UCF

Pursuit

University of Central Florida
College of Sciences
2020-2021

PURSUIT

2020-2021

PUBLICATION PRODUCTION

Judy Froehlich ’92 ’95MBA
Director, Marketing and Communications

Kyle Martin
Director, Content Development

Joshua Sweet ’16
Graphic Designer

Jonathan Hendricker ’06
Web Developer

Marygrace Slebodnik
Marketing & Communications Specialist

CONTRIBUTING WRITERS

Zenaida Gonzalez Kotala
Office of Research

Gene Kruckemyer ’73
UCF Marketing

Jordan McGrew ’21
College of Sciences

Simone Rousseau
Office of Research

Robert Wells, Ph.D.
Office of Research

Nicole Dudenhoefer ’17
UCF Marketing

PHOTOGRAPHY CONTRIBUTIONS

Nick Leyva ’15
UCF Marketing Photographer

2020 WAS A DIFFERENT YEAR
The pandemic reshaped our world and tested our resiliency. We proved in spite of the obstacles, though, Knights truly know how to charge on.

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A MESSAGE FROM THE INTERIM DEAN

The College of Sciences has grown tremendously since its humble origins, but one thing we've never lost is our can-do spirit. It's this moxie that's delivered us through a tough year, and what's going to carry us into a distinguished future. All the evidence you'll need is on these pages.

Over the past year:

- Justice for hit-and-runs and other vehicular crimes will be easier to come by thanks to the hard work of **Matthieu Baudelet** and his tire tread chemical analysis.
- The **RESTORES team** continues to expand and evolve their programs to benefit first responders and other frontline heroes searching for mental health support tailored to their unique needs.
- The stuff of science fiction inches closer to reality daily thanks to the curiosity and expertise of our planetary scientists. Check out **Theodora Karalidi's** work identifying planets capable of supporting human life.
- Social distancing was the norm this past year, but it didn't stop us from making new friends. Community partners like **Electronic Arts, Baker Landscaping and Orlando Utilities Commissio**n joined forces with the College of Sciences this past year to sponsor research and student success.
- Graduates of the **School of Politics, Security, and International Affairs** exit ready to make sense of a world continuously undergoing change. Over the past year, SPSIA alumni have gained a Pulitzer, counseled the Joint Chiefs of Staff and achieved elected office.
- Cancer diagnosis continues to grow more accurate and streamlined through skilled research underway in chemistry and physics. "Scanning your body for cancers will eventually be as easy as brushing your teeth," says **Richard Klemm.**

The pandemic continues to shift and morph, but it hasn't altered the ingenuity and commitment of the faculty, staff and students who represent this great college.

Charge on COS Knights!

Tosha Dupras, Ph.D.
Interim Dean, UCF College of Sciences

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GROWING FORWARD

PASSION PROJECT

Kelsie Johnson's thumb was decidedly not green growing up.

So it was all the more surprising to her grandparents when Johnson '16 announced she was pursuing horticulture and environmental conservation as a career.

"Kelsie has always been outgoing, but never did we picture her becoming involved in the Arboretum program or any of the outdoor type things," says Johnson's grandfather, Wayne Harris.

Expected or not, Harris and his wife, Sandra Harris, fully supported their oldest granddaughter's chosen path, and have watched with delight as Johnson rose from volunteer to the UCF Arboretum's program coordinator. Recently, their support took tangible form as a generous donation to the Arboretum's endowment fund, which supports ongoing programming and student development at UCF's beloved greenspace.

"The true motivation for the gift was seeing a young mind become so inspired and enjoy the program she's working in," Wayne Harris said. "Some jobs are just a paycheck, but you can see the passion she brings to her work."

FOR MORE INFO ABOUT THE UCF ARBORETUM VISIT:
arboretum.ucf.edu

SPONSORING SUCCESS

Experts in logistics, finance, small engine repair, soil chemistry and human resources are all in demand at **Baker Commercial Landscaping**, a 250-plus employee company that maintains the properties of homes and businesses across Tampa and Orlando, including UCF's main campus and Research Park.

CEO Ted Baker and his team envisions the talent to fill those roles coming from the Knights studying not too far from their office in east Orlando. That's why Baker Landscaping has invested in the UCF Arboretum, which is proving to be an invaluable training ground for students pursuing careers in horticulture and environmental sciences.

"We saw the professionalism and the potential at the Arboretum, so recruiting students and investing in their success was really a no-brainer," Baker said.

Baker Landscaping pledged five years of support for the Arboretum. Their commitment allows students to build expansions of the Arboretum, while simultaneously developing leadership and project management skills as they supervise fellow students.

"The potential is huge," says President Marc Blum '87, a graduate of UCF's College of Business Accounting program. "I would highly encourage other donors to join us in giving students the education and hands-on training they need to be successful."

Birds of a Feather

Chemistry Assistant Professor **Melanie Beazley, Ph.D.,** and her team have developed a groundbreaking biochemical analysis to identify excess contaminants and nutrients in Orlando's local lakes caused by native Florida birds.

The research, done in collaboration with Orange County and the City of Orlando, uses the DNA of contaminant-inducing agents against specific biomarkers to identify and confirm the source of contamination.

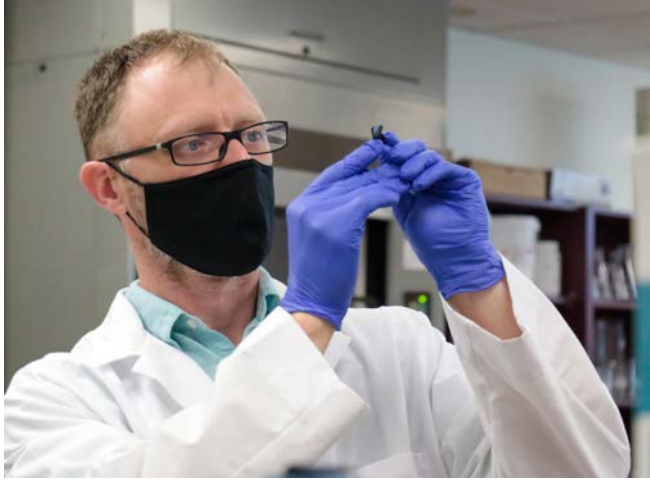
To collect data, Beazley and her team take water samples from local bodies of water, filter them and extract the DNA, and use quantitative PCR for analysis. This DNA is tested against specific biomarkers that identify the source of contamination.

The goal of the ongoing project is to help city and county officials and Florida stakeholders mitigate fecal contamination and improve water quality throughout Orlando.

"The fecal material produced by these birds that hang out near the lakes in Orlando have excess nutrients in them, especially nitrogen," says Beazley. "This can lead to harmful algal blooms and pathogen formation, which is what we are looking to diminish. Birds are a huge contaminant factor."

FOR MORE INFO ABOUT THE CHEMISTRY DEPARTMENT AT UCF VISIT:
sciences.ucf.edu/chemistry

BURNING RUBBER



A breakthrough chemical analysis using an often-overlooked piece of evidence holds big potential to change the way law enforcement investigates car wrecks.

Skid marks left by car tires are often analyzed for their impression patterns, but the widespread use of anti-locking braking systems makes this increasingly difficult for forensic experts. Associate Professor **Matthieu Baudelet, Ph.D.,** and his laboratory at the National Center for Forensic Science have unlocked new potential in what little evidence is recovered through the unique chemical signatures of the tires.

Their work focuses on classifying the chemical profile of tires to link vehicles back to potential crime sciences.

“Tire evidence is often overlooked in forensics,” says Baudelet. “In cases of hit and runs or accidents involving multiple cars the chemical signature of the tires have the potential to be integral information to the investigation.”

