CSMConnect is the College of Science and Mathematics (CSM) biannual newsletter designed to keep you informed of the latest activities and developments going on in the college. CSM values the networks developed with partners on and off campus. You are important in our network of partners.

The College of Science and Mathematics (CSM) provides students a high quality and innovative academic experience through our six minor programs, eight undergraduate degrees, three masters programs, and the Ph.D. in Analytics and Data Science degree. Students can create their own learning experience through provided tracks, research, and specialized courses. CSM is soaring into the next level of national prominence through cutting-edge research.

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Where does the time go? It has been four years since I arrived at Kennesaw State University to begin my new role as the Dean of the College of Science and Mathematics. At that time, the college was composed of four departments, had 87 full-time faculty members, and generated 59,000 student credit hours. Today, we have six departments, 127 full-time faculty members, and the college generated 83,000 student credit hours this fall semester. The significant growth experienced by the College of Science and Mathematics is consistent with the growth and change the entire University has enjoyed over the last 4 years, and is consistent with the growth throughout the entire history of KSU. With a total student enrollment of nearly 35,000 students, KSU is now one of the 50 largest universities in the country. The University’s growth in the college and its programs contributed significantly to a change in the University’s Carnegie classification to a Doctoral University with Moderate Research expectations. This is a staggering achievement for an institution with humble beginnings as a two-year junior college in 1963.

In 2013, the University celebrated the 50th anniversary of its founding. At the end of 2013, the University System of Georgia announced that KSU would be consolidated with nearby Southern Polytechnic State University. Consolidation was completed in 2015, and the newly consolidated KSU began operations in July of 2015.

The history of KSU is characterized by tremendous growth with major change milestones occurring every 10-15 years. The 15 years prior to consolidation were characterized by growth in the size and reputation of the University to become a state comprehensive university. Faculty initiated research became the expectation, and the University invested in the College by construction of the Science building and the Clendenin building. More recently, the completion of the Science Laboratory building marked the first building on campus dedicated to faculty initiated research activities that involve both undergraduate and graduate students. The growth in the College’s research activity is evident by the large number of students who collaborate with college faculty in discovery research projects, many supported by grants awarded by national funding agencies. Recently, the college held the third annual Birla Carbon Research Symposium, where students who conducted research over the summer supported by a generous donation from the Aditya Birla Carbon Group, presented their work to University community.

What does the next 20 years have in store for KSU and the College of Science and Mathematics? History tells us that the college in the year 2036 will be very different from what it is today. We are preparing for that future by reconsidering how we teach our courses, understanding how technology can be more completely integrated into our courses, and by anticipating what our disciplines will be in the future. Faculty of the college are participating in faculty learning communities to support each other as they prepare to teach courses from a multidisciplinary perspective, and as faculty integrate active learning and student engagement into courses. Email, Twitter, Instagram, iPads, and cellphones have all changed the way we communicate, and those technologies are continuously impacting how students interact with each other and how their courses are being taught. We can anticipate that virtual reality systems, which are becoming widely accessible, will impact how we teach. Technology will potentially allow students to directly “interact” with molecules, the solar system, etc.; to conduct laboratory experiments without the need to be in a physical laboratory space; or to visit regions of the world without having to leave campus.

It is clear that KSU has embraced change throughout its 53 year history and we will be prepared for whatever is next. In the College of Science and Mathematics, we are not waiting to see what is next, we are actively conducting research so that we can Discover the Future. I invite you to join us in Discovering the Future by discovering all that is happening in the College of Science and Mathematics. Discover Kennesaw State University.
Kennesaw State math educator selected as a 2016 Governor’s Teaching Fellow

Kennyshaw State University Associate Professor of Mathematics Education Kadian Callahan has been selected as a 2016 Governor’s Teaching Fellow. As one of 15 faculty members from institutions of higher education across the state, Callahan was named after a highly competitive application and selection process.

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Karyn Alme receives Carol J. Pope Award for Distinction

Karyn Alme, senior lecturer of environmental sciences, received the Carol J. Pope Award for Distinction from the President Commission on Disability and Strategies and Resources department at the 2015-2016 Presidential Diversity Awards on April 20, 2016.

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Kennesaw State University joins 100Kin10 to graduate more STEM teachers

Kennesaw State University is partnering with 100Kin10, a nationwide network coordinating and accelerating efforts to bring 100,000 new science, technology, engineering, and math (STEM) teachers into schools by 2021. Kennesaw State teacher educators have set the goal to graduate 330 new middle or secondary mathematics or science teachers by 2021, representing an average of 80 new STEM teachers per year for five years.

