workforce in Upstate South Carolina" Health Resources and Services Administration (2018-2021, \$949,396)
- Nursing Program Grants: Co-I "Expanding the Primary Care Nurse Practitioner Workforce with Expertise in Diverse, Rural and/or Underserved Populations in Appalachia Upstate South Carolina" HRSA Advanced Nursing Education Workforce grant (2019-2023, \$2,761,521). PI on "Expanding Primary Care Access in Greenville County Through Nurse Practitioner Education Support" Greenville Health Authority (2017-2019, \$410,000). Co-I on "CVS NP Scholarships" (2016-2019, \$5,000).
- Service Grants: PI on "Supplemental Nutrition Assistance Program Outreach Community/University Partnership" funded by USDA through SC Department of Social Services (2003 \$323,766-2016 \$530,882)
- Service: Southern Regional Education Board Nursing 2019 Program Chair & Nominations Committees; SC Dean's and Directors; SC Nurses Association APRN and Psychiatric-Mental Health Chapters; Senior Solutions Board Member



## Nancy L. Harp, PhD

### Associate Professor

School of Accountancy



Nancy Harp studies a variety of issues important to the accounting profession. Inspired by her past working experience as an auditor with Deloitte, her research primarily focuses on the current state of the auditing profession, including gender and work-life balance issues that are especially challenging within the profession. Her research also explores issues related to audit quality, including professional skepticism and investor perceptions of audit quality. Another stream of her research explores the implications of internal control disclosures required by the Sarbanes-Oxley Act of 2002.

Her research has been published in elite accounting journals, including *The Accounting Review* and *Accounting, Organizations and Society*, as well as several other top accounting journals, such as *AUDITING: A Journal of Practice & Theory*, *Accounting Horizons*, and *Behavioral Research in Accounting*. Her research primarily employs the survey and archival research methodologies, and she is ranked 82nd worldwide according to the most recent data available from the Brigham Young University accounting research rankings (across all methods and topics in the most recent six-year period).

Harp teaches courses in auditing, both at the undergraduate and graduate level. She is heavily involved in building and maintaining important relationships between the School of Accountancy and public accounting firms and other employers. She serves as a faculty initiate in Delta Sigma Pi (a business fraternity) and is passionate about mentoring students as they navigate through their college career and the recruitment/job-search process.

### **Selected Accomplishments**

- KPMG Best Paper Award from the AAA Gender Issues & Work-Life Balance Section
- Best Instructional Case Award from the Accounting Information Systems Educators Conference
- Two high-quality journal acceptances in the past year, 15 total publications since joining Clemson in 2012
- AAA Gender Issues and Work-Life Balance Section Vice-President of Practice
- Co-Coordinating a conference of the AAA Public Interest and Gender Issues & Work-Life Balance Sections to be held March 2020
- External Relations Committee Chair for the School of Accountancy
- Initiated and currently manages the School's Instagram account to engage with students, alumni, and employers through social media



## Michael D. Giebelhausen, PhD

### Associate Professor

Department of Marketing



**M**ichael Giebelhausen studies “moments of truth” in frontline service encounters. In particular, his research examines instances of co-production that force consumers to address a potentially threatening truth about themselves. Examples include being asked to donate to a charity during checkout, optional participation in green programs, juggling technology and interpersonal interactions, and reconciling the criticism of a beloved brand. Giebelhausen’s research has been published in a variety of well-regarded outlets including the Journal of Marketing, the Journal of the Academy of Marketing Science, the International Journal of Research in Marketing and the Journal of Business Research. Current projects are focused on situations where the frontline employee might be in the form of a robot or AI entity. Related to this, Giebelhausen teaches a creative inquiry course on “Frontline Service Robots and AI.” Student projects from this CI were recently presented at the Society of Marketing Advances annual conference.