Using laser-induced breakdown spectroscopy and classification techniques, Baudelet and his team resolved the difficulties of tire classification. Laser-induced breakdown spectroscopy (LIBS) uses a laser to create a mini-spark on the sample to analyze. The spark emits light according to the chemical composition of the sample. This is one of the technologies used on the last two Mars rovers, Curiosity and Perseverance.

“The process is as complicated as it is fun,” says Baudelet. “The whole idea is that tires hold a lot of data. They have patterns, but the braking system gives these pattern impressions a lack of viability. It became a question of can we use their chemical composition to obtain information from the tires?’”

FOR MORE INFORMATION ABOUT NCFS VISIT:
ncfs.ucf.edu

ADDING + ÷ VALUE

A shift from rote memorization to active learning is producing measurable, positive results for students taking Calculus I.

The Fall 2019 drop/add rate fell from UCF's historical 54% to 18-22% across all calculus courses after Professor Eduardo Teixeira, Ph.D., deployed a technique called meaningful learning theory. The statistical majority grade also rose to an A.

Teixeira points to the course improvements as proof students are looking for more meaningful interactions with math courses.

"Math is not the art of computing things, but rather solving problems through logical reasoning," he says. "The debate is settled. Active learning strategies are much more effective than traditional learning."

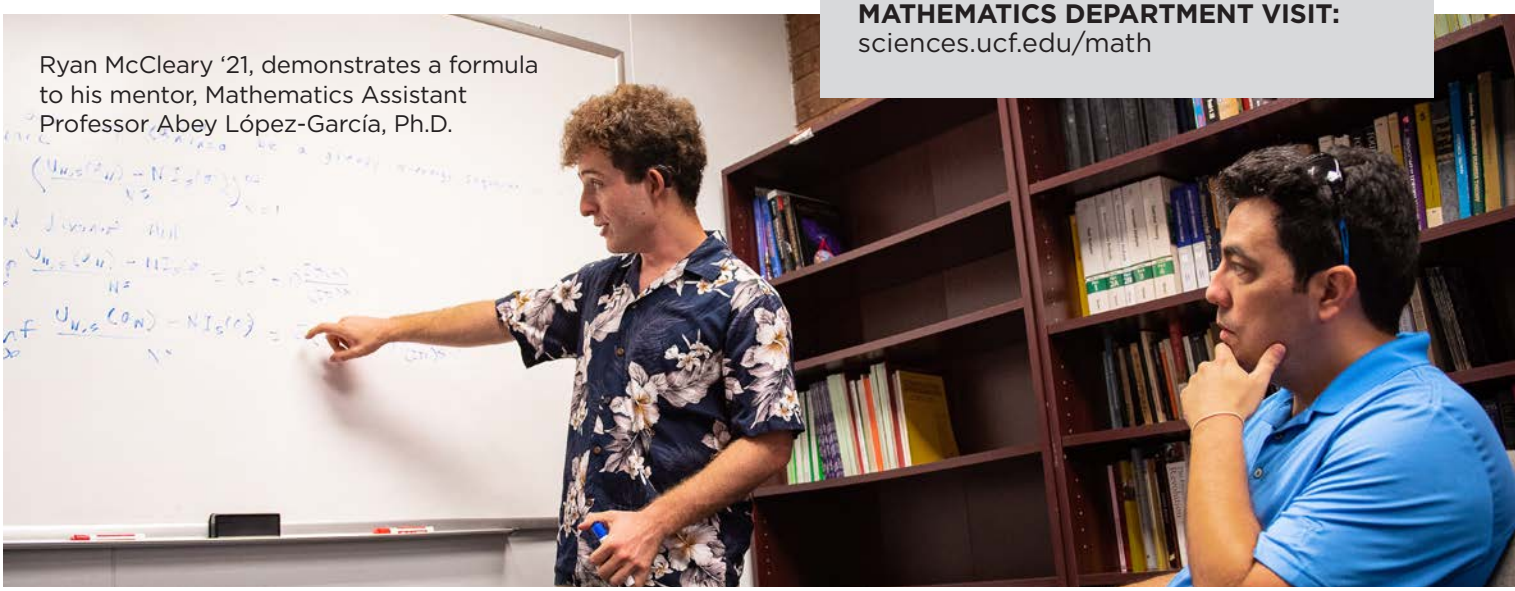
Traditional learning teaches through memorization; homework tests ability to recall, not application. This technique results in low knowledge retention and a prevailing attitude that the class is just a hurdle on the path toward a degree, according to Teixeira. He and others believe that such a cursory experience is why students underappreciate math.

To challenge this traditional method, Teixeira and colleagues drew from the respective concepts of educational psychologists David Ausubel's meaningful learning theory and Benjamin Bloom's taxonomy.

Meaningful learning theory emphasizes the combination of familiar information with new information. Teixeira applies this theory in his lectures by assigning adaptive homework assignments before the lecture to give students a sense of familiarity on a subject before going into depth, thereby using it as a part of the learning process. By encouraging students to think with higher-ordered thinking skills, knowledge becomes more meaningful and increases the retention of information. Students must make the effort to think before making computations, rather than attempt to perform such computations with little understanding of their real purpose.

"To be creative, think outside the box and work collaboratively to solve a complex problem — these are necessary skills for students entering the job market," Teixeira says. "And we have now designed calculus with that format."

FOR MORE INFO ABOUT THE MATHEMATICS DEPARTMENT VISIT:
sciences.ucf.edu/math



Ryan McCleary '21, demonstrates a formula to his mentor, Mathematics Assistant Professor Abey López-García, Ph.D.

A WILD INTERNSHIP

Senior **Savannah Compton** left her fall 2020 internship at ZooTampa with a newfound love for the study of animal behavior. Working in both the primate and commissary department of the zoo, Compton spent her time designing enrichment projects and learning about animal nutrition, stoking her passion for animal behavior and science.

Compton pursued her goal of becoming an archaeologist by studying anthropology with minors in biological anthropology and archeology. It wasn't until she took her primatology course she realized that studying archeology could also be combined with animal science.

"The course I took in primatology really helped prepare me for this internship," says Compton. "During my time at ZooTampa I worked with Colobus, Siamang and even Patas monkeys. The course familiarized me many of these different breeds."

One of Compton's assignments at ZooTampa was creating an enrichment project used to observe the primate in a fixed setting. Using a variety of tree and leaf clippings, Compton created a den for the mandrills to determine what types of foliage they prefer.

"We found through my project that the Mandrills at our zoo loved bamboo and willow. It was so exciting seeing them freak out over the den I built them out of that. All of the different readings and assignments that I've done in my anthropology classes helped inspire my enrichment project. I am very grateful for the professors at UCF," says Compton.

FOR MORE INFORMATION ABOUT THE DEPARTMENT OF ANTHROPOLOGY VISIT:
sciences.ucf.edu/anthropology