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KSU hosting national conference on undergraduate research

Kennesaw State University has been selected to host a national undergraduate research conference in 2019, the Council on Undergraduate Research (CUR) announced. Set for April of 2019, the National Conference on Undergraduate Research (NCUR) will bring together more than 4,000 students and their faculty mentors for a three-day conference at Kennesaw State.

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Myles Robinson didn’t have to look far to find inspiration to enter the medical field, or to see a successful Kennesaw State University graduate.

His mother, Candy Robinson, went back to school when Myles was 9 years old. She commuted from their home in Paulding County and earned a nursing degree from Kennesaw State, then became an operating-room nurse.

Robinson is following in his mom’s footsteps — first to Kennesaw State and now into health care. After graduating from KSU with a chemistry degree in May, Robinson is enrolled at one of the country’s top medical schools — the University of Chicago’s Pritzker School of Medicine — with plans of becoming a doctor.

“I’m excited about it,” he said. “I always felt like I wanted to work in health care, because I was exposed to it with my mom being a nurse. I really like providing care to people.” Robinson learned that first-hand after heeding his mother’s encouragement to become a certified nursing assistant.

While carrying a full load of classes and assisting chemistry professor Carol Chrestensen with laboratory research, he worked weekends caring for Alzheimer’s and dementia patients at a nursing home in Powder Springs. Those hands-on clinical and laboratory experiences were invaluable assets to include in his medical school applications.

“I was able to say in his letter of recommendation, ‘This is somebody you would want to be your doctor,’” Chrestensen said. “He knows exactly what he’s getting into because he experienced it from the nursing side, and he has the academic ability to do it. Further, he has shown how incredibly caring he is, because it is difficult to care for people with Alzheimer’s disease.”

Robinson also worked hard in the classroom, particularly after deciding as a sophomore that he wanted to become a physician. When he posted exceptional scores on the Medical College Admission Test, several of the nation’s most-renowned medical schools took notice.

“I just worked hard and, the next thing you know, I got my MCAT score back and realized, ‘Wow, I actually can apply to some of these schools I dreamed about attending,’” Robinson said. “It worked out better than I thought it could have.”

After interviewing at eight schools, Robinson chose the University of Chicago. The Pritzker School of Medicine awarded him a $200,000 scholarship, which will cover approximately 90 percent of his tuition over the next four years.
Robinson moved to Chicago in July and started classes this week. He has not yet decided which medical specialty he will pursue, but is leaning toward dermatology or neurology.

“It is definitely fun and rewarding to see my students succeed, and Myles is an absolutely exceptional case,” Chrestensen said. “It has been great watching him have so much success and represent Kennesaw State the way he has.”

At the same time, Chrestensen will miss Robinson, whom she described as her “go-to person” in the laboratory. During his final year-and-a-half at KSU, he assisted her in research into how certain proteins interact with and regulate eNOS (endothelial nitric oxide synthase), an enzyme in blood vessels that is essential to cardiovascular health.

The research potentially could lead to advancements in treating cancer, diabetes and inflammatory diseases, according to Chrestensen. Along with assisting her in experiments, Robinson also mentored other students who joined the research project.

“He is a great teacher, which is a particularly great attribute in medicine,” Chrestensen said. “It’s really an important ability, as a doctor, to teach your patients what they need to do and what is happening with them.”

Chrestensen isn’t the only one who holds Robinson in high regard. He said that his proud mom loves to tell the doctors she works with about her son’s accomplishments.

“She doesn’t hesitate at all to tell anybody, for that matter,” he said with a laugh.

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Congratulations to our faculty and staff!

Scholarship Award:  
Susan M.E. Smith, Ph.D.,  
Professor of Biology (MCB)

Staff Award:  
Laurette Rust (MCB)

Service Award: Kimberly Cortes, Ph.D.,  
Assistant Professor of Chemistry Education (CHEM)

Mentoring Award: Martin Hudson, Ph.D.,  
Associate Professor of Biology (MCB)

Teaching Award: Michelle Head, Ph.D.,  
Assistant Professor of Chemistry Education (CHEM)

Professor Award:  
Jonathan McMurry, Ph.D.,  
Associate Vice President for Research and Professor of Chemistry (MCB)/KSU Office of Research

Part-time Teaching Awards:  
Max Crocker (EEOB), Penney Sconzo (CHEM), Stephen Mervin (PHYS), and Elaine Bush (MATH)
A team of Kennesaw State University faculty and students have developed a novel cell-penetrating peptide technology that could result in new medical treatments ranging from improved cosmetic procedures to helping in the fight against cancer, according to team leader Jonathan McMurry, KSU’s associate vice president for research.