### **Selected Accomplishments**

- Two papers accepted to the Journal of Business Research in 2019
- Advanced revision at a Financial Times Top 50 Journal
- Student-Led Creative Inquiry Project Accepted to Society for Marketing Advances Annual conference
- Three Tier 1 Conference Presentations in 2018/2019
- Membership on two PhD Dissertation committees





## Kristin L. Scott, PhD

### Professor

Department of Management



Kristin Scott is a professor in the management department at Clemson and teaches courses in the area of business management with an emphasis on human resources. Much of her research has explored organizational dysfunction such as abusive leadership, workplace exclusion, burnout and incivility. More recently, she has expanded her research focus to consider the impact of health and wellbeing interventions to improve employee stress, turnover and other outcomes. To do this, she has leveraged her fellowship with the Prisma Health System to explore the effects of a program aimed at reducing the administrative burden on healthcare workers and subsequent burnout levels.

Her articles have been published in the Journal of Applied Psychology, Organizational Behavior and Human Decision Processes, the Academy of Management Journal and Personnel Psychology. Prior to obtaining her PhD, Scott worked as an HR Manager for several multinational corporations including General Electric Corp. and Ingersoll-Rand Co.

### **Selected Accomplishments**

- Awarded Faculty Fellowship at Prisma Health System (Jan. – Aug. 2018) to study clinician burn-out. Selected as one of three Clemson University researchers to receive this award
- Appointed as Faculty Scholar in the Clemson University School of Health Research (CUSHR) (2015-present)
- Selected as faculty advisor to the Student Advisory Board (Aug 2019 – present)
- Faculty representative for Samaritan's Feet Servant Leadership Program which involves students in a semester long charity program to help children in Puerto Rico
- Won College of Business and Behavioral Science Emerging Scholar Research Excellence Award, Clemson University (2012-2013)
- Awarded Dean's Excellence Fund (2015), Funded by the College of Business, \$5000
- Invited Presentation on "Adult Bullying/Abusive Supervision" for special Webinar presented by the Olweus Bullying Prevention Center, with Dr. Tom Zagenczyk. (May 22, 2018)
- Invited Presentation on "Emotional Intelligence" presented at the spring 2018 education seminar for the National Contract Management Association, Greenville, SC Chapter.
- Invited Presentation on "Workplace Violence Through the Eyes of HR," presented at the monthly meeting of the Association for Threat Assessment Professionals (ATAP), Atlanta, May, 2016



## Luke Bennett, EdD

### Lecturer, Online MED

Department of Teaching and Learning



Luke Bennett serves as a Lecturer in the Master of Education: Teaching and Learning program within Clemson University's College of Edu. He teaches the Classroom-based Research and Capstone Project courses in the program. His research interests focus on management and pedagogy in emerging learning spaces. Luke has a deep background in online program and course development. Prior to his appointments in higher education, Luke served for 16 years in K-12 education in both classroom teaching and administrative roles. He holds a terminal degree with two specializations- Instructional Leadership with a Curriculum Development focus and Instructional Technology and Distance Education.

### ***Selected Accomplishments***

- Currently serves as the Co- Chair of the Distance Education Advisory Board.
- Served on committees that support further program development .
- Chaired a T&L award committee.
- Presented at two international conferences.
- Published two peer reviewed articles.
- Developed the Classroom-Based Research and Capstone course sequence.
- Active member of several professional organizations that support online learning



## Michelle Boettcher, PhD

### Assistant Professor

Department of Educational  
and Organizational Leadership  
Development



**M**ichelle Boettcher is a scholar of student affairs and higher education leadership and administration. Her work focuses on issues of transition into, through, and beyond higher education. Her current projects focus college access in the context of first generation college (FGC) status, race, rurality, and poverty. She came to Clemson in 2014 after earning her doctorate in Educational Leadership & Policy Studies at Iowa State University and after a two decades-long career as a student affairs administrator serving in roles from residence hall director to Assistant Dean of Students, Director of Judicial Affairs.

