



RESEARCH

QUARTERLY RESEARCH REPORT
FEBRUARY 2025

TANJU KARANFIL

SENIOR VICE PRESIDENT FOR RESEARCH,
SCHOLARSHIP AND CREATIVE ENDEAVORS



From the Senior Vice President for Research, Scholarship and Creative Endeavors

Why do I feel so confident that we will reach our Clemson Elevate goal to double research? Because we have done it before. Now, to take the next step, we must invest in our future and modernize our operations.

For the first time, our total research and development (R&D) expenditures as tracked for all institutions by the National Science Foundation (NSF) surpassed \$300 million. In FY2024, Clemson reported total R&D expenditures to NSF of \$334 million, more than double from \$152 million in FY2013. On top of that, from December 2023 to August 2024, Clemson awarded 324 doctoral degrees, compared to 187 in 2013. Outstanding.

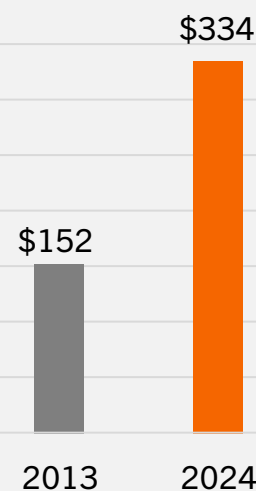
As 2025 began, Clemson had 2,048 active research projects with a total budget amount of more than \$823 million. That's a nearly 70 percent increase in the number of active projects over the past decade, and the combined value of those projects has more than tripled (see charts at right). We have grown our research portfolio by pursuing and securing high-value, complex awards that often involve multiple institutions and large teams. Since 2015, we have secured 125 projects valued at \$2 million or more, bringing more than \$721 million to the university.

Together, we have enhanced our research culture and posted unmatched growth. This has required a shared commitment from university leadership, deans, associate deans, department chairs, faculty, research associates, graduate students and support staff to enhance our research enterprise. Now, we have much work to do to take the next step.

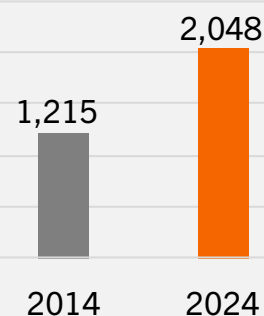
Large, complex awards have boosted our growth significantly and diversified our portfolio greatly, while significantly increasing the complexity of our administrative operations. We must modernize our research administration operations that manage proposals and awards, help faculty navigate complex compliance matters and support export compliance and research security, including the enhancement of IT and cybersecurity infrastructure, which are matters of growing importance to funding agencies. We have solidified our status as a Carnegie R1 institution. As we work to position Clemson for membership in the American Association of Universities (AAU) and to double research activity again, our research administration must reflect those ambitions.

To modernize research operations, we have been conducting external reviews of our pre- and post-award offices, research compliance, and export controls and research security operations. These reviews identified additional resources needed to support our current research growth and goals under Clemson Elevate. The investment to modernize research operations and management should start immediately and will take three years to fully complete.

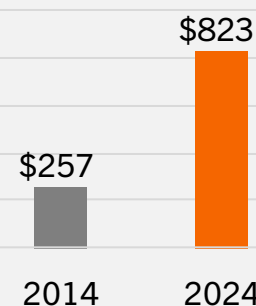
Total R&D Expenditures
(in millions)



Active Projects



Project Value
(in millions)





From the Senior Vice President for Research, Scholarship and Creative Endeavors

Our research community, meanwhile, continues to pursue more research. During the first quarter of fiscal year 2025, for example, Clemson researchers requested \$188 million to support 347 new research proposals and have earned \$65.5 million in new competitive awards, including several large projects valued at \$2 million or above. Additional details on research awards, proposals and expenditures for the first quarter of 2025, as well as a list of the top 10 grants received, are available in the Research Metrics section on [pages 4-11](#).

Behind this data, of course, are members of the Clemson Family working hard to ***Transform Lives***, a key pillar of the Clemson Elevate strategic plan. We are improving health care for both providers and patients, helping farmers increase profits, providing educators tools to better prepare young students, helping business maximize profits, working with communities to develop shared public spaces for all to enjoy and introducing technological advancements across numerous sectors with numerous applications. I have included examples in the Research News section on [pages 12-20](#) of ways Clemson works to ***Transform Lives*** through research. This is just a small sample chosen to cover a diverse range of fields, as well as to highlight some projects that may not be as well known as others. Again, Clemson has more than 2,000 active research projects happening across its footprint, each with a unique story to tell.

To provide some more examples of the breadth of scholarly activity happening at Clemson, I also have included a brief profile of one faculty member from each college, along with select accomplishments for each individual, in the Focus on Faculty section on [pages 21-29](#). I hope you will enjoy reading their stories, as I have.

It truly is a great time to be a Clemson Tiger!

Since 2015, Clemson has received **125 awards** valued at or above \$2M, bringing a combined **\$721M** to the university.

Sincerely,

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

Senior Vice President for Research, Scholarship and Creative Endeavors
Clemson University



Tanju Karanfil



RESEARCH

RESEARCH METRICS

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

Executive Summary

- Total R&D expenditures at Clemson surpassed \$300 million at Clemson for the first time in fiscal year 2024 ([page 5](#)).
- Competitive expenditures reached nearly \$50 million in the first quarter of fiscal year 2025 (FY2025). Details on expenditures by business unit, innovation cluster, funding source and per tenure/tenure-track faculty member are included on [pages 6-7](#).
- Proposal submissions were \$188 million for the first quarter of FY2025. Details on proposals per college, along with targets for FY2025, are on [page 8](#).
- Research awards in the first quarter of FY2025 were nearly \$66 million. Details on awards per college are on [page 9](#).
- Clemson faculty remain successful earning high-value awards. A selection of large grants received in the first quarter are on [pages 10-11](#).

The tables on the following pages provide details on proposal submissions, awards and expenditures per college/unit. Abbreviations used in the tables are listed below.

CAAC: College of Architecture, Art & Construction

CAH: College of Arts & Humanities

CAFLS: College of Agriculture, Forestry & Life Sciences

CBSHS: College of Behavioral, Social & Health Sciences

CECAS: College of Engineering, Computing & Applied Sciences

COE: College of Education

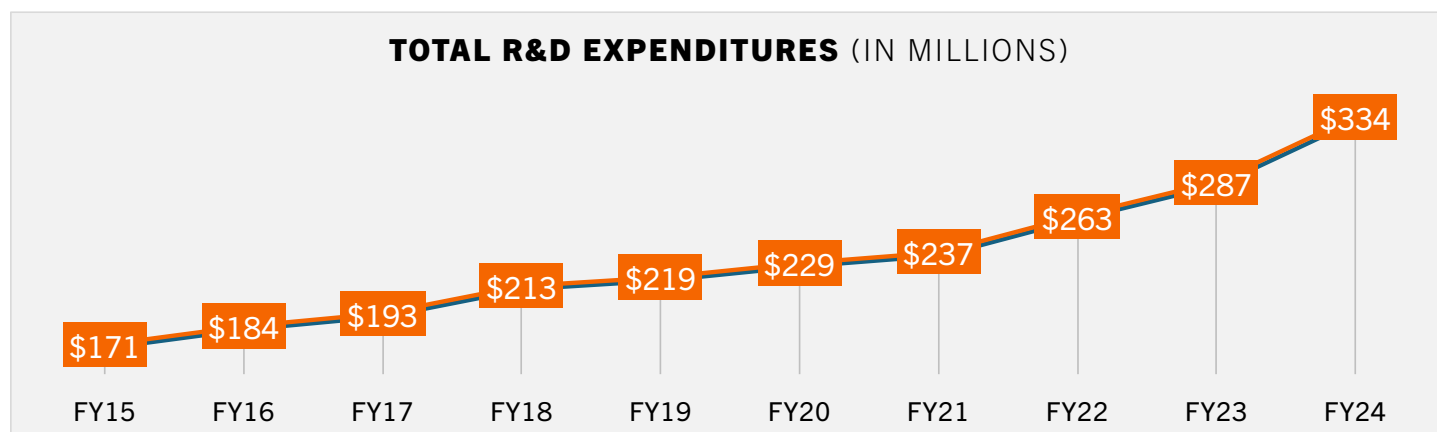
COB: Wilbur O. and Ann Powers College of Business

COS: College of Science

Total R&D Expenditures

Clemson's total R&D expenditures reached \$334 million in FY2024, as shown in the graph below. This data includes expenditures on all research revenue, including state support, gifts, external research services, competitive awards and other sources, as reported to the National Science Foundation Higher Education Research and Development (HERD) Survey.

