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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Kennesaw State University
College of Science and Mathematics

csm.kennesaw.edu
In 2013, the University System of Georgia designated Kennesaw State University a Comprehensive University. This designation emphasized the combined mission of the university in teaching and research excellence. The faculty of the College of Science and Mathematics have embraced this mission. This issue of CSM Connect highlights many of the activities and accomplishments of the college that demonstrate the integration of all we do with the central focus on the success of our students.

Professor Bill Ensign of the Department of Ecology, Evolution, and Organismal Biology has been leading a conservation effort around the Raccoon Creek watershed in Paulding County. This area represents a vibrant ecosystem encroached upon by commercial and residential development. Working with students and government agencies, Bill is educating both students and the community about the local ecology, the impact of development on some of nature’s treasures, and sustainable development.

Hannah Santoro, a professional advisor for the College, works with hundreds of students to help them find a successful path to graduation and the start of their career. In this issue, we read about a student’s path to KSU from Nigeria, and how CSM advising helped her achieve her goal of attending medical school. This is just one of many success stories about our students, but it illustrates how CSM integrates student advisement into our routine interactions with students. All of our professional advisors are dedicated to helping students be successful.

A freshman seminar is a central course designed to help first year students integrate into the University and have a successful first year. The Advanced Majors Program (AMP), a new CSM freshman program, creates cohorts of students who all take the same freshman seminar course, general Chemistry course, and Mathematics course their first semester at KSU. The faculty of these courses collaborate so that the content of the courses is coordinated, giving students a clear understanding of the integrative nature of the science curriculum. High-achieving students who applied to KSU and expressed an interest in science degree programs were invited to be part of the inaugural AMP program in Fall 2017. Approximately 130 students became part of AMP this year, and we hope the program continues to grow in the future. Dr. Jennifer Louten deserves credit for directing the program to a great start for students.

As students grow in our majors, we encourage them to engage in research activities with faculty collaborators. In 2017, we celebrated the fourth year of the Birla Carbon Scholars Program. This program provides funding to 10 students who work full-time on an independent research project during the summer months. The program culminates with a symposium where the students present their work to the public. This year, senior Rebecca Webster, with faculty mentor Dr. Joel McNeal, was the recipient of the Outstanding Presentation Award at the Birla Carbon Research Symposium.

Professor Marcus Davis, Associate Dean for Research, recounts many of the research activities of the College in his column. Currently, the College has the largest number of active federally funded projects in our history. This is a testament to the quality of the research conducted at KSU, as project proposals are subject to rigorous peer review prior to an award made.

I encourage you to read in detail about these stories of the College of Science and Mathematics community. In just four years since the KSU Comprehensive University designation, the College of Science and Mathematics embodies the core of this designation in the way we integrate teaching and research in service to our students. I welcome you to visit our campuses to see firsthand all the good work our faculty and students are engaged in.
Along with co-owning a successful music school, Miriam “Mik” Chari has a passion for animals. Volunteering at Zoo Atlanta inspired her to pursue a biology degree at KSU. Chari worked under Assistant Professor of Biology Dr. Lisa Ganser on a neurophysiology research team to learn more about the effects amphetamine exposure and addiction have on the human brain.

Animals’ best friend
Graduate dedicated to veterinary school, volunteerism

Four grants in four days
KSU researchers earn multiple NSF awards

Green Learning Spaces
Outdoor areas provide unique educational opportunities

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“I’m working on an exciting project, and it will be my legacy if I can pull it off,” says Bill Ensign, a Kennesaw State biology professor for the past 20 years.

Outfitted in waders and wearing a backpack electroshocker, he led 16 undergraduate students from his Aquatic Methods class through the underbrush beside Campus Loop Road down to Kennesaw Creek in mid-April.

The humid early morning air carries the fragrance of nearby honeysuckle. As the water in the creek bubbles over the rocks, novice biologists listen carefully to Ensign as he instructs them in a safe way to stun the fish.

The lead from the electroshocker activates and an electric surge enters the water, temporarily stunning the fish in the creek so they can be netted, identified by species, measured and then tagged and placed back in their habitat.

“A healthy creek has about 25 species,” says senior biology major Will Commins as he climbs up on the bank. “But this one only has about seven in it.” Urban runoff and silt are combining to threaten the creek’s viability, reducing the number of species that inhabit the creek down to a handful.

“We have a couple of species of bream showing up in the nets,” says Ellery Harding, a senior biology major who’s measuring the fish, most of which the class had tagged earlier in the year. “The redbreast sunfish is pretty easy to identify. The largemouth bass easily stand out, too.”