Boettcher is an active member of the Association for the Study of Higher Education (ASHE), NASPA (formerly an acronym for the National Association of Student Personal Administrators), the American College Personnel Association (ACPA) and a variety of local affiliates. Her work is published in leading journals for her field, such as, *The Journal of College and University Student Housing*, *The Journal of Veterans Services*, and *The Journal of Organizational Learning and Leadership*. She has co-edited a book, *Critical perspectives on hazing in colleges and universities: A guide to disrupting hazing culture*, and a monograph, *Social justice practice in residential communities*.

### **Selected Accomplishments**

- Editor of the *College Student Affairs Journal*, among the premier journals for student affairs practitioners
- Named as one of six TeachingForward Fellows for the 2019-20 academic year.
- Program Coordinator for the Masters of Education in Student Affairs
- Chair and co-Chair of the College of Education's Inclusive Excellence ClemsonForward design and the Committee on Diversity and Community





## Corrine Sackett, PhD

### Associate Professor

Education and Human  
Development



Corrine Sackett is a counselor educator who studies the meaningful experiences of clients in the counseling process, as well experiences of societal issues for the purpose of advocacy in the counseling profession. She conducts most of her research in and around the upstate, collaborating with schools and community organizations and agencies. She employs qualitative methodologies to access participants' lived experiences, including an innovative method called photovoice to explore perspectives of societal issues of concern such as poverty, racial identity, and childhood obesity. She has focused on mentoring master's level counseling students through research and scholarly writing collaborations, and has seven national, peer-reviewed journal articles published or in press with master's counseling students as co-authors. One of those students, now a graduate, recently earned a Ph.D. in Counselor Education from the College of William and Mary and is currently a visiting professor at John's Hopkins University, and another is pursuing her PhD in Counseling Psychology at the University of Kentucky.

### **Selected Accomplishments**

- Serves on the editorial review board for the counseling field's top two journals.
- Serves on a national committee for the American Counseling Association for Research and Knowledge.
- Serves as the program coordinator for the Counselor Education program.
- Serves on the Advisory Committee to the Founding Dean of the College of Education.
- Ten national peer-reviewed journal articles either published or in press since 2017.
- Awarded the Excellence in Graduate Student Mentoring and Advising from the College of Education at Clemson University in 2017.



## John R. Wagner, PhD, P.E.

### Professor

Mechanical Engineering



John Wagner is a licensed mechanical engineer and enthusiastic educator / researcher with expertise in nonlinear control theory, mechatronic system design, and digital engineering tools with application to transportation and power generation systems. He joined Clemson after a distinguished nine-year leadership role at Delco Electronics where he learned exemplary practices in electronic and mechanical system design.

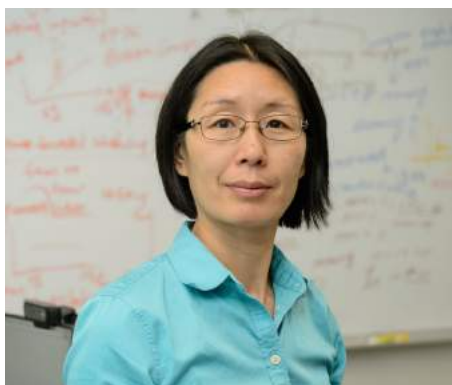
Wagner teaches dynamic systems and control courses with a passion for hands-on learning. He established the Rockwell Automation Mechatronics Systems educational laboratory which features a variety of industry inspired experiments. In addition to traditional classroom instruction, he teaches the Senior Mechanical Engineering Laboratory which presents computer-numerically controlled and other industrial / research work environment inspired experiments to help prepare undergraduate students for rewarding career opportunities.

Wagner's multi-disciplinary research activities emphasize a collaborative teaming approach. He has authored over 95 journal and 115 conference peer reviewed articles, while graduating 12 PhD and 29 M.S. students plus completing 7 undergraduate honors research theses. His research program has been continuously supported by numerous US Government agencies, automotive and manufacturing companies, and research foundations. Wagner's share of external research grants is approximately \$1.3 million since 2015. He is also a senior researcher in the Clemson University Institute for Global Road Safety & Security which seeks to improve automotive and transportation safety through evidence-based countermeasures and products.