The table below shows various outputs (Ph.D. productivity, licensing revenue, patents, etc.) and the size of the workforce supporting research activity at Clemson.



	2021	2022	2023	2024	2025 1st Quarter
NIH R01-Equivalent Awards	3	1	6	2	1
Doctorates Awarded	225	242	285	310	111
STEM Doctorates Awarded	159	172	190	197	71
Disclosures	44	50	61	76	15
Patents	15	33	11	13	5
Licenses/Options	13	27	16	20	1
Licensing Revenue	\$239,074	\$380,286	\$392,162	\$387,274	\$100,123
Start-up Companies (based on licenses/options)	1	4	4	7	1
Supporting Workforce					
Graduate Student Enrollment	5,538	5,448	6,401	5,872	5,676
Sponsored Graduate Research Assistants	546	729	926	1,049	820
Postdoctoral Fellows	106	117	112	141	131
Research Faculty: Permanent 100% Non-E&G Funded	12	2	5	4	4
Research Faculty: Temporary 100% Non-E&G Funded	45	32	28	36	46

Competitive Expenditures

Competitive expenditures reached nearly \$50 million in the first quarter of fiscal year 2025. Competitive expenditures include funds only from competitively bid projects, such as federal grant awards.

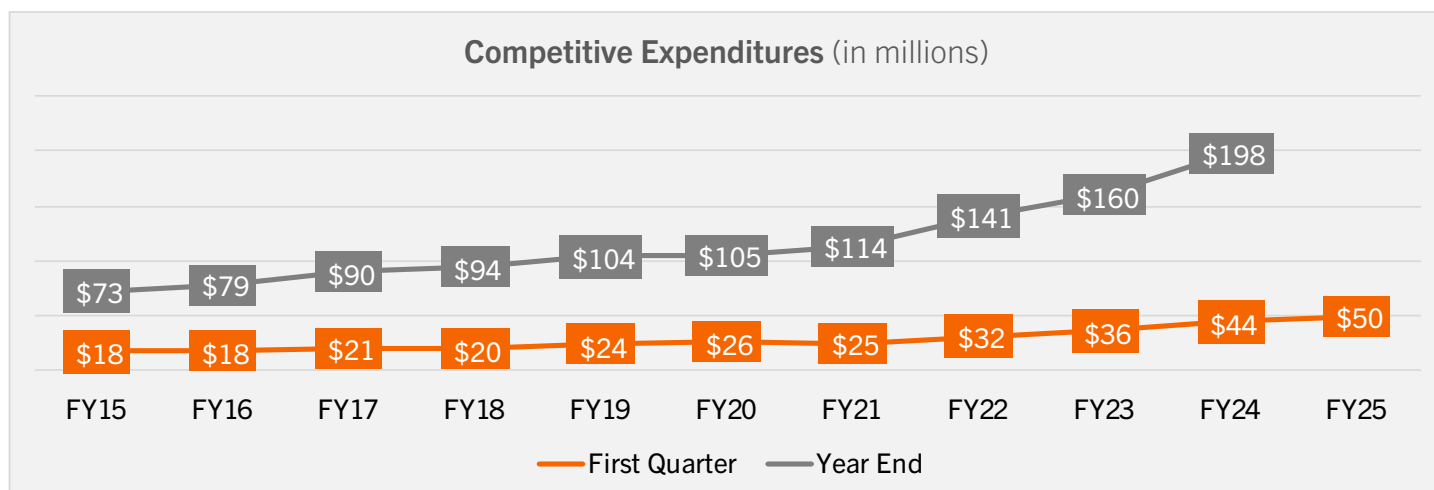
Additional details on expenditures by business unit, innovation cluster, funding source and per tenure/tenure-track faculty member are included in the table on the next two pages.

The line graph on the following page compares competitive expenditure data for the first quarter of each of the past 10 fiscal years in orange and for year end in gray.

Research Expenditures (millions)	2021	2022	2023	2024	2025 1st Quarter
By Business Unit	\$114.4	\$141.4	\$160.3	\$198.5	\$50.0
CAAC	\$1.0	\$1.1	\$1.3	\$1.8	\$0.4
CAH	\$0.1	\$0.2	\$0.6	\$1.0	\$0.3
CAFLS	\$20.5	\$25.0	\$29.7	\$40.7	\$8.5
COB	\$0.7	\$0.7	\$1.0	\$1.4	\$0.3
CECAS	\$54.4	\$71.7	\$76.0	\$88.6	\$22.5
CBSHS	\$9.0	\$12.0	\$16.7	\$21.1	\$6.9
COE	\$2.3	\$3.8	\$5.6	\$6.6	\$2.1
COS	\$15.9	\$18.5	\$23.1	\$28.0	\$7.1
VP for Res & Interdisc Inst	\$9.6	\$7.0	\$6.2	\$7.6	\$1.4
All Other	\$0.8	\$1.5	\$1.6	\$1.8	\$0.5
By Innovation Cluster	\$114.4	\$141.4	\$160.3	\$198.5	\$50.0
Advanced Materials	\$14.3	\$18.6	\$21.1	\$23.6	\$5.9
Cyberinfrastructure & Big Data Science	\$5.5	\$8.2	\$7.7	\$8.6	\$2.2
Energy, Trans. & Advanced Manufacturing	\$19.9	\$27.7	\$29.5	\$32.0	\$8.0
Health Innovation	\$27.1	\$26.3	\$30.5	\$38.7	\$11.1
Human Resilience	\$12.7	\$14.8	\$19.1	\$24.2	\$6.4
Sustainable Environments	\$21.3	\$26.8	\$33.7	\$49.7	\$10.9
Other	\$13.6	\$19.6	\$20.2	\$21.7	\$5.5

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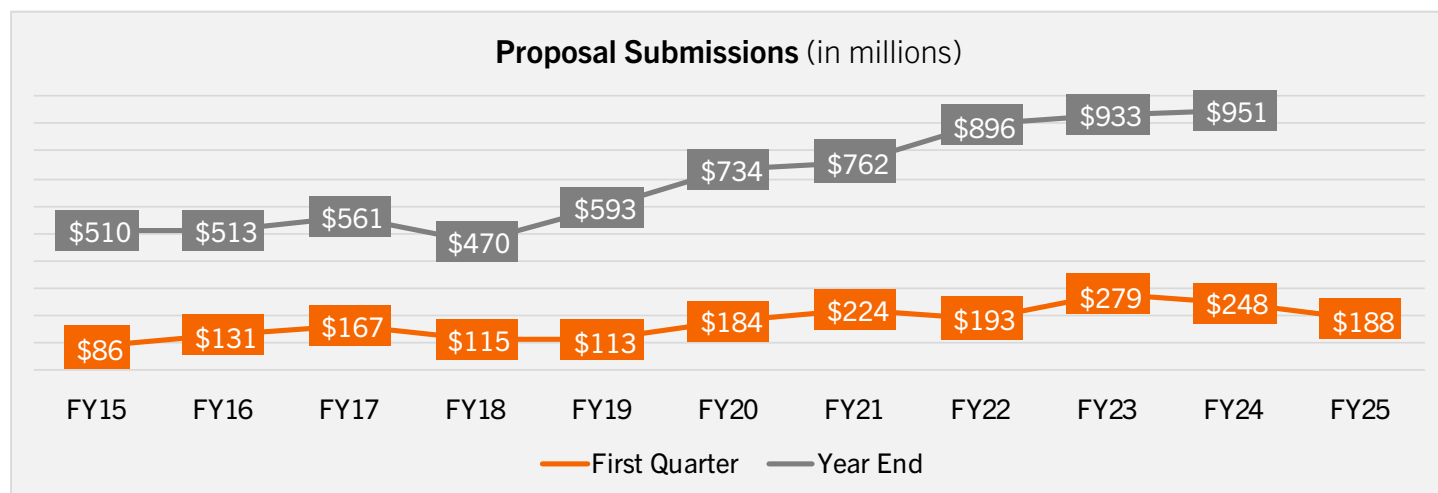
Competitive Expenditures