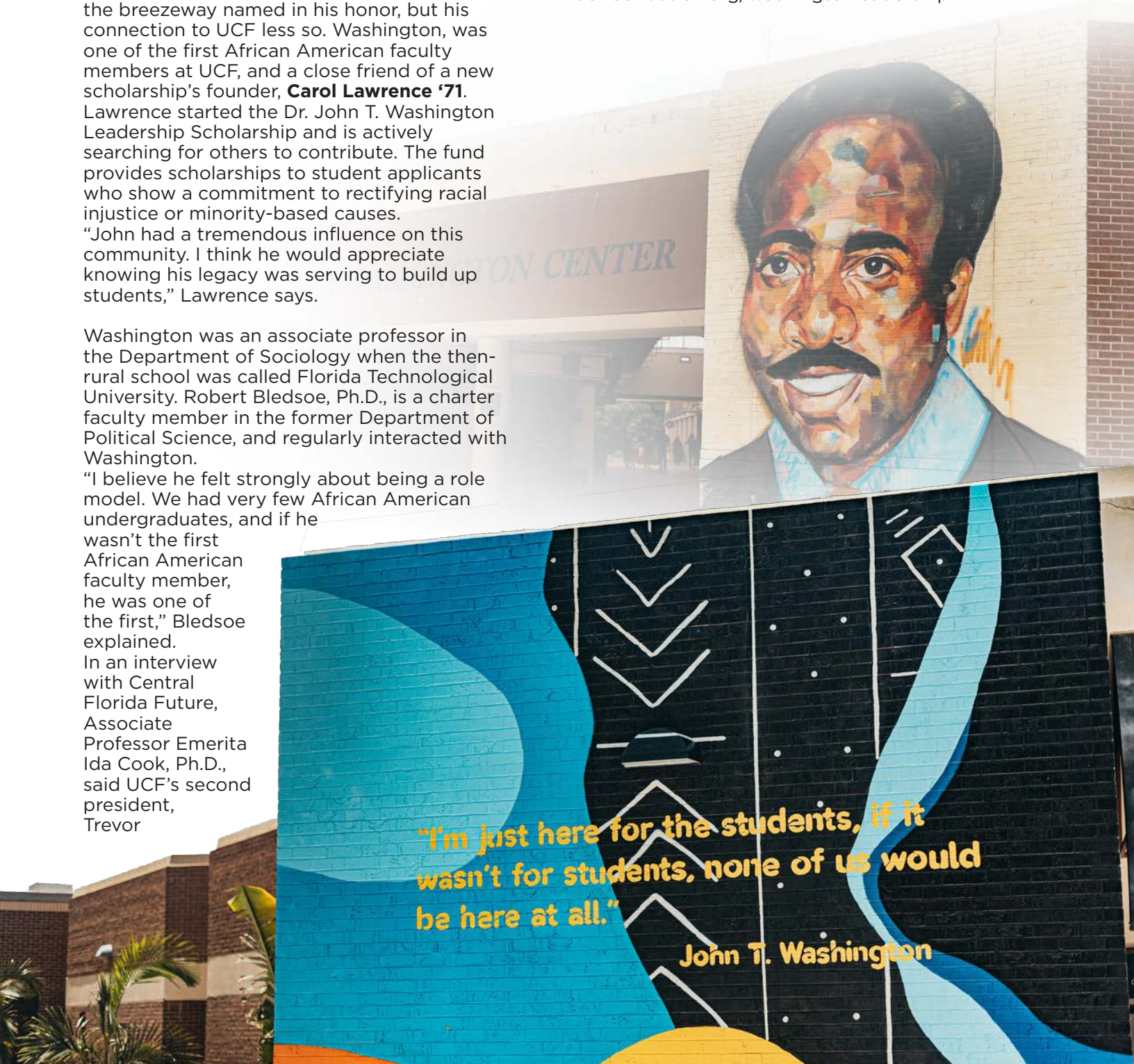
JOHN T. WASHINGTON

The name **John T. Washington** is probably familiar to campus visitors walking through the breezeway named in his honor, but his connection to UCF less so. Washington, was one of the first African American faculty members at UCF, and a close friend of a new scholarship's founder, **Carol Lawrence '71**. Lawrence started the Dr. John T. Washington Leadership Scholarship and is actively searching for others to contribute. The fund provides scholarships to student applicants who show a commitment to rectifying racial injustice or minority-based causes.
"John had a tremendous influence on this community. I think he would appreciate knowing his legacy was serving to build up students," Lawrence says.

Washington was an associate professor in the Department of Sociology when the then-rural school was called Florida Technological University. Robert Bledsoe, Ph.D., is a charter faculty member in the former Department of Political Science, and regularly interacted with Washington.
"I believe he felt strongly about being a role model. We had very few African American undergraduates, and if he wasn't the first African American faculty member, he was one of the first," Bledsoe explained.
In an interview with Central Florida Future, Associate Professor Emerita Ida Cook, Ph.D., said UCF's second president, Trevor Colbourn, "relied on Washington to tell him what could be done to assist minority faculty."

The outcome of Washington's advocacy includes UCF's Office of Equal Opportunity and Affirmative Action and the Office of Multicultural Academic and Support Services. In the city of Orlando, Washington served with several community organizations, including the Orlando Housing Community, the NAACP, the Orlando Metropolitan Urban League and the Mayor's Minority Business Task Force.

FOR MORE INFO ABOUT THE DR. JOHN T. WASHINGTON LEADERSHIP SCHOLARSHIP VISIT:
ucffoundation.org/washingtonleadership



UCF RESTORES

SAFETY FACTORS

Ongoing work to provide free, research-backed mental health assistance to the first responder community took another step forward this year with the relaunch of a website called RedlineRescue.org.

Redline Rescue was originally designed to establish a peer support network among firefighters searching for help with the anxiety and other distressing symptoms that often accompany exposure to traumatic events. The updated Redline Rescue builds on that mission with an automated web portal that gives visitors a personalized landing page with profiles and contact information for trained, currently available peer supporters in their immediate area, along with culturally competent, professional mental health care providers available for clinical support.

"For years, Redline Rescue has played a key role in the (Florida Firefighters Safety & Health Collaborative)'s ability to provide critical support to our brothers and sisters in their times of greatest need. The launch of RedlineRescue.org will completely redefine this ability, expanding the model's reach, accessibility and effectiveness," says Dustin Hawkins, director of the FFSHC and co-chair of its statewide mental wellness team.

The expanded version of the website was developed in tandem with multiple partners, including UCF RESTORES. The clinical research center and trauma treatment clinic based on UCF's main campus maintains an intensive outpatient program, incorporating elements like exposure therapy, group treatment and new, emerging technologies to reduce the distressing symptoms that often accompany a traumatic event.

For more information about the UCF RESTORES visit:
ucfrestores.com

DESIGNED FOR EXCELLENCE

A psychology professor's work at the intersection of people and machines recently earned him the U.S. Army's Civilian Service Achievement Medal.

Pegasus Professor and Provost Distinguished Research Professor Peter Hancock, Ph.D., specializes in human factors, a unique discipline that blends human behavior and engineering. It's behind the design of everything from medical equipment to smartphones or, in the military sector, cockpits and training exercises.

Hancock works closely with the U.S. military, including contributing to the Army Science Board for studies like the 2020 Advanced Army Modeling and Stimulation study. His work provides a comprehensive, science-based framework for leadership and technical decision making.

"It's rewarding to know my contributions will play a part in keeping troops safe," Hancock says.

Hancock joined the Army Science Board following the recommendation of UCF Assistant Vice President for Research and Innovation Michael Macedonia, Ph.D., also a member of the Army Science Board.

"Without Mike, I would not have been afforded this opportunity. It shows the power of UCF that we have such influential individuals on our campus," Hancock says.

Hancock's past committee appointments include the National Academy of Sciences (NAS) and National Research Council's Committee on Human Factors.

His previous awards include the Franklin V. Taylor Award of the American Psychological Association, the Jerome Hirsch Ely Award of the Human Factors and Ergonomics Society, as well as the Roger Green Medal of the Royal Aeronautical Society of Great Britain.

In addition to the Department of Psychology, Hancock has a joint appointment with the Institute for Simulation and Training as well as a courtesy appointment in the Department of Industrial and Systems Engineering in the College of Engineering.

For more information about the Department of Psychology visit:
sciences.ucf.edu/psychology

COLOR THEORY

A new chapter in the search for planets that can support human life draws on the same technique that makes effective sunglasses.

Only a handful of the roughly 4,000 identified planets outside our solar system can potentially support human life — what experts call "habitable exoplanets" — but astronomers are certain there are many more. The best candidates were found when they crossed in front of the star they orbit, but a silhouette is hard to analyze for life-sustaining conditions, particularly against the brilliant light of a star.