In 2016, Wagner was appointed Founding Director of the Product Lifecycle Management (PLM) at Center University. This center is the southeast's premier academic consortium for education, research, and industry outreach focused on digital transforming tools. The creation of PLM concepts and software training learning modules empower students and continuing education professionals to gain expertise on these virtual design and prototyping tools.

### ***Selected Accomplishments***

- Clemson University PEER / WISE Award, "For your Dedication and Commitment to Increasing Diversity and Inclusion at Clemson University", 2019
- Donation of Siemens and Dassault Systemes PLM academic software and on-going technical support (gift-in-kind) in partnership with senior Clemson administrators as PLM Director
- Championed 433 students using PLM software in courses / workshops, 2019
- FCC Licensed (technician, general, amateur extra) operator and volunteer examiner, 2018-19
- Fellow, SAE International (formerly Society of Automotive Engineers), 2018
- 2018 SAE Springer Award for Original & Outstanding Technical Paper - X. Tao and J. Wagner, "An Engine Thermal Management System Design for Military Ground Vehicles"
- Clemson Mechanical Engineering Department, Eastman Faculty Excellence Award, 2017



## Rong Ge, PhD

### Associate Professor

Computer Science



Rong Ge directs the Scalable Computing and Analytics Lab at Clemson. Her research in high performance computing (HPC) explores novel computer systems and software technology to improve the performance, energy efficiency, and resilience of large-scale parallel and distributed systems, machine learning, and data science. In particular, she takes an experimental systems approach to build theoretic foundations and enabling technologies that allow compute- and data-intensive applications to efficiently utilize modern computing, storage, and networking technology at scale. Ge's research is supported by grants from the U.S. National Science Foundation (NSF), Department of Energy, and prominent companies including Amazon, Intel, Mellanox, and Nvidia. Ge is a recipient of the prestigious NSF Faculty Early Career Development (CAREER) Award.

Ge is a pioneer in energy efficient computing. She has developed the original proofs-of-concept of poweraware HPC, built the first power-energy profiling framework for distributed systems, and created models and prototypes for performance-oriented energy-aware HPC. The tools have helped discover the energy inefficiency of large-scale scientific computing and big data analytics, improve system performance, and conserve energy.

Currently, she is investigating efficient computing technology to support machine learning for a broad spectrum of systems ranging from datacenters and mobile devices to edge computing and Internet of Things. Ge regularly teaches operating systems and computer organization courses at both undergraduate and graduate levels that are essential to computer science education: computer organizations study how hardware components work together to execute computer programs; operating systems manage hardware resources and provide layers of abstractions and services to user programs. She also teaches a Creative Inquiry course, which provides undergraduate students with research and learning experience on emergent technology. Students investigate liquid immersion cooling for energy efficiency and system reliability for computing and network devices. Ge currently supervises five PhD students.

### ***Selected Accomplishments***

- PI, "DeepGreen: Modeling and Boosting Accelerated Computing on Liquid Immersion Cooled HPC Systems". NSF, \$453,486. August 2019 - August 2021
- PI, "CAREER: Cross-Layer Power-Bounded High Performance Computing on Emerging and Future Heterogeneous Computer Clusters". NSF, \$269,777. February 2015 - January 2021
- PI, Research Experience for Undergraduate (REU) Supplement. NSF, \$48,000. February 2016-August 2021
- Ge and her research team have received in-kind donation from Intel, Mellanox, Nvidia and other companies, \$50K for year 2019.
- In a recent First Destination Survey, a graduate indicated Ge made a big difference in his journey at Clemson.