Research Expenditures (millions)	2021	2022	2023	2024	2025 1st Quarter
By Funding Source	\$114.4	\$141.4	\$160.3	\$198.5	\$50.0
Federal Government	\$95.1	\$125.1	\$141.0	\$175.0	\$44.0
Foundations, Societies and Associations	\$6.2	\$4.6	\$5.4	\$6.6	\$1.6
Industry/Other	\$4.8	\$4.8	\$5.9	\$5.2	\$1.0
International	\$0.4	\$0.5	\$0.5	\$0.6	\$0.2
Local Government	\$0.8	\$0.9	\$0.7	\$0.6	\$0.1
State Government	\$7.3	\$6.2	\$8.2	\$10.4	\$3.0
Per T/TT Faculty Member					
CAAC	\$18,195	\$21,321	\$26,231	\$35,020	\$8,794
CAH	\$1,113	\$1,864	\$5,507	\$10,135	\$2,509
CAFLS	\$131,195	\$196,657	\$231,788	\$301,646	\$61,837
COB	\$7,132	\$6,787	\$9,865	\$14,564	\$3,166
CECAS	\$223,843	\$296,203	\$310,088	\$358,535	\$90,411
CBSHS	\$67,202	\$90,220	\$121,581	\$149,294	\$45,733
COE	\$48,805	\$80,058	\$121,114	\$124,266	\$36,744
COS	\$107,258	\$120,778	\$146,445	\$177,322	\$44,064
Clemson average (Total exp/Total T/TT faculty)	\$103,187	\$142,129	\$159,792	\$196,501	\$47,766

Proposal Submissions

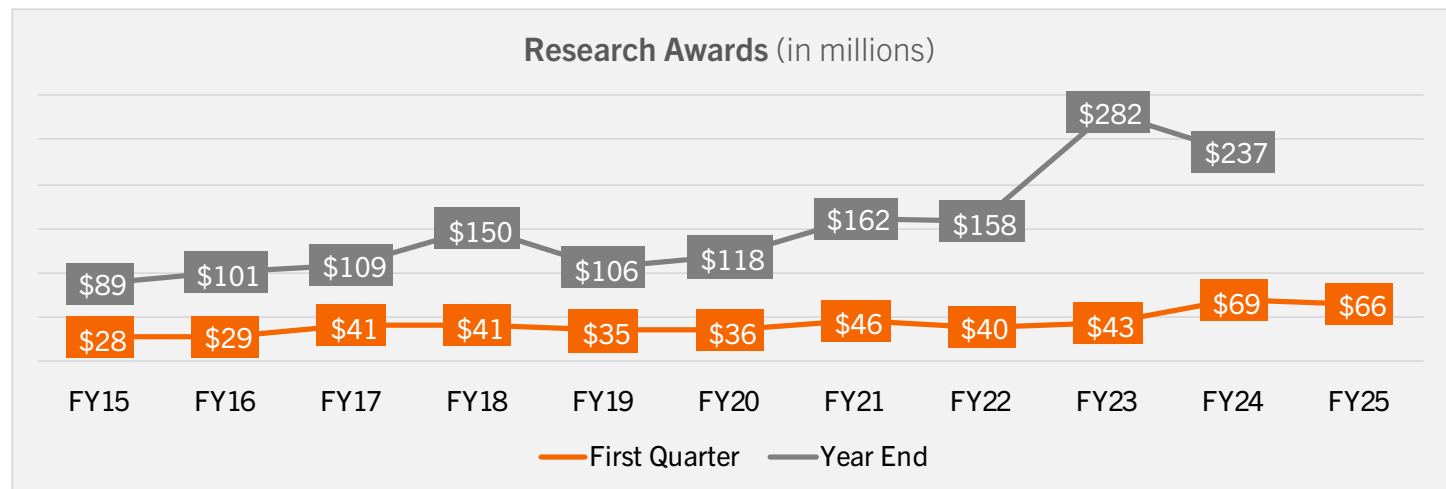
Proposal submissions were \$188 million for the first quarter of FY2025. The line graph shows first quarter data for each year in orange, along with year-end data in gray.



Proposal Submissions	2021	2022	2023	2024	2025 1st Quarter	
By Count	1,581	1,492	1,680	1,728	347	
CAAC	49	24	20	18	4	
CAH	12	11	7	12	0	
CAFLS	426	392	451	455	108	
CBSHS	150	151	183	179	32	
CECAS	596	631	684	701	120	
COE	37	43	45	49	27	
COB	14	9	11	11	1	
COS	229	193	259	262	51	
VP for Res & Interdisc Inst	29	23	11	13	2	
All Other	39	15	9	28	2	
By Value (millions)	\$762	\$896	\$933	\$951	\$188.1	FY2025 Targets
CAAC	\$3.8	\$6.5	\$10.4	\$8.6	\$0.7	\$11.47
CAH	\$1.7	\$1.7	\$3.0	\$1.5	\$0.1	\$3.32
CAFLS	\$89.7	\$249.9	\$149.6	\$188.9	\$36.0	\$164.97
CBSHS	\$64.3	\$73.1	\$106.5	\$116.4	\$15.4	\$117.39
CECAS	\$342.9	\$380.8	\$426.0	\$429.8	\$75.1	\$469.62
COE	\$22.4	\$32.3	\$34.4	\$34.0	\$27.3	\$37.91
COB	\$4.2	\$4.8	\$6.3	\$3.1	\$2.3	\$6.9
COS	\$175.4	\$127.3	\$169.8	\$125.5	\$30.9	\$187.17
VP for Res & Interdisc Inst	\$22.3	\$11.0	\$6.7	\$5.7	\$0.02	
All Other	\$35.7	\$8.9	\$20.3	\$36.9	\$0.3	

Competitive Research Awards

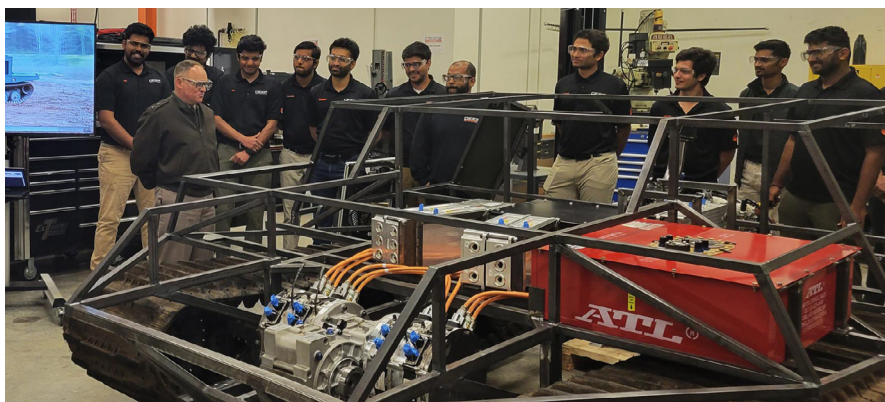
Research awards in the first quarter of FY2025 were nearly \$66 million. The line graph below shows first quarter data for each year in orange, along with year-end data in gray. Awards in FY2023 were elevated by the largest single federal award Clemson has ever received, a \$70 million grant from USDA. The table provides details on awards per college and young investigator awards received.