Enter a new $772,000 NASA project, which aims to narrow the search by developing a new way of seeing the colors a planet emits. The elements that make up breathable atmospheres and water sources emit specific wavelengths of light (color). Physics Assistant Professor **Theodora Karalidi, Ph.D.**, is working with a national team to build an inventory of those wavelengths. Then, astronomers can look for those signature colors when observing any exoplanet through telescopes. These color profiles will be created with technology similar to that used in the polarization of sunglasses, which breaks down the wavelengths of light.

For more information about Planetary Sciences at UCF visit:
planets.ucf.edu

PLANETARY SCIENCES
The Department of Physics annually advances our understanding of the cosmos with national and international partners.

UCF COASTAL

Climate change, sea level rise, invasive species, coastal development and emerging diseases all pose threats and cost taxpayers billions when disasters strike. UCF Coastal brings together economists, biologists, business leaders, planners and others to develop creative and sustainable solutions to coastal threats.

PARTNERSHIPS

UCF Coastal partners with government agencies, private companies and NGOs to resolve problems that transcend the capabilities of any single organization.

The Nature Conservancy

The objective of this partnership is to establish UCF Coastal as a Center for Conservation Initiatives partner institution and formalize a mutual collaboration. UCF Coastal deepens TNC's research and academic bench strength by lending world-recognized experts to their objectives. Meanwhile, UCF Coastal benefits from access to pristine, preserved lands maintained by TNC for research purposes. **www.nature.org**

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Fury Adventures Key West

UCF Coastal continues to develop a strong working partnership with Fury Water Adventures Key West to undertake several basic research and outreach projects. One project currently under development includes the application of environmental DNA (eDNA) to assess the structure of the system. Our goal is to better understand the species living in the area so we can predict responses to system disturbances. Having a broader understanding of the state of the ecosystem will provide managers insight on where to focus their management efforts. We also recognize the critical need for developing educational and outreach programs and materials that can be used by captains and other members of the Fury team to work with the general public. **www.furycat.com**

UCF COASTAL CORE FACULTY

Since 2018, UCF Coastal faculty have successfully received over $30 million in grant funding from an array of agencies because of UCF Coastal's unique approach and expertise.

For More Information on UCF Coastal Visit:
coastal.ucf.edu

Sergio Alvarez is studying the social and economic impacts of Florida's red tide events and harmful algal blooms that occurred during 2017-19.

Jacopo Baggio is leading the development of our proposed PhD in Integrated Coastal Systems, which addresses the need for well-trained professionals in this crucial field.

An interdisciplinary team led by **Chris Emrich** is developing web tools to educate homeowners and renters on reducing property risks from natural disasters and increasing resiliency in cost-effective ways.

Kristy Lewis is developing a "boots on the ground" approach to evaluating how severe wetland loss impacts the recreational fishing industry in Louisiana.

Thomas Wahl is researching coastal nuisance flooding. This minor flooding causes problems such as flooded roads and overloaded stormwater systems, which can be major inconveniences for people and provide habitats for bacteria and mosquitoes.

CUTTING DOWN SCREEN TIME

As cancer treatment advances, scientists are keeping pace with methods for catching cancer early. Here's how two College of Sciences researchers are contributing.

BIOCHEMICAL CANCER DETECTION TITLE

Early screening can mean the difference between life and death in a cancer and disease diagnosis. That's why Chemistry researchers are working to develop a new screening technique that's more than 300 times as effective at detecting a biomarker for diseases like cancer than current methods.

The technique, developed partially in the laboratory of Assistant Professor **Xiaohu Xia**, uses nanoparticles with nickel-rich cores and platinum-rich shells to increase the sensitivity of an enzyme-linked immunosorbent assay (ELISA).

ELISA is a test that measures samples for biochemicals, such as antibodies and proteins, which can indicate the presence of cancer, HIV, pregnancy and more. When a biochemical is detected, the test generates a color output that can be used to quantify its concentration. The stronger the color is, the stronger the concentration.

FOR MORE INFO ABOUT THE DEPARTMENT OF CHEMISTRY VISIT:
sciences.ucf.edu/chemistry

HANDHELD CANCER SCREENING

A handheld device that could allow individuals to screen themselves for cancer is one potential outcome of ongoing research into the power of terahertz lasers.

The work comes from the lab of **Richard Klemm, Ph.D.,** in collaboration with the Kadowaki-Kashiwagi-Tsujimoto and Minami groups at the University of Tsukuba in Japan. They recently published the results of their exploration of crystal-powered lasers in the Japanese Journal of Applied Physics.

Harnessing the power of a "supercurrent" generated by the Josephson effect, the team believes they can use a reflected wave to study tissue beneath the skin. Such a device remains years in the future, but the lab has proven the concept is viable through tests on a dried heart pea.

The 3D scan of the pea penetrated several millimeters deep to distinguish the three seeds at the bottom of the plant. That's enough to give Klemm optimism for what's to come.

"Scanning your body for cancers will eventually be as easy as brushing your teeth," he says.

Next steps include enhancing the power of the device, potentially with Queen's College in New York and Argonne National Laboratory. Production of a commercial product is easily a decade in the future, but Klemm pictures the cancer screener to something akin to a flashlight or laser pointer.

FOR MORE INFO ABOUT THE DEPARTMENT OF PHYSICS VISIT:
sciences.ucf.edu/physics

TAKING CARE OF OUR

SEA TURTLES

UCF has run a sea turtle monitoring and research program on the beaches of the Archie Carr National Wildlife Refuge (ACNWR) in southern Brevard County for more than 35 years. UCF findings about sea turtle abundance and behavior are among the reasons the refuge was created in 1991. The UCF Marine Turtle Research Group focuses on long-term nesting beach and coastal juvenile sea turtle research in Brevard and Indian River counties locally. The group also studies the oceanic "lost years" tracking turtles in the Gulf of Mexico, North and South Atlantic, and Indian Oceans.

University of Central Florida researchers are homing in on the cause of a major disease of sea turtles, with some of their latest findings implicating saltwater leeches as a possible factor.

The disease, known as fibropapillomatosis, or FP, causes sea turtles to develop tumors on their bodies, which can limit their mobility and also their health by interfering with their ability to catch and eat prey.

"Florida is one of the areas most heavily impacted by FP," says **Anna Savage, Ph.D.**, an associate professor in UCF's Department of Biology and study co-author. "Over the past three decades, approximately half of the green turtle juveniles encountered in the Indian River Lagoon have FP tumors, which is one of the highest rates documented."

The study's lead author and a recent undergraduate alumna of UCF's Biology Department, **Leah Rittenburg '20**, spearheaded the research and was responsible for the genetic analyses. To test a possible connection between leeches and FP, the researchers documented the presence of leeches on green and loggerhead turtles captured from the Indian River Lagoon and also used genetic analyses to determine if leeches collected from the turtles contained chelonid alphaherpesvirus 5, or ChHV5, the virus most likely responsible for disease development in an individual turtle.

"Our historical data, collected by the UCF Marine Turtle Research Group between 2006 and 2018, revealed that leech parasitism was significantly associated with FP in green turtles, but not in loggerhead turtles," Rittenburg says.

"For the genetic analysis, about one-fifth of the leeches we collected were positive for ChHV5, and one leech species trended towards coming from FP-positive turtles, further supporting the hypothesis that leeches may act as ChHV5 transmitters," she says.

Now that the researchers have demonstrated a relationship between FP and leeches, they want to evaluate more specifically if leeches transmit the turtle herpesvirus, which would provide stronger evidence that the virus is an underlying cause of FP.

Study co-authors were Jake R. Kelley, a master's student in UCF's Department of Biology, and Kate L. Mansfield, an associate professor in UCF's Department of Biology and director of the UCF Marine Turtle Research Group.