## Kapil Chalil Madathil, PhD

### Assistant Professor

Departments of Civil and  
Industrial Engineering



**K**apil Chalil Madathil is a human factors and ergonomics engineer with a background in the entire spectrum of human-machine system design. Specifically, his area of expertise is in applying the knowledge base of human factors to the design and operation of human-computer systems that involve rich interactions among people and technology. He draws on qualitative and quantitative methodologies including ethnography, contextual inquiry, surveys and controlled behavioral experiments to understand how humans perceive, make sense of, and interact with human-machine systems. He has been a principal investigator or co-investigator for more than 25 research grants and awards, generating more than \$11.5 million in funding. His work is funded by the United States National Science Foundation, Office of Naval Research, Agency for Healthcare Research and Quality, Department of Defense, Department of Labor, National Institutes of Health and several other industry and state agencies. A great majority of these funded efforts involve multiple institutions including K-12 systems, technical colleges, universities, and industry partners. He currently teaches undergraduate courses on human factors and ergonomics and graduate courses on accident analysis, user-centered system design and human-computer interaction. He serves as the Associate Editor-in-Chief of the International Journal of Industrial Ergonomics. He is also the Associate Editor for Ergonomics in Design, and Program Chair for the Human Factors and Ergonomics Society's Computer Systems Technical Group, and a technical reviewer for 20 different journals.

### **Selected Accomplishments**

- To date, he has published a total of 76 peer-reviewed publications, demonstrating a significant research productivity and indicating that his research program is increasingly well established and recognized for its positive contributions to science.
- The total number of citations referencing his research publications was 783 according to the Google Scholar database, and h-index was 14.
- He has graduated 2 PhD and 2 MS students, and he is currently the primary advisor for a post-doctoral researcher and 5 PhD students.
- He conceptualized, created and implemented the Online Master of Engineering in Risk Engineering and System Analytics Program for working professionals with a current enrollment of more than 60 students. The program graduated its first cohort in Aug'19.
- He was an invited participant at the Workshop on Workforce Adaptability conducted by the National Academy of Engineering.
- He serves on the National Visiting Committee of the NSF National Center for Autonomous Technologies.
- He received the Inventor's Club Award from Clemson University Research Foundation in 2018 and 2019 for commercializing educational technologies.



## Michael W. Sears, PhD

### Associate Professor

Department of Biological Sciences



**M**ichael Sears is internationally recognized for his work in the areas of physiological ecology and ecological modeling. His work focuses on understanding whether and how animals, particularly lizards and salamanders, might respond to ongoing climate change. His work takes place in the Southern Appalachians (the global hotspot for salamander biodiversity), in pineland ecosystems along the eastern U.S., and in montane and desert ecosystems in Southwestern U.S. Recent research projects have been supported by grants from the National Science Foundation. Sears currently teaches undergraduate and graduate courses in Quantitative Biology, Integrative Organismal Biology, and Scientific Writing. His lab has also been involved with the Creative Inquiry (CI) program and has included four undergraduates on three recent publications. Currently, he advises one doctoral student. Recently he graduated two doctoral students and one Masters student, who have taken positions at the University of California, Berkeley, Wake Forest University, and the U.S. Department of Agriculture.

### **Selected Accomplishments**

- Published over 40 peer-reviewed journal articles that have been cited over 3,400 times, including recent contributions to Nature Communications, Science Advances, Proceedings of the National Academy of Sciences, Ecology Letters, and Ecological Monographs.
- Featured in the national media including the New York Times, Washington Post, National Geographic, BuzzFeed, and National Public Radio among others.
- Recently highlighted in Blue Ridge Outdoors magazine for salamander conservation.
- Cited in reports by the Intergovernmental Panel on Climate Change (IPCC).
- Delivered over 50 invited national and international talks including the opening talk for a Gordon Conference on Unifying Ecology Across Scales and recent invited symposia at the Society for Integrative and Comparative Biologists and the United States-International Association of Landscape Ecology.
- Received a National Science Foundation Research Experiences for Undergraduates SITE Award.
- Lab members received a NSF Doctoral Dissertation Improvement Grant and a NSF Graduate Research Fellowship awards.
- Serves on the Editorial Boards of PLoS ONE and Physiological and Biochemical Zoology.
- Serves as Guest Editor for a special feature on an Integrative Approach to Thermoregulation for Frontiers in Environmental, Aviation, and Space Physiology.
- Served as Chair of the Division of Ecology and Evolution in the Society of Integrative and Comparative Biology.
- Serves on the Scientific Advisory Board at the Highlands Biological Research Station (NC).