Research Awards	2021	2022	2023	2024	2025 1st Quarter
By College/Unit (millions)	\$162.2	\$157.6	\$282.0	\$237.3	\$66.0
CAAC	\$1.0	\$0.4	\$3.4	\$1.5	\$0.6
CAH	\$0.4	\$0.8	\$2.1	\$0.7	\$0.4
CAFLS	\$29.9	\$26.9	\$107.4	\$37.4	\$18.7
CBSHS	\$17.4	\$13.7	\$21.0	\$27.8	\$4.8
CECAS	\$75.0	\$76.4	\$102.8	\$109.4	\$22.9
COE	\$5.1	\$5.7	\$10.1	\$4.9	\$2.1
COB	\$0.2	\$0.9	\$1.1	\$1.1	\$0.02
COS	\$25.4	\$17.8	\$24.4	\$34.0	\$8.1
VP for Res & Interdisc Inst	\$5.1	\$6.6	\$7.1	\$7.0	\$0.8
All Other	\$2.6	\$8.3	\$2.6	13.5	\$7.0
Young Investigator Awards	9	5	8	10	3
NSF CAREER	8	4	6	10	2
NIH KO1	-	-	-	-	1
Air Force Young Investigator	-	-	1	-	-
Army Young Investigator	-	-	-	-	-
DARPA Young Investigator	-	-	-	-	-
EPA Early Career	-	-	-	-	-
DOE Early Career	1	1	-	-	-
Arnold & Mabel Beckman Foundation	-	-	1	-	-
Dept. of Education Inst. of Educational Sciences	-	-	-	-	-

Top Competitive Awards (First Quarter of FY2025)

The U.S. Army awarded Clemson an additional \$4.5 million in support of the Virtual Prototyping of Autonomy-Enabled Ground Systems (VIPR-GS) project that is creating advanced tools and methods for testing vehicles quickly and affordably through virtual prototyping. The project is led by VIPR founding director Zoran Filipi, director of the School of Mechanical and Automotive Engineering.



VIPR researchers

The U.S. Department of Agriculture (USDA) awarded Clemson another \$3.6 million to continue efforts to eradicate the Asian longhorned beetle, which threatens extensive loss to ornamental and commercial tree species and forested areas if not contained. The project is lead by Steven Long, assistant director of Clemson Regulatory Services.



Asian Longhorned Beetle

The U.S. Department of Energy awarded Clemson \$2.4 million to demonstrate a medium-duty, off-road engine fueled by renewable energy and with fewer emissions. This will support development of computational engine design tools that are needed for rapid market penetration of engines that use renewable dimethyl ether as fuel. The project is led by Benjamin Lawler, associate professor of automotive engineering.

The National Science Foundation awarded Clemson \$2 million to work with the College of Charleston and Claflin University to increase research capacity across the state by enhancing the administrative infrastructure that supports sponsored research. The project is led by Shelia Cotten, associate vice president for research and provost's distinguished professor.



Daniel Whitehead, left

The National Institutes of Health awarded Clemson \$1.8 million to develop strategies to enable the discovery of novel biologically active compounds to expand medicine and to develop new chemical tools that will increase understanding of human gut bacteria, which is relevant to human health and disease. The project is led by Daniel Whitehead, associate department chair of Chemistry.

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Top Competitive Awards (First Quarter of FY2025)

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The National Science Foundation awarded Clemson \$1.6 million for the “CloudLab Phase 4: Strengthening a Core Resource for Research and Education” project. Led by the University of Utah, the project aims to improve the underlying infrastructure of cloud technologies used in the workplace every day. Clemson’s work on the project is led by K.C. Wang, C. Tycho Howle endowed chair and professor of electrical and computer engineering.



K.C. Wang, center



Shahid Mukhtar

The National Science Foundation awarded Clemson \$1.6 million to advance development of climate-resilient soybeans, a significant food source. The overall project aims to significantly advance the understanding of soybean stress responses and identify potential genetic targets for enhancing crop resilience. The project is led by Shahid Mukhtar, professor of genetics and biochemistry.

The U.S. Department of Agriculture awarded Clemson \$1.5 million to develop sustainable packaging innovations to support the export of specialty crops. The export of specialty crops is an important part of the agricultural economy, representing \$143 billion in 2023. The project is led by James Sternberg, assistant professor of sustainable packaging.



James Sternberg, left

The U.S. Department of Agriculture awarded Clemson \$1.2 million to construct a contained research facility at the Edisto Research and Education Center that will allow for integrated management research. In particular, researchers will identify methods to manage harmful root-knot nematodes that are highly disruptive to numerous vegetable crops. The project is led by Paula Agudelo, professor of plant pathology and associate dean for research.



Gang Li, left

The U.S. Department of Energy awarded Clemson \$1.2 million to develop an artificial intelligence-enabled inverse design workflow to aid innovation in materials. The project is led by Gang Li, professor of mechanical engineering.



RESEARCH

RESEARCH NEWS

This section highlights research news from across the university.

Executive Summary

Behind the growing research awards and expenditures are members from across the Clemson Family working hard to **Transform Lives**, a key pillar of the Clemson Elevate strategic plan.

As 2025 began, Clemson had 2,048 research projects happening across its footprint valued at a combined \$823 million. Each one of those projects has a story of faculty and students working to solve a problem, to make life better. They are improving health care for both providers and patients, helping farmers increase profits, providing educators tools to better prepare young students, helping employers train and retain employees, working with communities to develop shared public spaces for all to enjoy and introducing technological advancements across numerous sectors with numerous applications.

This special news section provides some examples of the many ways Clemson faculty and students **Transform Lives** through research. Where possible, stories provide links to additional information. Entries have been selected to provide samples from a diverse range of fields, as well as to highlight some projects that may not be as well known as others. There are many, many other examples of Clemson researchers working to **Transform Lives** through the more than 2,000 research projects happening across Clemson's footprint.



Chowdhury

Additionally, two Clemson faculty members earned substantial national honors in January.

Mashrur "Ronnie" Chowdhury, the Eugene Douglas Mays Chair of Transportation and director of the \$20 million National Transportation Center for Transportation Cybersecurity and Resiliency, received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. He is one of just 30 honorees across the country this year and among about 350 awardees over the past 30 years. This is a truly a rare honor.



Sun

And, Cheng Sun received the Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor awarded by the U.S. government to early career scientists and engineers. Sun, an associate professor of mechanical engineering and materials science and engineering, is just the second Clemson faculty member to earn the award in the last 20 years. He was nominated by the U.S. Department of Energy. His research addresses fundamental challenges in structural materials with an emphasis on material behaviors in extreme environments.

Transforming Lives through Research

Keeping citizens safe in natural disasters

Four Clemson University researchers are part of a national team that has developed a Flood Evacuation Tool to help forecast floods, identify at-risk roads and verify safe evacuation routes.

The tool partners artificial intelligence (AI) with human knowledge. Researchers are using this human-AI teaming (HAT) partnership to create an intelligent model for addressing flood evacuation decisions in isolated South Carolina rural coastal communities.

Current flood evacuation models include Geographic Information System (GIS) and infrastructure planning approaches, which do not use artificial intelligence.

Tools, including National Weather Service (NWS) flood warning alerts, GIS and transportation infrastructure planning, are used to make flood evacuation decisions in South Carolina. This new tool leverages AI and human capabilities at a local scale, such as a road segment, to use in flood evacuation decision-making processes. [READ MORE](#)



Clemson helped develop a flood evacuation tool.

Better batteries for renewable energy

With 86% of the world's electricity coming from fossil fuels, there's a critical need for cleaner, renewable solutions. However, renewable energy sources — like wind, water and solar — are intermittent, requiring efficient storage to harness their full potential.

Mark Roberts, associate professor of chemical engineering, has helped find a solution to this problem. He developed an innovative interface to improve redox flow batteries, enabling longer power cycles and more efficient, affordable energy storage.

By advancing storage technology, Clemson University is helping pave the way for reliable, accessible and eco-friendly energy solutions. This will help contribute to eliminating carbon footprints and moving toward a more sustainable world. [READ MORE](#)



Improving food security with climate-resilient crops

As climate change brings more extreme weather, growing crops is getting tougher. Researchers Hung Luo and Qian Hu at Clemson University have developed a new “gene stacking” technology that combines three powerful genes to help plants thrive in harsh conditions like drought, heat and salty soil.

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Tranforming Lives through Research

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This makes crops stronger and increases their yield, helping farmers grow more — even when the environment is tough. Originally developed in grasses, this technology could soon benefit food crops and other important plants.