The research was funded by grants from UCF's Office of Undergraduate Research and by a Florida Sea Turtle License Plate grant.

Green turtle nest counts are the fifth highest recorded since 1982, in a year when their numbers were supposed to be down. Florida's sea turtle nesting surveying came to a close on Halloween and like everything else in 2020, the season was a bit weird.

GREEN TURTLE NESTS:
2020: 8,110 *(unexpectedly high for a "low year")*
2019: 15,784 *(record, "high year")*
2018: 1,230 *(typical "low year")*

LOGGERHEAD NESTS:
2020: 12,968
2019: 10,813
2018: 11,901

LEATHERBACK NESTS:
2020: 40
2019: 36
2018: 17

Note: there are no clear trends in local leatherback counts; the highest recorded total nests were 55 in 2016.

FOR MORE INFO ABOUT THE UCF MARINE TURTLE RESEARCH GROUP VISIT:
sciences.ucf.edu/turtles

CHARGING ON WITH BIG DATA

Data Science Provides Early Warning of Utility Fraud

UCF students recently converted a drawback to an advantage when they tackled an overabundance of data generated by "smart" meters used by Orlando Utilities Commission (OUC).

The smart meters offer multiple benefits to the business and its customers, from improved accuracy and streamlined meter reading to mapping strategies for long-time goals. But with over 400,000 meters reporting data back daily, the data team was struggling to keep up with a near-constant flow of feedback.

"We embarked on this data journey, but we had no place to put the data," explains Dawn Frye, manager of smart grid and meter data management. "We wanted to stop throwing it away."

OUC reached out to the Department of Statistics and Data Science for assistance. Together they narrowed the scope of their data mission to two objectives: identifying theft through meter tampering and forecasting the prevalence of electric car charging. For added incentive, they packaged their assignments to students as a competition with cash prizes and bragging rights.

"This gave students opportunity to use what they learn and take their learning from theoretical and abstract to concrete," says Assistant Professor Rui Xie, Ph.D. Months of parsing raw data by 15 teams revealed irregularities that signal potential theft and established the groundwork for future forecasting of electric vehicles. The student winners were: Phuong Pho, Yuan Du and Jianbin Zhu for the Utility Theft case and Daniel Mariano, Ryan Jones, Anna Perdue and Dharitrikumari Rathod for the EV Detection case.

The work wasn't without its challenges. Students typically learn the fundamentals of data analysis using rudimentary data sets. In contrast, the OUC data was raw and unfiltered information that needed context and sorting before it would yield anything useful. Establishing protocols and inquiries just to start using the data took a solid two to three months of creative problem solving by students, Xie says.

"There was a lot of frustration initially. But we built on our class work and slowly began to set more accurate goals," Xie says.

Both objectives built on the strengths of the smart meter investment made by OUC. Detecting theft previously required a physical inspection and many false positives; data can reveal unusual activity remotely and efficiently.

The second task builds on the long-term goals of OUC to remove as much greenhouse gas from the atmosphere as it produces — a benchmark called "net zero" — by 2050. Meeting that long-term goal requires the company to understand how demand will impact its output for tasks like charging electric vehicles and the output it will need as it converts its plants to natural gas.

"We're continuing to uncover more and more ways to use the data," says Eddie Fee, director of meter services at OUC. "It enhances and enables programs for operations, customer service, energy time-of-use and water conservation initiatives."

Fee adds that students are also reaping the benefits when they enter the job market and can point to work on real-world projects like OUC's data.

"It really pays dividends. They're not just sitting in class doing theoretical problems," Fee says.

FOR MORE INFO ABOUT THE DEPARTMENT OF STATISTICS & DATA SCIENCE VISIT:
sciences.ucf.edu/statistics

Covid 19 comunication

The past year has been one giant global experiment. Researchers from the UCF Nicholson School of Communication and Media and the UCF Department of Statistics and Data Science are working with public agencies to help predict infection rates and to help manage COVID communication.

EXAMINING CRUCIAL COVID COMMUNICATION

While the pandemic has provided many lessons in nearly all aspects of life, communication is one of the most crucial areas. Helping to guide how public agencies communicate about crises is Deanna and Timothy Sellnow, Ph.D., two professors from the Nicholson School of Communication and Media who have served as consultants for the Center for Disease Control since the early 2000s.

"The philosophy we work under is the right words at the right time can save lives," Timothy Sellnow says. "We've been able to see firsthand how organizations and industries are taking this pandemic more seriously and are making substantial changes that we wouldn't have the motivation to undertake if it weren't for something like this. But bear in mind, one life lost is too many."

Through the years, the two have helped the CDC build its pandemic plan, conducted pandemic/influenza training throughout the country on its behalf, and recently created a specific communication model to help with these events.

Through the IDEA model and other work, the Sellnows emphasize the importance of not only sharing what is known but what isn't and what is being done to obtain that information. They also stress that it's crucial for public agencies to collaborate and make an effort not to put out contradictory messages, as well as prioritize the need for action.

"Rebuilding credibility and trust [during or after a crisis] is a much harder challenge than establishing credibility and trustworthiness in the quiet times prior to crisis," Deanna Sellnow says. "Some of the credibility lost early in the pandemic because of disinformation is still not recovered."

FOR MORE INFO ABOUT THE NICHOLSON SCHOOL OF COMMUNICATIONS AND MEDIA VISIT:
communication.ucf.edu

Advising America

The School of Politics, Security, and International Affairs carries a reputation for equipping graduates for success no matter where a career takes them — including the Pentagon.

TOP RANKED ADVICE

U.S. Army Colonel Joseph Funderburke, Ph.D. '19, has stepped into a new advisory role as Special Assistant to the Chairman of Joint Chiefs of Staff, General Mark A. Milley — the highest-ranking military officer in the Department of Defense and principal military advisor to the President of the United States and the Secretary of Defense.

"You'd never guess it, but the chairman is very human behind closed doors," says Funderburke. "We're all very human. We laugh, we speak frankly and we make decisions based on the national security of the United States."

The Joint Chiefs of Staff sit within the Department of Defense and function as a conduit of information and assistance to civilian authorities in the United States. Funderburke serves as part of this advisory council to Milley, and provides input on military conflict and strategy. From speech writing to informing major military decisions, Funderburke's day-to-day tasks always vary.

"It's a humbling experience to serve on the Joint Staff as a special assistant to the Chairman," says Funderburke. "I have the responsibility of making sure he's informed in his decisions. His success is my success is the American people's success. Ensuring that he makes the right choices strengthens the fibers of our national security system."

In 2013, Funderburke began pursuing his degree in Security Studies after a program supporting the education of military officers was created by the Army's Chief of Staff. Funderburke, already having served over 20 years in the military, felt drawn towards the opportunity.

"Pursuing my degree at the University of Central Florida ended up being the best decision," says Funderburke. "The education at this institution provided me with the intellectual and critical thinking skills needed to successfully do my job today."

Funderburke's military experience, in combination with his education, has given him the necessary knowledge to advise some of the world's most powerful officials.

"I'm in weekly meetings with people like the Secretary of Defense and the Chairman himself," says Funderburke. "I am very honored to be in this role where I'm trusted to represent and inform our country's leaders."

SPSIA YEAR IN REVIEW | 2020-2021

SPSIA faculty, students and alumni persevered in a challenging year, positively representing the school well beyond campus.

ALUMNI

Michael Schwirtz '03 was selected as a 2020 Pulitzer Prize winner for international reporting, one of the honor's 15 journalism categories.

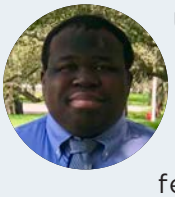
FACULTY

Aubrey Jewett received the Manning Dauer Award from the Florida Political Science Association.