McMurry said the researchers’ work, some of which has been published this month in the Journal of Cell Science, has “thousands” of potential applications. KSU professors John Salerno, Scott Nowak and Carol Chrestensen are co-authors of the paper.

**Developing CPP Technology**

At the heart of the research is a novel cell-penetrating peptide (CPP) technology capable of carrying other molecular “cargos” directly into living cells, coupling with them and then successfully uncoupling after delivering its payload. Cargos can be therapeutic molecules like antibodies that fight against parasites and diseases, or anti-cancer proteins.

McMurry and his team developed a recombinant CPP by using a viral protein fragment fused to the human protein Calmodulin. A CPP is a short chain of amino acids capable of crossing membranes of living cells.

The prototype, called TAT-CaM, can deliver a wide array of molecular cargos to many different cell types, including human retinoblastoma cells. These are the cells that can lead to a rare form of eye cancer.

As with other CPP technologies, TAT-CaM attaches to and penetrates the targeted cells, carrying desired biomolecules with
it. An important difference is that TAT-CaM releases its cargo on entering the cell’s membrane.

“In theory, this will enable things like gene therapy to be conducted more effectively than before,” said McMurry, who also is an associate professor of biochemistry in KSU’s Department of Molecular and Cellular Biology. “TAT-CaM gets into cells faster than anything else we’ve ever seen.

“CPP technologies have been in development for years, but generally they have disappointed because, while most enter cells efficiently, their cargos remain bound to the CPP, which in turn gets trapped in undesired locations,” he continued. “They are like UPS drivers who might bring your packages to your front door, but then can’t deliver them to you. Our CPP delivers the package – and leaves it safely in your hands.”

With grant funding from the National Institutes of Health, McMurry began the research with Salerno. The work continues in memory of Salerno, who was the Neel Distinguished Chair of Biotechnology at Kennesaw State prior to his death in December 2015.

KSU’s First Incubator Company

Salerno and McMurry founded KSU’s first incubator company, New Echota Biotechnology, and have filed for several patents for their cell-penetrating discoveries. The Georgia Research Alliance has also supported development of the business through its GRA Ventures program. The company now employs five people, including three KSU students, who are assisting in the research.

McMurry credited the Kennesaw State University Research and Services Foundation (KSURSF) with supporting the initial steps in forming the company and helping to secure patents. He hopes that other Kennesaw State students and faculty will follow his company’s lead and work with KSURSF to develop their intellectual properties and take steps to commercialize them.

“Universities are increasingly serving as platforms for start-ups. And while not many people think of KSU when they think ‘research university,’ there is a surprisingly vibrant and growing research culture here,” McMurry said.

“New Echota may be the first, but we certainly won’t be the last. The coming years will increasingly see KSU-developed technologies contribute to economic development and the betterment of humanity. I think Kennesaw State is Georgia’s next research university.”
Searching for Answers

Research with nanoparticles designed to simplify detection process

Associate Professor of Chemistry and Biochemistry Dr. Bharat Baruah’s research using baby wipes could play a significant role in beefing up airport security, leading to quicker, more reliable and environmentally friendly screening materials to detect explosives.

Baruah is conducting research using baby wipes, which have been chemically modified by imbedding silver nanoparticles. In the growing field of nanomaterial research, the metal nanoparticles – which are slightly bigger than molecules – act as a sensor to help detect contaminants.

“The silver nanoparticles-coated baby wipe is rubbed on the surface to be tested to collect a small sample, which is then passed under a Raman spectrometer,” Baruah explained. “The machine shines a laser light on the wipe, and the contaminant material produces a chemical signature, like a fingerprint, based on the unique vibration in the targeted molecules.”

While the Raman technique normally requires millions of contaminant molecules to obtain an accurate chemical signature, only a few molecules are needed in the presence of silver nanoparticles. Baruah points out that each fiber in the wipe has countless anchor molecules that can securely bind with the metal nanoparticles.

According to Baruah, the simplicity of using baby wipes and the Raman spectrometer means personnel can easily be trained to use the technique in an airport setting.