The technology combines favorable plant traits to create a plant with superior performance in handling biotic and abiotic stresses. This enhances plant growth and tolerance to drought, salinity, heat stresses and nutrient deficiencies. [READ MORE](#)

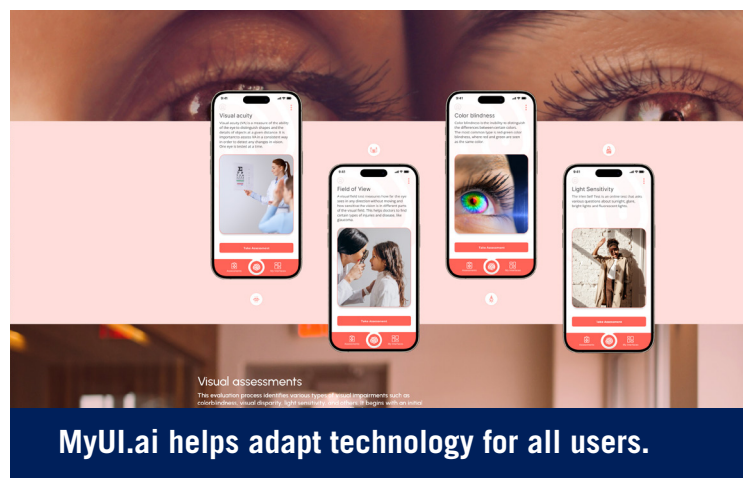
Unlocking technological advances for all

Digital interfaces enable user interactions with technology. Think self-checkout kiosks at grocery stores, smart appliances in our home or autonomous vehicles. These interfaces can be activated by voice or gestures, for example, or with graphical elements like icons or buttons on devices and software.

They are fundamental to the use of modern technology, but these interfaces are not always accessible to people with disabilities, such as color-blindness, light sensitivity or field-of-view limitations, for example.

Julian Brinkley, associate professor in the School of Computing, developed technology that breaks down these barriers for people with disabilities. His product, MyUI.ai, utilizes artificial intelligence to adapt digital interfaces for people with disabilities.

MyUI.ai earned the Community Service Award at the annual InnoVision Awards competition in November. The business resides in Clemson University's Brook T. Smith Launchpad, an entrepreneurial hub that helps faculty, students and staff launch businesses.



Julian Brinkley

Enabling new vaccines for disease treatment

Recently, the use of mRNA was validated to create vaccines against COVID-19; hence, there is significant potential for using them as vaccines and treatments for many other conditions. While mRNA drugs have led to a potential paradigm shift in disease treatment, they face challenges that impede the successful translation of these molecules into drugs. They are very large molecules, are intrinsically unstable and prone to degradation by nucleases, and they can abnormally activate the immune system.

Clemson University's Jessica Larsen and Ph.D. student Chloe Forenzo developed a novel mRNA technology, "Stabilized mRNA Therapeutics with Precise ROS-triggered Delivery." Their discovery overcomes the delivery and targeting challenges with existing mRNA, increasing stability and controlling release location helping fully exploit their effectiveness for many.

This has the potential to improve the targeting safety of mRNA-based therapeutics for cancer and other chronic indications.

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Tranforming Lives through Research

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Ksenia Gasic

Keeping peaches on the table

Ksenia Gasic, professor of horticulture, peach genetics and breeding for the plant and environmental sciences department in the College of Agriculture, Forestry and Life Science at Clemson University, is one of the foremost experts in the world on peach growing and breeding. She and her team, an interdisciplinary group of students, Extension agents and researchers called The Peach Team, have spent more than 15 years developing dozens of variations of peach trees that

are resistant to bacterial spot, which, together with the brown rot bacteria, is the main enemy of peach growers worldwide. [READ MORE](#)

Treating the world's most debilitating diseases

One research group at the Clemson University Eukaryotic Pathogens Innovation Center (EPIC) has identified a compound that inhibits a key enzyme that brain-eating amoebas need to live, while a second laboratory is working on a more efficient and effective way to get that compound into the brain.

Naegleria fowleri thrives in warm freshwater lakes, ponds and rivers. While infection is rare, if water containing the amoeba is forced up a person's nose while swimming or diving, the amoeba can travel to the brain, causing primary amoebic meningoencephalitis, an infection that results in tissue damage and hemorrhagic necrosis. It is nearly always fatal — only four of the 157 people with confirmed cases in the United States from 1962 through 2022 survived.

EPIC is at the forefront of biomedical research on eukaryotic pathogens responsible for infectious diseases that threaten the health of billions of people worldwide. [READ MORE](#)



Sparing infants the pain of opioid addiction

Infants exposed in utero to opioids taken by substance-dependent mothers can suffer from fever, seizures, hyperactive reflexes, vomiting, diarrhea, sweating and dehydration, common symptoms of withdrawal. These infants are born with neonatal abstinence syndrome. The high-pitched crying and trembling make breastfeeding or bonding with a mother more difficult, and seizures can lead to lack of oxygen and even death if unrecognized.

Researchers from Clemson's College of Behavioral, Social and Health Sciences have helped inform Prisma Health's Managing Abstinence in Newborns (MAiN) program, an early intervention model for babies born to opioid-dependent mothers. The

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Tranforming Lives through Research

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program offers an innovative model of care that combines early treatment, rooming-in of babies and mothers at the hospital, interdisciplinary care and outpatient medication weaning, which combine to reduce the need for neonatal intensive care.

The MAiN 2.0 program is now used at 10 hospitals in South Carolina and has led to two newly funded S.C. Opioid Recovery Fund projects to expand services in Pickens and Anderson counties. In these counties, patients now receive home health nurse visits and receive support from infancy up to 5 years of age.

Increasing profits for S.C. farmers

Clemson University precision agriculture researchers have developed numerous online tools to help farmers reduce costs and increase profits. Online calculators, for example, help farmers optimize the use of fertilizer and irrigations to maximize crop productivity while minimizing costs. Online tools help livestock farmers calculate nutritional analysis and automate feed. Other tools help growers calculate loan rates and estimate yields. There are numerous applications available.

The online tools report nearly 40,000 users annually in the United States and provide valuable insight for South Carolina's \$51.8 billion agriculture and forestry industries.

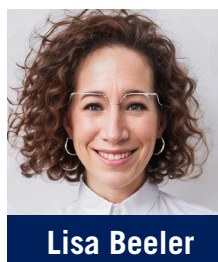
To increase impact of new technologies, the Clemson University College of Agriculture, Forestry and Life Sciences has established CU-CAT, the Clemson University Center for Agricultural Technology, in 2022. CU-CAT is a center for collaboration focused on research, education and outreach. Information provided by the Center will come from researchers of different disciplines who will collaborate to provide research-based information for farmers.



Clemson precision agriculture engineer Kendall Kirk, left, works with a farmer.

Helping businesses drive sales and retain employees

Faculty in the Wilbur O. and Ann Powers College of Business are working with industry partners on research that doesn't just add to the academic field but also creates actionable insights to impact how businesses operate. Here's a look at some of the groundbreaking work that these researchers are leading, aiming to equip sales leaders and professionals with tools and strategies that make a difference.



Lisa Beeler

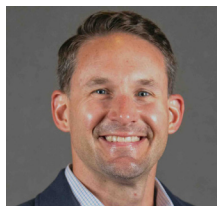
Lisa Beeler, assistant professor of marketing, has worked with several industry partners during her time in academia, including telecommunications companies and medical device sales. One co-authored study, called "Alleviating the negative effects of salesperson depression on performance during a crisis: Examining the role of job resources," explored the negative consequences of depression over time in the sales profession. Traditionally, sales is a stressful job that has high risk and high reward.

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Tranforming Lives through Research

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Through her research, Beeler saw that the most effective technique a sales manager can use to help their employees when they are faced with depression due to job stress is providing them with time and resources to seek mental health care.



Ryan Mullins

Ryan Mullins, professor of marketing, has conducted research recently on salesperson compensation and the evolving role of technology in sales.

In one of his studies, Mullins explores how companies can craft compensation packages that genuinely attract and retain top talent—something that's increasingly crucial in a competitive job market.

In another project, Mullins investigated the critical factors for success in digital transformations. His research reveals that frontline managers play an outsized role in framing and communicating the expected outcomes from a change to digital selling. At the same time, a lack of collaboration between marketing and sales teams is often a major stumbling block, undermining the effectiveness of digital selling initiatives.



Alec Pappas

Alec Pappas, assistant professor of marketing, examined how competitiveness influences both performance and employee retention in sales. Sales teams often have an internal, competitive culture with leaderboards and performance comparisons, but Pappas' research suggests that shifting the focus toward self-improvement or competing with external rivals rather than colleagues can activate a salesperson's competitiveness more positively, boosting both team morale and productivity.

Another study Pappas has been working on addresses the potential of unlocking valuable communication data hiding in plain sight to understand employee behaviors.