## Jennifer M. Mason, PhD

### Assistant Professor

Department of Genetics and  
Biochemistry



Jennifer Mason's work focuses on the mutations in humans that increase cancer incidence. Her focus is determining how genes that function to repair damage in the DNA protect cells from accumulation of unwanted mutations. In the long term, Mason hopes to identify novel targets for chemotherapy. Currently, Mason teaches Molecular and General Genetics Course and a special topic Senior Seminar course on the gene editing technique, CRISPR-Cas9. She is actively involved in undergraduate research. Since arriving at Clemson, she has mentored nine undergraduates in the lab. Her research lab consists of one research technician, two PhD students, three undergraduate researches, and one undergraduate honors student.

### **Selected Accomplishments**

- Published co-corresponding author peer-reviewed manuscript in Nature Communications.
- Nominated for Clemson Master Teaching award.
- Awarded 2nd place undergraduate lightning talk at Clemson Biological Sciences Annual Student symposium (CBASS) (student presentation).
- Awarded 1st place undergraduate poster presentation at Clemson Biological Sciences Annual Student symposium (CBASS) (student presentation).
- Chosen as one of 15 possible faculty mentors at Clemson University for undergraduate students awarded the Beckman Scholars Award from the Arnold and Mabel Beckman foundation.
- Published a total of eight peer-reviewed journal articles.
- Invited seminar speaker at USC-Columbia and USC-upstate
- Invited to give seminar at annual Environmental and Mutagenesis Society (EMGS) meeting in Washington DC.
- Served as NSF grant reviewer.
- Served on graduate admissions committee for the Department of Genetics and Biochemistry.





## Stephen R. Kaeppler, PhD

### Assistant Professor

Department of Physics and  
Astronomy



Stephen Kaeppler is an experimental space plasma physicist who studies the neutral and ionized layers of the Earth's atmosphere called the thermosphere and ionosphere, respectively. He joined the faculty at Clemson University in 2018. His research focuses on both auroral electrodynamics and energy transfer and dissipation during auroral events (the northern lights). Kaeppler uses two observational methods to obtain data for scientific analysis: sounding rocket-based experiments and high-power large-aperture radars.

He is currently conducting research projects supported by the National Science Foundation, NASA, the Air Force Office of Scientific Research (AFOSR), and he recently received funding from IARPA. Kaeppler currently teaches a junior-level course on classical mechanics and organizes the Atmospheric and Space Physics Seminar. His growing research lab consists of one post-doctoral fellow, one PhD student, and four undergraduate research students, along with two undergraduate alumni.

### **Selected Accomplishments**

- Received a \$1,726,489 research grant from NASA for the Ion-Neutral Coupling during Active Aurora (INCAA) sounding rocket mission. This grant includes subcontracts to the University of California – Berkeley, University of Calgary, and University of Alaska – Fairbanks. This mission will launch in April 2021.
- Received a \$335,734 research grant from the Air Force Office of Scientific Research (AFOSR).
- Published 1 peer-reviewed book chapter in The Dynamic Loss of Earth's Radiation Belt, and 2 peer reviewed journal articles.
- Best Poster Presentation at Clemson University 6th Undergraduate Research Symposium (student presentation)
- Mentored an undergraduate student who won a South Carolina Space Grant Consortium Undergraduate Research Award and attended the MIT Haystack Research Experience for Undergraduates in Summer 2019.

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Feb. 6, 2020



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