For restaurant/food service environments, the nanoparticle-embedded baby wipe could also help detect the bacteria that may contaminate food. The test results would immediately be available, obviating the need to send samples to a lab for processing.
Nearly 100 students, faculty, staff and Birla Carbon executives reviewed the posters on display in the KSU Center, which featured comments from Kennesaw State Interim President Houston Davis, College of Science and Mathematics Dean Mark Anderson and Birla Carbon’s North American Region Chief Technology Officer Dale Clark.

This year’s scholars include: Johnathon Ard, physics; David Axford, biology; Graeme Bettler, chemistry; Soprinye Dappa-Fombo, biology; Rebecca Hyche, biology; Elena Ninova, biology; Katerina Slavicinska, chemistry; Omar Ugarte Trejo, chemistry; Danielle Varljen, biology; and Courtney Willett, biology.

“Over the summer, these students have actively engaged as collaborators on projects ranging from methods that could potentially yield nanowires, to the use of bioinformatics to detect more accurately E. coli or salmonella contamination in packaged foods, to the remediation of soils contaminated during the Fukushima nuclear catastrophe in Japan,” said Anderson. “These are all very impressive projects that the students were given the opportunity to work on full time, thanks to the generous support of Birla Carbon.”

The event marked the third year of a five-year partnership with Birla Carbon, which has allowed the College’s 10 Birla Carbon Scholars to participate in summer research opportunities. Birla Carbon is the world’s largest manufacturer of carbon black.

The scholars program was developed in April 2014 with a $250,000 pledge from Birla Carbon for a five-year annual gift of $50,000 to support research opportunities for students in KSU’s College of Science and Mathematics. The program has awarded 30 KSU students each a $4,000 stipend since 2014.

Katerina Slavicinska took the top prize for her research project entitled, “Designing a Liquid-Solid Cell for in Situ Analysis of Nucleoside Phosphorylation by Schreibersite.” She worked beside her faculty mentor, Assistant Professor of Chemistry Heather Abbott-Lyon, in the Abbott-Lyon Laboratory (ALL).

“Her project involved an examination of a mineral found in meteorites called schreibersite,” said Abbott-Lyon. “Using infrared light, she analyzed the mineral surface to find traces of phosphate groups, which are a primary component of life found in nucleic acids, cell membranes and energy-transfer coenzymes.”

Slavicinska explained, “This allowed me to obtain data about the surface that will help me understand how a metal-phosphorus alloy like schreibersite could phosphorylate (transfer a phosphate group to) various prebiotic molecules like nucleosides and glycerol. We prepare solutions of these prebiotic molecules separately and then submerge our synthetic meteorite in them.”

In its ongoing research, along with partners from Georgia Tech and the University of South Florida, the Abbott-Lyon Laboratory immerses schreibersite in solutions of water and other molecules vital to cell function. The hope is to find clues about how the mineral might have contributed reactive phosphorus to form the first biopolymers needed for life.
Since its construction a couple years ago, the Oasis has already been put to use in providing aquatic plants, algae, and invertebrates for a number of biology courses. Water Lilies bloom all summer, and are often accompanied by inconspicuous Bur-Reed, blue-purple flower clusters of Pickerelweed and white spikes of Lizard’s Tail. Later in summer, blue Monkeyflower and scarlet Cardinal Flower bloom prolifically. Shrubs such as Buttonbush and Swamp Loosestrife will bloom in coming years, as will Spider Lilies and Blue Flag Iris. The bog area of the Oasis contains carnivorous plants such as Venus Flytrap and a number of pitcher plant species native to the southeastern U.S. Joining them in the bog are Yellow-eyed Grass and multiple orchid species, including the endangered Monkeyface Orchid.

Despite being enclosed within a canyon of tall buildings, the open courtyard has allowed a large number of arthropod species to drop in to the oasis to visit or colonize. Dragonflies and damselflies are usually apparent in midsummer, with Blue Dashers, Fragile Forktails, Carolina Saddlebags, Wandering Gliders, and Common Whitetails being among the most common. A Comet Darner last summer was a pleasant surprise.

Hellgrammites, the larva of the Dobsonfly, live in the gravelly bottoms. Water Striders usually make an appearance every summer, and occasionally butterflies drop in to visit the blooms on the aquatic plants. The abundant arthropod community in the oasis provides food for the mosquitofish and sunfish stocked in the oasis.