Jonathan Knuckey. Southwest Political Science Association's Pi Sigma Alpha Award best conference paper award; co-authored with undergraduate student Komysha Hassan.

Mark Schafer received the 2021 Distinguished Scholar of the Year recipient (lifetime achievement award), Foreign Policy Analysis section of the International Studies Association.

Assistant Professor **Kenicia Wright, Ph.D.,** is challenging perspectives through her research focusing on the interplay of race and gender. Wright earned the Best Paper on Race and Intersectionality Award, from the American Political Science Association, Women, Gender and Politics section. The paper examines the positive outcomes that result when non-Hispanic white women, non-Hispanic black women and Latinas are treated by women physicians.



UNDERGRADUATE STUDENTS

Olatayo Bakare: one of eight undergraduates selected nationally as a fellow for the 2021 Society for Political Methodology Expansions Initiative.

Raquel Lozano began her role on the Orange County Soil and Water Conservation District as she works toward her degrees in political science and public administration. In this position, Lozano hopes to connect with people through community engagement, promote democracy through education, and unite local resources for collaborative projects.

Nina Neto: Fulbright Scholarship, Brazil

Abigail Reynolds: Boren Scholarship to study Swahili; State Department internship in Nairobi, Kenya

GRADUATE STUDENTS

Devyn Escalanti: American Political Science Association Diversity Fellow

Doreen Horschig: accepted the MIT Nuclear Stanton Fellowship; also selected as the Roger L. Hale Fellow at the Ploughshares Fund

Jennifer Hudson: selected for Columbia University's Summer Workshop on the Analysis of Military Operations and Strategy (SWAMOS)

FOR MORE INFO ABOUT THE SCHOOL OF POLITICS, SECURITY, AND INTERNATIONAL AFFAIRS VISIT:
sciences.ucf.edu/politics

Beginning in Fall 2022, thanks to a $100,000 gift from Electronic Arts (EA), the annual EA Inclusion in Gaming Endowed Scholarship will encourage the pursuit of video game industry careers for students in interactive entertainment and gaming programs at UCF.

Available starting Fall 2022, two Inclusion in Gaming awards will be distributed annually to students in the Nicholson School of Communication and Media who demonstrate how they have overcome adversity or are striving for the inclusion of others.

"Close industry partnerships like the one we have had with EA for many years are critical to our students' success," says **Ben Noel**, executive director at the Florida Interactive Entertainment Academy (FIEA) and director of innovation and partnership at the UCF Nicholson School of Communication and Media. "We share EA's commitment to developing diverse and inclusive game makers, and this generous gift will allow us to support underrepresented students in perpetuity."

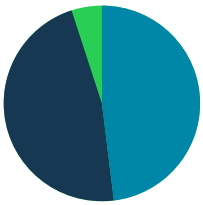
The interactive entertainment graduate program at FIEA and the digital media undergraduate program are offered at the UCF Downtown campus in Orlando's Creative Village district, which will be home of the new Electronic Arts Tiburon studio later this year.

"The 'Inclusion in Gaming' scholarship builds upon the great relationship we have with UCF and increases access to opportunities for electronic artists of the future from diverse backgrounds," says Daryl Holt, vice president and general manager, EA Tiburon (Orlando), EA SPORTS Austin and EA SPORTS Madrid. "As we move into the Creative Village and our partnerships evolve, we're hopeful to spark a collective effort by the Orlando community to educate and prepare underrepresented youth for success in STEAM fields."

TO MAKE A GIFT TO THE FLORIDA INTERACTIVE ENTERTAINMENT ACADEMY VISIT:
foundation.ucf.edu/givetocos

ADVANCEMENT FAST FACTS

Total Gifts & Commitments	$1,507,010
Number of Gifts	1,059
Number of Donors	474



Cash	$727,163
Pledges	$708,548
Gift-in-kind	$71,299

Donor Classification	
Alumni	263
Friends	151
Corporations	29
Foundations	13
Organizations	18

FINDING *the Right Fit*

The freedom to explore different career paths in college can be a burden as much as a gift for students, including **Abbigale Martin '21**.

Martin first chose English as her major based on a love of writing, then pursued Human Communication with a Business and Professionalism Track after transferring to UCF from Florida Gulf Coast University (FGCU) in 2019. But even that field offered multiple options, and she felt the pressure to pick the right one. That's where the Nicholson School of Communication and Media Mentorship Program proved its worth.

Martin was paired with **Gwen Griffin '85**, founder and chief executive officer of Griffin Communications Group, during the fall of 2020. Martin's mentor has a resume that spans 35 years and just about every aspect of communications Martin might consider for a job, including director of marketing for NASA-Kennedy Space Center Visitor Complex and area marketing manager for Southwest Airlines.

Together they talked over Martin's past internships, passions and the kind of workplace her personality would find a home. Griffin's expert insight suggested Martin would fit well in an agency environment just like the one she operated. That led to an internship with Griffin Communications Group, and following graduation this May, a permanent position as an assistant account executive for Martin.

"I've hired a lot of people over the past 25 years. I've found that you and the agency itself are always happier when the work fits your personality," says Griffin, who also chairs the College of Sciences Dean's Advisory Board.

Martin benefited from Griffin's input and encouragement as she wrapped up her college education. Perhaps more importantly, talking with Griffin and other mentors within the program erased some of the guesswork on where to pursue a career.

"I've discovered I really enjoy working somewhere that brings something new every day," Martin says. "You have to wear a lot of hats to work in an agency. I love that."

ALUMNI FAST FACTS

Total COS Alumni

70,153

Staying connected to the university is key to the advancement of our students and programs. Our alumni can stay connected through mentoring programs, guest speaking opportunities, volunteering through our College of Sciences or Nicholson Alumni Chapters, or contributing to one of our many programs or scholarships.

NSCM Alumni Mentorship Program

- **Over 240 participants** (student and alumni participants), over 150 alumni participants
- **2 Chapter hosted events:** One in Fall 2020, one in Spring 2021. Alumni mentors shared their best advice for seeking out an internship and a job after graduation.

COS Alumni Chapter

The COS Alumni Chapter hosted a four episode virtual series titled, Life After Graduation. Over a dozen alumni from a variety COS programs participated as panelists in these events.

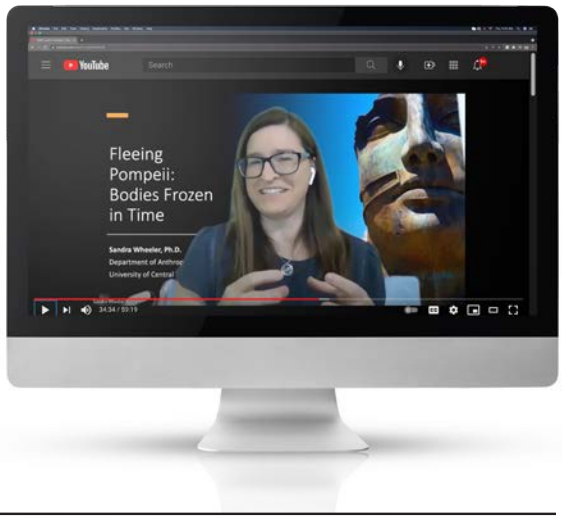
TO GET INVOLVED VISIT:
ucfalumni.com/sciences

VIRTUAL SPEAKER SERIES

Isolation and distancing was the name of the game for most of 2020. Thankfully, technology kept us connected and learning.

Our virtual speaker series showcased the expertise of UCF faculty across multiple disciplines. A natural partnership with the Orlando Science Center widened our community impact.