Restoring and elevating public spaces

Students from the Master of Resilient Urban Design (MRUD) program recently teamed up with The Marsh Appreciation and Restoration Society for Happiness project (M.A.R.S.H.), a grassroots and community-based nonprofit located in Charleston, to develop designs for an urban ecological corridor that creates community spaces and recreation, while restoring and reconnecting Charleston's remaining salt marsh ecosystems, specifically focused on Halsey's Creek.

On Oct. 2, MRUD students and The M.A.R.S.H. Project held the Design Charrette: Ecological Corridor, which included city planners, architects, City of Charleston staff, community members and students as they worked to gather information from the Charleston community that will inform students' designs of the ecological corridor.



Clemson worked with the community to redesign public space in Charleston.

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Tranforming Lives through Research

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“The students worked to create activities that would collect the data needed to drive their design and balanced that with open-ended sketching activities to allow for community input without bias or input from the studio,” explained Schuyler Clogston, a lecturer in the MRUD program and leader of the studio.

According to Clogston, the participants were led through a series of activities where they mapped their current transit routes, looked at how water could become more accessible and dreamed up a path for the ecological corridor.

“The way we structured the activities gave each community member the chance to get their own ideas out there, as well as work together with other members at their table,” explained Master of Architecture student Anna Rowell. “It was very exciting to see all of the ideas and insights the community had and how they might design the ecological corridor.”

The students also led the charrette participants in another activity, which, according to Clogston, allowed for more concrete data collection. [READ MORE](#)

Protecting national security on social media

The Clemson University Media Forensics Hub developed a platform called the Foreign Influence Network Detector (FIND) that uses statistical anomaly detection around certain hashtags, keywords or websites to expose networks of coordinated accounts that are trying to influence social media conversations about certain topics.

Darren Linvill, co-director of the Media Forensics Hub and professor of communication, said that FIND is an evolution of the work that he, co-director Patrick Warren and their colleagues with the Hub have been doing for years.

The platform won second place in the recent Defense Innovation Unit (DIU) and National Security Innovation Network (NSIN) Cyber Innovators Challenge for its work to identify malign, coordinated influence operations on social media.

The Hub was awarded \$100,000 in the challenge, which was held by DIU and NSIN in partnership with the Department of Defense (DoD) University Consortium for Cybersecurity (UC2). Teams of university researchers from across the country submitted solutions to address cyber threats and challenges faced by the DoD. Clemson was recognized in the “Persona and Influence” category, which focused on how foreign adversaries and bad actors use deception and fake online personas to avoid identification and detection. [READ MORE](#)



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Tranforming Lives through Research

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Tackling obesity in South Carolina

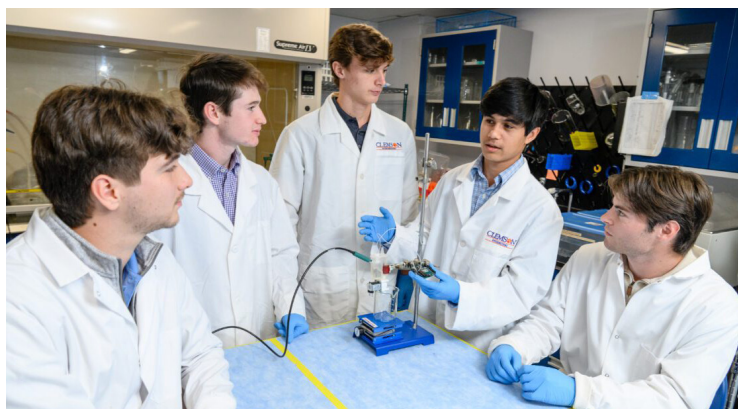
More than 16,000 people in Hampton, Lee and Marion counties, or about 25 percent of the counties' combined population, have received assistance from Clemson University to address obesity.

Now, the program is expanding from three to 10 counties – Allendale, Bamberg, Darlington, Dillon, Florence, Marion, Hampton, Lee, Orangeburg and Marlboro counties – to help South Carolinians curb obesity and live healthier lives.

The Healthy Options Program started five years ago with funding from the Centers for Disease Control and Prevention, which provided an additional \$3.8 million this year to expand the program and transform more lives. The program helps communities with high rates of obesity increase access to healthy foods, create safe places for physical exercise and guide lifestyle changes. It is led by Clemson Department Public Health Sciences professor Sarah Griffin along with a team of public health researchers and Clemson Extension Rural Health and Nutrition agents. [READ MORE](#)



Clemson's Health Options Program is helping tackle obesity in South Carolina.



A team of students developed a medical device to help patients of cardiac surgery.

Helping patients recover from cardiac surgery

A medical device that was developed by five bioengineering undergraduates as part of a senior-year project has won a national competition, and its creators plan to keep nudging it toward the marketplace.

The NephroGuard is designed to detect acute kidney injury after cardiac surgery within hours instead of days. It won the \$15,000 NIDDK Kidney Technology Development Prize as part of the Design by Biomedical Undergraduate Teams (DEBUT) Challenge.

The team that created the device consists of Omar Aguilar, Alexander Bowie, Calvin Chernyatinskiy, Aaron Spearman and Nicholas Stiebler. All five graduated in May with Bachelors of Science degrees in bioengineering.

Their faculty advisors on the project were John DesJardins, the Hambricht Distinguished professor in engineering leadership, and Tyler Harvey, senior lecturer in bioengineering. [READ MORE](#)

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Tranforming Lives through Research

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Pioneering genetics research for better health

Clemson University's Trudy Mackay has become one of the world's foremost experts in human genetics, discovering the genetic roots of complex traits that are important to human health. Her work is helping scientists answer questions that have puzzled many for decades — why some people who use drugs or drink alcohol become addicted while others do not. Or why some people live a lot longer than others. Or why a genetic disorder severely affects some members of a family but causes only minor symptoms in others.

Mackay has been recognized widely for her work and, in October, was named Clemson University's first-ever member of the prestigious National Academy of Medicine, one of the highest honors in the fields of health and medicine.

Three academies make up the National Academies of Sciences, Engineering and Medicine — and Mackay is now a part of two of them, having been elected to the National Academy of Sciences in 2010.

"Trudy Mackay is a world-renowned researcher in the field of genetics. Her election to the National Academy of Medicine is a historic and exciting day for Clemson University," said President Jim Clements. "As Clemson's first National Academy Member of Sciences and now our first National Academy Member of Medicine, Trudy continues to elevate our University's research profile to new heights. I am thrilled that Trudy has received such an incredible honor, and I am excited to see how her research further transforms and positively impacts the lives of others for generations to come." [READ MORE](#)



Trudy Mackay

Setting up multilingual learners for educational success

Clemson University College of Education researchers are helping South Carolina caregivers better educate multilingual learners.

With \$2.1 million from the U.S. Department of Education, Clemson is training caregivers through a M.Ed. in literacy program and literacy course.

Through coursework, caregivers learn to use research-based home literacy strategies to ensure their child has a strong foundation for success. The course covers various topics for supporting literacy and academic achievement in conjunction with classroom instruction, including an introduction to the South Carolina school system organization and home, legal, financial and health care literacy.

A recent class of caregivers included recent immigrants and long-term residents of the U.S., with educational backgrounds ranging from high school diplomas to doctoral degrees. Predominantly Spanish speakers, the cohort also included speakers of Vietnamese, Korean, Arabic, Swahili, Creole, Marathi, Tagalog and Filipino, most of whom had children in elementary school — notably, 100% of participants completed and graduated from the course.

Emily Howell, co-principal investigator on the project and assistant professor in literacy, said the literacy component of the course for caregivers was crucial to its success, just as the involvement of caregivers was crucial to student success. [READ MORE](#)



RESEARCH

FOCUS ON FACULTY

This section highlights faculty members at Clemson University. Each College submitted a profile of one faculty member.

Executive Summary

- Each college provided a brief introduction to a select faculty member. Click the links below to read about faculty from the respective college.
 - » [College of Agriculture, Forestry and Life Sciences](#)
 - » [College of Architecture, Art and Construction](#)
 - » [College of Arts and Humanities](#)
 - » [College of Behavioral, Social and Health Sciences](#)
 - » [Wilbur O. and Ann Powers College of Business](#)
 - » [College of Education](#)
 - » [College of Engineering, Computing and Applied Sciences](#)
 - » [College of Science](#)



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

James T. Anderson, Ph.D.