In the future, the diversity of plants and animals in the oasis will continue to increase. The surrounding courtyard will be planted with native plants such as small trees and shrubs such as azaleas, dogwood, redbud, and buckeyes, as well as herbaceous species like trilliums and a number of rare Georgia plant species for both educational and aesthetic purposes.
Dr. Charles Herd  
Director, Rubber Carbon  
Black Technology  
Birla Carbon

Tuesday  
October 18, 2016  
2:00-3:15pm  
Kennesaw Campus  
Birla Carbon Auditorium, SC109  
370 Paulding Ave. NW  
Kennesaw, GA 30144

The Future of Automobiles, Trucks and the Tires they Use:  
Development of New Carbon Blacks to Meet Current and Emerging Market Trends

Tire Technology is changing rapidly and it continues to evolve as environmental regulations, sustainability initiatives and autonomous car concepts drive major changes in the technology of automobiles and trucks. This talk will review the major market drivers for automobiles, trucks and the tires they use and how Birla Carbon is addressing these requirements through development of new products.

Seats are limited! Register by Friday, Oct. 17!

Register Today ➔

Growing Education

Student learning experiences are enhanced by contributions provided to the college to support our student scholarships; improve the margin of excellence; and support research endeavors and professorships to help Kennesaw State University provide a strong environment for recruitment and retention of promising faculty.

For philanthropic opportunities, contact the CSM Director of Development at giving@kennesaw.edu or visit giving.kennesaw.edu.

To donate to the college, visit bit.ly/GivetoCSM.
The Ph.D. in Analytics and Data Science is an advanced degree that has been developed to meet the explosive growth in market demand for data scientists. This degree will train individuals to translate large, structured and unstructured, complex datasets into information to improve decision-making.

Master of Science in Applied Statistics (MSAS)
Master of Science in Applied Statistics is a professional degree program which utilizes cutting-edge statistical methods. These methods are used in industry, business, and government for predictive modeling and process improvement with emphasis on the unique challenges associated with BIG Data. Graduates will analyze and interpret real-world data effectively.

Master of Science in Chemical Sciences (MSCB)
Discover the next level of research in this thesis-based program with tracks in chemistry and biochemistry. MSCB prepares students to think in interdisciplinary ways in various related areas of study. Current research areas include traditional sub-discipline areas although not limited to chemical biology, astrochemistry, nanochemistry, synthetic organic chemistry and enzymology.

Master of Science in Integrative Biology (MSIB)
Integrative Biology is based on the emerging paradigm linking concepts across disciplines to produce a more complete understanding of biological systems. The thesis-based graduate program is designed to integrate expertise in specialized fields within biology with collaborative research to solve current and complex biological problems.

Ph.D. in Analytics and Data Science
The Ph.D. in Analytics and Data Science is an advanced degree that has been developed to meet the explosive growth in market demand for data scientists. This degree will train individuals to translate large, structured and unstructured, complex datasets into information to improve decision-making.
Verra Ngwa entered Vanderbilt University’s Cancer Biology Ph.D. program in the fall of 2016, where she hopes her research will one day lead to a cure for cancer.

A native of Cameroon who now lives in Austell, Ngwa is participating in the Peach State Bridges to the Doctorate program and received her Master of Science in Chemical Sciences degree from Kennesaw State University in the spring of 2016. The thesis-based program with tracks in chemistry and biochemistry was a good fit for Ngwa, according to her graduate adviser, Jonathan McMurry.

"Verra excelled in her studies and did some super research," said McMurry, Kennesaw State’s associate vice president for research and a professor of biochemistry. "She is the epitome of our Bridges to the Doctorate program."

Ngwa, who also received her bachelor’s degree from Kennesaw State, worked as a graduate research assistant alongside McMurry and a team of faculty and students recently to develop a novel cell-penetrating peptide technology that could result in new medical treatments ranging from improved cosmetic procedures to helping in the fight against cancer.

For Ngwa, there is a personal side to the research because she lost her mother to cancer.

“I grew up in Cameroon, and at a young age I lost my father in an armed robbery," she said. “After my father had passed away, my mother became ill and had to have surgery to remove cancer cells. Unfortunately the cancer had metastasized before the surgery was completed.”

Ngwa said her mother’s death inspired her to pursue a degree in the chemical sciences.

“I wanted to make a difference and prevent anyone else from losing a family member to cancer,” she said. “The journey to receiving this degree has been a difficult one, but I have persevered.”

The Bridges program, which is funded by the National Institutes of Health, aims to increase the diversity of the nation’s biomedical research workforce. It provides a path for students in groups underrepresented in biomedical and behavioral sciences to earn a master’s degree in the College of Science and Mathematics’ innovative research-based graduate programs in integrative biology or chemical sciences and transition to doctoral programs at major research universities.