FOR MORE COLLEGE OF SCIENCES EVENTS VISIT:
sciences.ucf.edu/events



LAUNCH BREAK SPEAKER SERIES

Faculty from the UCF Department of Physics and the UCF Planetary Sciences Group, and educators from Orlando Science Center, helped us blast off into space and explore our universe. These talks were collaborative efforts with the Orlando Science Center's Planet Pioneers traveling exhibit, which explained what was necessary to survive and thrive on another planet.

LUNCH IN POMPEII SPEAKER SERIES

Faculty from the UCF Anthropology and Chemistry Departments, and educators from Orlando Science Center, helped us walk back in time and explore artifacts from Pompeii: The Immortal City and how they relate to the modern world. The artifacts discussed in these talks were on display in ***Pompeii: The Immortal City*** traveling exhibit at Orlando Science Center, October 26 – January 24.

COSTALKS SPEAKER SERIES

COSTalks celebrated the diversity of contributors to outstanding scholarship in the natural and social sciences. Highly successful scholars from historically underrepresented backgrounds provided a chance to promote diversity and inclusion among our faculty and students.

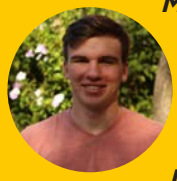
Goldwater Winners

Three UCF College of Sciences students were selected from a pool of 1,256 nominees across the nation and received 2020-21 Goldwater Scholarship Awards.

Only 410 college students were selected after a rigorous screening process. The Goldwater Scholarship program "is among the oldest and most prestigious national scholarships in the natural sciences, engineering and mathematics and seeks to identify and support sophomores and juniors who demonstrate exceptional promise in becoming the next research leaders in these fields."

The awards are not only coveted because of the money, but also because recipients are thought to have great promise. Many have gone onto receive additional prestigious awards such as Rhodes, Marshall, Churchill and Hertz scholarships as well as National Science Foundation Graduate Research Fellowships to help them pay for graduate school.
Awardees receive a scholarship to cover tuition, fees, books and room and board costs for a maximum of two years at their home institution.

SPENCER TAMAGNI
Major: Mathematics



Career Aspiration: Teaching and applying complex math problems to physics at a university.

Mentor: Associate Professor of Physics Costas Efthimiou, Ph.D.

Research: Solving problems at the boundary of mathematics and physics.

Advice to Fellow Students: "Go as deep as possible with subjects that interest you. Do not hesitate to discard things that bore you." In other words consume as much content in the field as humanly possible...

OLUWAGBOTEMI AKINSOJI
Major: Chemistry

Career Aspiration: To own a company.

Mentors: Associate Professor of Chemistry Fernando Uribe-Romo, Ph.D., Georgia Southern Professor of Organic Chemistry Karelle Aiken, Ph.D., UF Assistant Professor of Microbiology Willm Martens-Habbena, Ph.D.

Research: Developing rechargeable batteries through metal organic frameworks. The batteries will be a source of reliable electrochemical energy storage with fewer toxins in the environment.

Advice to Fellow Students: "Don't be afraid to apply to these types of scholarships and opportunities. Even if you do not get it at the first, do not lose motivation. Participate and engage in multiple opportunities available on campus. Find things that interest you and make you happy."

RILEY HAVEL
Major: Physics

Career Aspiration: Planetary Scientist, which could lead to becoming an astronaut, research scientist, a (NASA) mission leader or a professor.

Mentors: Assistant Professors of Physics Christopher Bennett, Ph.D., and Adrienne Dove, Ph.D., and Research Associate Jose Aponte at NASA Goddard Space Flight Center

Research: Using simulation of the space environment to study organic material produced and preserved in different areas of space and how they contribute to the origin of life.

Advice to Fellow Students: "Find a friend. My best friend Abigail Reynolds and I have always worked on applications together, discussed our aspirations in-depth, and challenged one another to be more intentional with our time as undergrads. I would recommend that everyone find a friend who has similar goals, but not necessarily similar interests and recognize the value that friendship can add in any endeavor."

Students interested in applying for an NSF Graduate Research Fellowship or other major national awards should contact Morgan Bauer in the Office of Prestigious Awards at opa@ucf.edu.

COLLEGE OF SCIENCES

The quality of our faculty and staff is the foundation of our academic mission. Each one of these individuals adds expertise that enhances the college's strengths in our disciplines across the physical, natural and social sciences.

2020-2021 FACULTY & STAFF

97
Professors

96
Associate Professors

73
Assistant Professors

124
Instructors & Lecturers

699
Staff

2020-2021 NEW FACULTY

A warm welcome to the new faculty training the next generation of scholars, researchers and community leaders.

ANTHROPOLOGY

Donovan Adams, Ph.D.
Assistant Professor
Bioarchaeology of the Eastern Mediterranean, Forensic anthropology, Ethical practice.

Who was your favorite teacher growing up?
My favorite teacher growing up was my high school physics teacher, Mr. Davison. He helped to foster my love of learning and engagement in science, willing to be the supervisor whenever I wanted to participate in a science competition or start up my school's environmental club. He pushed me to continue my passion for science and anthropology as I entered my undergraduate program.

Sarah Freidline, Ph.D.
Assistant Professor
Biological Anthropology, specializing in Paleoanthropology, human craniofacial morphology.

What is your favorite part about being an anthropologist?
"My favorite part about being an anthropologist is the traveling. There is something magical about handling fossils of ancient humans hundreds of thousands of years old in the places they impacted history."

CHEMISTRY

Julie Donnelly, Ph.D.
Lecturer
STEM education, specifically faculty instructional practices.

Who is a big influence in your life?
My mom. She is superwoman and I want to be just like her when I grow up!

What makes you laugh?
My kids. They are so silly and can find a way to have fun doing anything.

Bahvini Goswami
Assistant in Instrumentation
Gas Chromatography, Liquid Chromatography, Mass Spectrometry.

Who is a big influence in your life?
My parents have always been my biggest influencers in life. They came to the US in their twenties, worked very hard and put three daughters through college. They rooted in their daughters to be independent, hardworking and good at heart. And now I am passing on the same to my little boys.

Nicole Lapeyrouse, Ph.D.
Lecturer
Chemistry education research and Diversity and Inclusivity in STEM.

Who inspires you?
The women in my family inspire me every day. They have instilled in me the importance of working hard, always pursing my dreams, and never settling for less.

What is your hidden talent?
I have found out I have a talent for editing and creating fun educational videos for my chemistry and geology courses.

PHYSICS

Richard Jerousek, Ph.D.
Lecturer
Planetary Rings, Astrophysical Disks, Origins of Planetary Systems.

What song always makes me sing along?
The Bird is the Word - The Trashmen

What makes me laugh?
I think I have a pretty good sense of humor so I laugh a lot. I am a big fan of comedy but in some ways my sense of humor has not progressed much since middle school. I still find bodily functions hilarious. Sometimes I just have to laugh at the state of the world, otherwise I'd cry.

PSYCHOLOGY

Lidia Meshesha, Ph.D.
Assistant Professor
Novel treatment development, Substance use disorders, Technology based intervention, Mechanisms of addiction behavior change.

Favorite teacher growing up:
Although I had many great teachers, my geometry and algebra high school teacher, Mrs. Mili, stands out in my memory. She was incredibly enthusiastic, passionate, and cared deeply about her students' learning. When in her presence, it was almost impossible not to be infected by excitement for math and life in general!

Nelson Roque, Ph.D.
Assistant Professor
Leveraging active and passive assessments, to understand the influence of context and environment on cognition across the lifespan.

What makes you laugh?
Michael Scott – I can always count on 'The Office' for a good laugh after a long day!

What is your hidden talent?
Computer + app programming. Although my formal training is in Psychology, throughout the years, I've become proficient in computer programming, learning over 8 different languages.

Kelsey Larsen, Ph.D.
Assistant Professor
Political Psychology, U.S. Military, National Security.

What makes you laugh?
When I need a laugh in the middle of my research… I google videos of baby goats wearing pajamas. But I wear glasses while doing it, so it still counts as professorial.