*Interim Director, Baruch Institute of Coastal
Ecology and Forest Science*

Forestry and Environmental Conservation



Anderson joined Clemson University in August 2021 as director of the James C. Kennedy Waterfowl and Wetlands Conservation Center, the James C. Kennedy endowed professor of waterfowl and wetland ecology and a faculty member of the Department of Forestry and Environmental Conservation. Prior to Clemson, Anderson was a wildlife and fisheries resources professor and the Davis-Michael professor of forestry and natural resources at West Virginia University for more than 20 years. He received his Bachelor of Science in wildlife from the University of Wisconsin – Stevens Point, his Master of Science in range and wildlife management from Texas A&M University – Kingsville and his Ph.D. in wildlife science from Texas Tech University.

His research centers on the ecology and management of waterfowl and wetlands and the evaluation of wetland and riparian systems and their relation to society (e.g., human dimensions, climate change). However, his recent studies extend beyond waterfowl to include saltmarsh restoration, integrating oysters into restoration efforts to enhance ecosystem services, wetland pollinators, alligators and microplastics, American crocodile and caiman ecology and an antebellum rice field decision support system.

Anderson has authored more than 260 publications, garnered more than \$30 million in grants and contracts and mentored more than 60 graduate students. He also teaches courses and recently became interim director at the Baruch Institute. As principal investigator, he has received funding from state and federal agencies as well as private foundations.

Select Accomplishments

- Recently funded projects include:
 - » Reviving Biodiversity: Restoring Wetland Pollinators and Empowering Underserved Communities Surrounding Hampton Plantation through Pollinator Education (U.S. Department of Agriculture);
 - » Conserving South Carolina's Historic Coastal Rice Fields: Assessing Waterfowl Dynamics and Restoration Potential Using a Decision Support Framework (Ducks Unlimited);
 - » Developing Anuran, Avian, Macroinvertebrate and Vegetative Indices of Biotic Integrity for Isolated Carolina Bays (U.S. Environmental Protection Agency);
 - » Envisioning the Future of South Carolina's Antebellum Rice Fields: Development of a Decision Support System (S.C. Sea Grant Consortium); and
 - » Regional Examination of Wood Duck Recruitment from Nest Boxes in the Southeastern and Mid-Atlantic United States (S.C. Department of Natural Resources).



College of
**ARCHITECTURE, ART
AND CONSTRUCTION**

David J. Allison, FAIA, FACHA

Director of Graduate Studies

Architecture + Health



Allison 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 integrating 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 Allison's direction.

Allison is a registered architect in California, South Carolina and North Carolina. His scholarly focus is on healthy community planning and design, design prototyping and research related to healthcare environments. He has served on numerous national health environments design award juries. He 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 American Institute of Architects/Academy of Architecture for Health 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.

Select Accomplishments

- Principal investigator: Master Plan Advisory Committee on Behavioral Health, South Carolina Department of Health and Human Services (Hourly Contract not to exceed \$37,365).
- Co-investigator: (Anjali Joseph, principal investigator) P30: Realizing Improved Patient Care through Human-centered Design for Pediatric Mental and Behavioral Health in the Emergency Department Patient Safety Learning Lab; AHRQ, National Institutes of Health/DHHS (\$1,999,048).
- Co-investigator: (Anjali Joseph, principal investigator) Evidence-based Hospital Design Process; Indiana University Health (\$458,118 in year one).
- Co-principal investigator: (with Byron Edwards) Clemson Area Retirement Center Engagement with the Clemson University Architecture and Health Program (\$9,500).
- Co-investigator: (Anjali Joseph, principal investigator) P30: Realizing Improved Patient Care through Human-centered Design in the Operating Room Learning Lab; AHRQ, National Institutes of Health/DHHS (\$3,975,998).



College of
**ARTS AND
HUMANITIES**

Caroline Dunn, Ph.D.

Associate Professor

History



Dunn has been a member of the Clemson Department of History and Geography faculty since 2007. She specializes in medieval history, especially English society between 1200 and 1500. Her first book, “Stolen Women in Medieval England: Rape, Abduction, and Adultery, 1100-1500” (Cambridge University Press, 2012) remains in print and has reached a wide audience beyond medieval studies, having been cited in works about modern rape culture in America and India, modern political kidnappings and a recent (2021) rebuttal to the best-selling “Better Angels of Our Nature” by noted Harvard psychologist Steven Pinker.

Dunn’s second book, “Ladies-in-Waiting in Medieval England,” was published by Cambridge University Press in 2024. It offers the first scholarly treatment of ladies-in-waiting across three centuries of the English Middle Ages and illuminates the experiences of more than 1,200 medieval women. Although most female attendants lived their lives behind the scenes of both mundane days and great ceremonial occasions, their ordinariness did not make them unimportant. Elite female servants played significant roles in royal and noble households, though their value and influence receive little acknowledgment from historians. Rewards earned for service, including lands, dowries, retirement annuities and material commodities, demonstrate attendants’ value to employers. Families sought to promote their daughters and wives at court and in great households because female servants could gain both remuneration and intangible patronage opportunities for themselves, their families and associates. The significance of some ladies-in-waiting is revealed in the roles they played in major political events, in ways that assisted and promoted the monarchs, but sometimes they were targeted by other courtiers who were hostile to what they saw as undue influence. In an era when politics was all about access to the decision-making monarch, female courtiers enjoyed and benefitted from such informal routes to access.

Select Accomplishments

- 2020 winner of the Bonnie Wheeler Fellowship, a prestigious medieval grant awarded annually to a noted female medievalist at the associate professor level.
- Published several articles and also co-edited (with Clemson professor emerita Elizabeth Carney) a volume on “Royal Women and Dynastic Loyalty” (Palgrave, 2018).
- Won the College of Arts and Humanities Teaching Award in 2011 and the John B. and Thelma A. Gentry Award for Teaching Excellence in the Humanities, Clemson University in 2019.



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

Zahra Rahemi, Ph.D.

Associate Professor

School of Nursing



Rahemi has extensive experience in various clinical roles and administrative positions, including serving as a hospital Chief Nursing Officer (CNO). During her Ph.D. program at Florida Atlantic University, she focused on studying older adults from diverse populations, examining their end-of-life care planning, decision-making and health disparities, resulting in multiple publications. At Clemson, Rahemi's research is centered on an interdisciplinary approach aimed at enhancing the quality of life and end-of-life care, particularly for racial minorities and individuals with Alzheimer's disease and related dementias (ADRD). She is focused on advancing her research on older adults with ADRD and memory disorders using artificial intelligence and machine learning (AI/ML), as well as precision medicine in ADRD.

Rahemi is at the forefront of applying AI/ML in aging/ADRD and end-of-life research through multiple active projects, including her projects funded by National Institutes of Health (NIH), Alzheimer's Association and the Artificial Intelligence/Machine Learning Consortium to Advance Health Equity and Researcher Diversity. These research projects position her to apply cutting-edge science to advance precision medicine in ADRD, improve the lives and end-of-life care of patients with ADRD and their caregivers and better address the needs of the increasingly diverse population of older adults both globally and in the United States.

She is an active member of several institutions and societies, including the Gerontological Society of America, the Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (ISTAART), Artificial Intelligence/Machine Learning Consortium to Advance Health Equity and Researcher Diversity (AIM-AHEAD), Resource Centers for Minority Aging Research (RCMAR), the Southern Gerontological Society (SGS), the Clemson Institute for Engaged Aging (IEA), the Center for Research on Health Disparities (CRHD), Clemson University School of Health Research (CUSHR) and the Clemson-MUSC AI Hub.

Select Accomplishments

- Published 19 peer-reviewed articles in less than two years (2023-2024).
- Presented 27 papers and posters at international, national and local conferences in less than two years (2023-2024).
- Serves as principal investigator on three externally funded research projects awarded in 2024.
- Serves as principal investigator on a five-year NIH-funded award (K01, 2024–2029) with direct costs of \$656,775.