Who was your favorite teacher growing up?
My favorite teacher has always been my mom; she's an elementary art teacher, and she just has one of those brains that sees the world in a cool, unconventional, kaleidoscopic way. She embodies the quote attributed to Georgia O'Keeffe-- "I found I could say things with color and shapes that I couldn't say any other way." Even as a political scientist, I try to mimic her same sense of creativity and inspiration!

STATISTICS & DATA SCIENCE

Jongik Chung, Ph.D.
Assistant Professor
Brain network analysis, FMRI data analysis, Graphical models, Statistical computing, Statistical Learning, Regularization.

Who is a big influence in your life?
My wife, Wooree, is the biggest influence in my life. We go through every single detail together as a team. She came to U.S. only for me, even though there is no family here. She inspires me and I can relieve my stress just by being with her. We like to find some new and beautiful places, so we love traveling.

Who was your favorite teacher growing up?
My favorite teacher is my academic advisor in my graduate years in UGA, Dr. Cheolwoo Park. Originally I studied Business in my undergraduate, but after taking his class, I changed the path to Statistics. The course that he taught and his research were so interesting to me.

Mitchell Hill, Ph.D.
Assistant Professor
Statistical Modeling of Natural Images, Markov chain Monte Carlo, Deep Learning.

What is your hidden talent?
I like to play classical guitar in my free time. It helps me relax and practice a different kind of thought process than my statistical work. My favorite guitar composer is Mauro Giuliani, although his work is definitely a tough challenge for me!

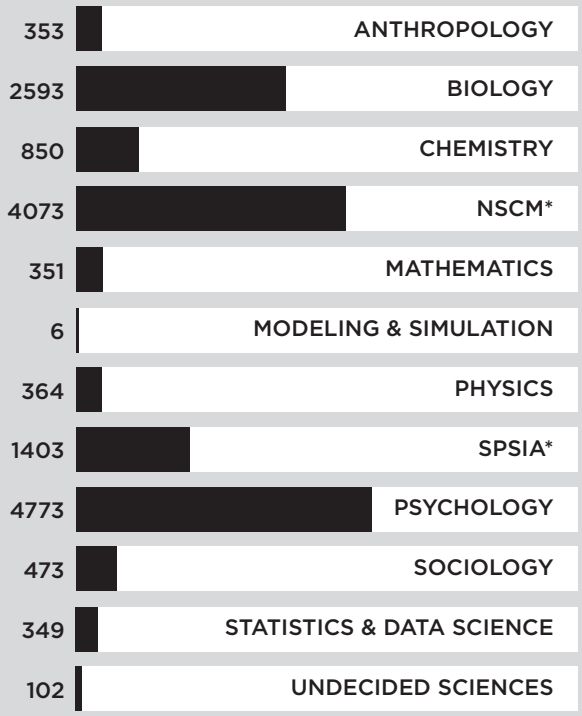
What song makes me sing along?
One of my favorite sing-alongs is Sir Duke by Stevie Wonder. I learned this song with my guitar teacher in middle school and it has really stuck with me as an amazing tune and a beautiful message about the universal joy of music.

UCF COLLEGE OF SCIENCES FAST FACTS 2020-2021

Fall 2020 Highlights

- Graduate program in video game design ranked **No. 1 in The Princeton Review**; undergraduate program ranked No. 14.
- Three of UCF's four 20-21 **Goldwater Scholars** study in the College of Sciences.
- Peter Delfyett earned membership in the **National Academy of Engineering** and won the 2021 Arthur L. Schawlow Prize in Laser Sciences.
- James Hickman was inducted into the **National Academy of Inventors**.
- A new scholarship started by the **National Save the Sea Turtle Foundation** will award junior and senior students with support for their tuition, books and academic fees.
- COS alumni played a part in summer 2020 when Americans were **launched into space** from U.S. soil for the first time in over a decade.
- Drs. Xiaohu Xia and Richard Klemm are working on **early cancer screening methods**. One is a new test method for biochemicals that indicate the presence of cancer. The other is a handheld device that could allow people to screen themselves for cancer using a reflective wave to study tissue beneath the skin.
- Recently, **UCF RESTORES** began offering treatment services for healthcare workers and first responders experiencing traumatic stress as essential workers during the COVID-19 worldwide pandemic.

Fall 2020 Declared Majors



*Nicholson School of Communication and Media
*School of Politics, Security, and International Affairs

22%
UCF Undergrads
Pursue COS Degrees

UCF Total
71,928

COS Total
15,690

2020-2021 Degree Programs

23 Bachelor's

16 Master's

10 Doctoral

2020 UCF Top Majors

#1 **Psychology**
4,773 Students

#6 **Biology**
2,593 Students

#12 **Digital Media**
2,113 Students

2020-2021 Degree Programs

Anthropology
- Anthropology B.A.
- Anthropology M.A.
- Integrative Anthropological Sciences Ph.D.

Biology
- Biology B.S.
- Biology M.S.
- Integrative & Conservation Biology Ph.D.

Chemistry
- Chemistry B.S.
- Forensic Science B.S.
- Chemistry M.S.
- Forensic Science M.S.
- Chemistry Ph.D.

Nicholson School of Communication and Media
- Advertising/ Public Relations B.A.
- Communication and Conflict B.A.
- Digital Media B.A.
- Film B.A.
- Film B.F.A.
- Human Communications B.A.
- Journalism B.A.
- Media Production and Management B.A.
- Communication M.A.
- Digital Media M.A.
- Emerging Media M.F.A.
- Feature Film Production M.F.A.
- Interactive Entertainment M.S.
- Strategic Communication Ph.D.

Mathematics
- Mathematics B.S.
- Mathematical Sciences M.S.
- Mathematics Ph.D.

Physics
- Physics B.A.
- Physics B.S.
- Physics M.S.
- Physics Ph.D.

School of Politics, Security, and International Affairs
- Int'l and Global Studies B.A.
- Political Science B.A.
- Political Science M.A.
- Security Studies Ph.D.

Psychology
- Psychology B.S.
- Clinical Psychology M.A.
- Industrial/Organizational Psy M.S.
- Psychology Ph.D.

Sociology
- Social Sciences B.S.
- Sociology B.A.
- Sociology B.S.
- Applied Sociology M.A.
- Sociology Ph.D.

Statistics and Data Science
- Actuarial Sciences B.S.
- Data Science B.S.
- Statistics B.S.
- Statistics and Data Science M.S.
- Big Data Analytics Ph.D.

2020 Centers, Institutes and Initiatives

- UCF Arboretum
- Center for Global Economic and Environmental Opportunity
- Geographic Information Systems
- The India Center
- Intelligence Community Center for Academic Excellence
- iSTEM
- Kurdish Political Studies Program
- Lou Frey Institute
- UCF Marine Turtle Research Group
- Robinson Observatory
- National Center for Forensic Science
- UCF RESTORES

2020-2021 Scholarship Funding

127k In Scholarships Awarded to Students

2020-2021 National Rankings

U.S. News and World Report
Best Graduate Programs:

Atomic/Molecular/Optical Physics	#12
	#61

The Princeton Review

Graduate Video Game Design	#1
Undergraduate Video Game Design	#14

2020-2021 Research

$120 MILLION IN PROPOSALS
in College of Sciences research funding

314 PROPOSALS SUBMITTED
with COS Faculty as the lead Principal Investigator

140 PROPOSAL COLLABORATIONS
with COS Faculty as Co-PIs

$25 MILLION AWARDED
in COS Research Funding

#2 COLLEGE FOR RESEARCH PROPOSAL SUBMITTED
in COS Research Funding

#4 COLLEGE FOR RESEARCH PROPOSALS AWARDED
in Dollar Value & Funding

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