Wilbur O. and Ann Powers College of

BUSINESS**Matthew S. Lewis, Ph.D.***Professor***John E. Walker Department of Economics**

Lewis is a professor in the John E. Walker Department of Economics at Clemson University. His research focuses on industrial organization, energy economics and health economics. His extensive research on gasoline markets has investigated gas station competition and pricing issues, price dynamics, consumer search and consumers' response to price fluctuations. His other research has examined the competitive effects of consolidation in the hospital market and the relationship between airline competition and the use of price discrimination. Policymakers and media outlets regularly call upon his expertise for consultation and commentary, and he is a highly active participant in the academic community, presenting his research at numerous conferences and seminars.

Lewis's research has been published in leading economics journals, including the *Journal of Political Economy*, the *RAND Journal of Economics*, the *Review of Economics and Statistics*, the *American Economics Journal: Economic Policy*, the *International Journal of Industrial Organization* and the *Journal of Industrial Economics*.

Prior joining the faculty at Clemson, Lewis has held positions at Ohio State University and the University of California Energy Institute. He received his Ph.D. from the University of California Berkeley.

Select Accomplishments

- Received the 2012 Paul Geroski Award for the best paper published in the *International Journal of Industrial Organization*.
- Serves as an associate editor for the *International Journal of Industrial Organization*.
- Recent publications include:
 - » "Asymmetric Information Sharing in Oligopoly: A Natural Experiment in Retail Gasoline," authored by David P. Byrne, Nicolas de Roos, Matthew S. Lewis, Leslie M. Marx, and Xiaosong Wu, *Journal of Political Economy*, forthcoming;
 - » "Multimarket Contact and Price Discrimination," authored by Haobin Fan and Matthew S. Lewis, *International Journal of Industrial Organization*, December 2024; and
 - » "Consumer Search with Learning in the Retail Gasoline Market," authored by Xiaosong Wu, Matthew S. Lewis and Frank A. Wolak, *RAND Journal of Economics*, Summer 2024.



Darris R. Means, Ph.D.

Professor

Educational and Organizational Leadership



A Spartanburg native, Means returned to South Carolina to join the College of Education faculty in summer 2024. He has spent his career focused on research and practice that expands educational opportunity and access for rural students, first-generation college students, students from low-income families and students of color. His research has been funded by the National Science Foundation and the Spencer Foundation. Means has published two co-edited books and 40 articles and book chapters. He is also a frequent speaker on improving educational opportunity and access for first-generation college students and rural students and has given keynote talks at several colleges and universities, including Columbia University's Teachers College, Harvard University, Penn State University and Texas A&M University.

Means is a nationally renowned expert who has been invited to serve on several high-profile committees and advisory boards. In 2020, he was invited by the Joan Ganz Cooney Center, the research and innovation lab of Sesame Workshop, to serve on a one-year research advisory board focused on how the public media could better connect with youth. Most recently, he was invited by the National Academies of Sciences, Engineering and Medicine to serve on a national committee to conduct a consensus study on K-12 STEM education and workforce development in rural areas. The committee is making recommendations on how to improve rural STEM education and workforce development across the United States. Means is also engaged in national service focused on rural education. He is currently on the executive committee for the National Rural Education Association, the leading rural education professional organization.

Select Accomplishments

- Awarded as an Emerging Scholar by Diverse: Issues in Higher Education.
- Selected as a National Academy of Education/Spencer Foundation Postdoctoral Fellow to engage in research on rural Black youth and postsecondary education access and opportunity.
- Elected as a Rockefeller Institute of Government's Richard P. Nathan Public Policy Fellow to engage in scholarship focused on state policy and rural student educational opportunity and access.
- Served as a keynote speaker or panelist for more than 25 colleges and universities, statewide and community organizations and state legislatures.
- Published 30 articles in top-ranked journals in the last 11 years.
- Former doctoral advisees have earned 10 dissertation of the year awards.



College of
**ENGINEERING, COMPUTING
AND APPLIED SCIENCES**

Jinhua “Joshua” Tong, Ph.D.

Professor

Materials Science and Engineering



Tong is a professor with the Department of Materials Science and Engineering at Clemson University. He joined Clemson in 2016 after serving in positions with the Research Institute of Innovative Technology for the Earth and the National Institute of Advanced Industrial Science and Technology (both in Japan), the University of Cincinnati, the California Institute of Technology and the Colorado School of Mines. Tong is an internationally recognized researcher in solid-state ionics for energy conversion and storage. He has established a vibrant and productive research group that is the largest in the department with more than 13 members currently, the Sustainable Clean Energy Laboratory (SCEL).

Tong has achieved significant progress in the development of novel energy materials and energy devices, including fuel-electrolysis cells, membrane reactors, solid-state batteries and thermochemical reactors. He has developed additive manufacturing, laser processing and reactive sintering for manufacturing energy devices. He has applied these materials and techniques toward hydrogen and power production, natural gas/biogas upgrading, solar fuel production, ammonia synthesis and carbon dioxide utilization.

Tong serves as the undergraduate student program director for materials science and engineering and played a key role in the most recent renewal of program accreditation by ABET, formerly known as the Accreditation Board for Engineering and Technology Inc. He serves in leadership roles within the High-Temperature Energy, Materials and Processes Division of the Electrochemical Society and the Energy Materials and Systems Division of the American Ceramic Society. He is the 2017 recipient of the Ross Coffin Purdy Award of the American Ceramic Society for the most valuable contributions to the ceramics research literature over the preceding two years.

Select Accomplishments

- Recipient of the 2024 McQueen Quattlebaum Faculty Achievement Award for outstanding accomplishments by a CECAS faculty member in the preceding year and distinctions and awards over the past three years.
- Author of 20 peer-reviewed journal papers over the past three years.
- Investigator on 25 research grants (including 15 as the principal investigator) for a total of \$28 million in funding.
- 2017 recipient of the Ross Coffin Purdy Award of the American Ceramic Society for the most valuable contributions to the ceramics research literature over the preceding two years.



Stephen R. Kaeppler, Ph.D.

Associate Professor

Physics and Astronomy



Kaeppler is a space plasma physicist whose research focuses on the plasma and neutrals in near-earth space environment (62 miles altitude) called the ionosphere (plasma)-thermosphere (neutrals). Kaeppler's laboratory focuses on understanding the electrodynamics of the high latitude ionosphere-thermosphere with a particular focus on the aurora, also called the northern lights. Beautiful displays of aurora were visible in South Carolina in May and October 2024. The second area of focus is understanding ionospheric impacts on high frequency (HF) radio wave propagation, which impacts critical surveillance systems used by the U.S. government, namely Over-the-Horizon (OTH) radars. Kaeppler's laboratory focuses primarily on experimental techniques, including sounding rocket measurements and measurements from various radar systems. Kaeppler has received funding from NASA, the Air Force Office of Scientific Research (AFOSR), the Office of Naval Research (ONR) and the National Science Foundation, including being the recipient of the prestigious NSF CAREER Award.

In 2022, Kaeppler was the principal investigator of the Ion-Neutral Coupling during the Active Aurora (INCAA) sounding rocket mission, which successfully launched from Poker Flat Research Range, Alaska, on April 7, 2022. This mission brought \$1.7 million through Clemson University. The mission was focused on understanding energy transfer processes in the aurora. While these processes occur near the geographic poles, impacts from the energy deposition can be detected at all latitudes all the way to the equator. Kaeppler's experience with sounding rockets has also developed into student undergraduate teams that participated in the NASA Rocksats-X program in 2023/2024. As part of that program, undergraduate students develop scientific instruments that are flown on a NASA sounding rocket. Kaeppler is currently leading an effort for the students to participate in the joint NASA/ESA GHOST rocket mission, another undergraduate student sounding rocket mission that will launch from Norway. These experiences have been partially supported by the Clemson University Creative Inquiry program.

Select Accomplishments

- Received the National Science Foundation CAREER award in 2023.
- Earned ONR award in 2023 to focus on understanding the bottomside ionosphere.
- Led the undergraduate student team that participated in the Rocksats-X program in 2024 and the current team of students who will participate in the NASA/ESA GHOST mission launch from Norway in 2025.
- Currently advising five graduate students with an expected Ph.D. student to finish in 2025. Currently advising multiple undergraduate students. Past undergraduates have gone onto top graduate schools at Stanford University and University of Colorado at Boulder.



Division of

RESEARCH

Quarterly Research Report

February 2025