This morning’s field research is taking place across the street from the Austin Residence Complex on the southeast side of the Kennesaw Campus, but it’s similar to Ensign’s research in Raccoon Creek. It’s there, almost 20 miles due west of campus, where he hopes ensuring the survival of aquatic life like fish, turtles and mussels in a rural Paulding County waterway will be his legacy.

From its beginnings in Paulding, Raccoon Creek flows north 21 miles to join the Etowah River in Bartow County. The creek contains some 45 species, about six times the number of species as Kennesaw Creek, but its future is threatened by development and encroaching urbanization.

“Since 2007, my students and I have been sampling fish in the Raccoon Creek watershed there on the county’s northwest side,” Ensign says. “There are a couple of federally listed (endangered) fishes in the stream, and we’re working together with colleagues at the Georgia Department of Natural Resources (DNR) and the Nature Conservancy.”

As Ensign describes the creek and surrounding countryside, he paints a picture of how drastically different the landscape in the south used to look before widespread timber cutting, row-crop agriculture and the twin forces of urbanization and development overtook nature.

Towering up to 200 feet tall and living 250-450 years, the montane longleaf pine used to be abundant across the Piedmont region of

Nature’s Last Stand
Georgia and Alabama. This species of the stately tree was largely decimated starting about 150 years ago due to over-exploitation of the species.

There is a good stand of these majestic trees in the area surrounding Raccoon Creek, but there’s no mistaking the loss of their original habitat. The montane longleaf pine may be making its last stand in the area.

“The county, the DNR and the Nature Conservancy in 2005 identified the area as holding a lot of significant biological diversity,” he says.

One of those Ensign is working with is Jason Wisniewski, an aquatic zoologist with DNR in the Nongame Conservation Wildlife Resources Division.

“This area of Paulding County is very rich in rare aquatic organisms,” according to Wisniewski. “However, it historically had an even greater richness but development and threats from the past completely destroyed many rare aquatic species from the Etowah River Basin during the past 100-150 years.”

For the past two years, Ensign has enlisted the aid of Marc Pedersen’s Paulding County High School advanced science students. A little more than 100 students in the biotechnology pathway of the school’s magnet program are conducting research in the creek that flows near their school. They have been collecting water samples to filter for environmental DNA.

“So far the students have targeted two mussel species,” Pedersen says. “They have also participated in seine netting to examine fish species in Pegamore Creek, a nearby otributary.”

The importance of studying the mussels offers a window into what is happening to the streams over time.

“Generally speaking, freshwater mussels of most species occur only in high quality habitats with good water quality and good substrate,” says the DNR’s Wisniewski.

“They are often compared to the ‘canary in the mineshaft’ and mussel declines are forewarning us of additional bad things on the horizon whether it be water pollution or increased development without appropriate conservation measures to protect streams.”

The hands-on research in the creek has made the students and many in the community more appreciative of their environment.

“They are unaware of the biodiversity of the watershed and the fact that so many threatened, endemic, and extirpated species exist or once existed in this waterway.” Pedersen says. “They have an opportunity to educate the public on the significance of Raccoon Creek and the surrounding land.”

Ensign said Georgia historically had many diverse mussels, but the removal of millions during the past two centuries, along with destruction of their habitat and encroaching urbanization, changed all that.

“We are working hard to try to get an environmental research facility started at Raccoon Creek where we can do scientific and educational outreach,” Ensign says. “We’re trying to get the word out, especially to the people who have lived in this area for generations and want to preserve what’s left for their children and their children’s children.”
Few Kennesaw State students can say they went from tending goats and sheep in Nigeria to graduating from college. And fewer still are headed to med school this fall like senior biology major Michelle Edward.

“My decision to attend KSU was unplanned,” said the 20-year old. “I had only been back in the country for four months after a six-year hiatus in Nigeria and was gradually losing hope that I would be able to attend university that fall.”

After taking a gap year between high school, Edward said she “was eager to start college but I had missed most deadlines and was greatly misinformed about how to gain admission as an international student.”

“After hearing about KSU from a family friend, I approached my parents about wanting to attend,” she said. “I wanted a school that was affordable, but that could also guarantee me one of the best educational experiences I could receive in Georgia.”

During a summer visit to KSU, Edward had a fortuitous visit with newly hired College of Science and Mathematics advisor Hannah Santoro.

“Michelle met with me at KSU the summer before she started at KSU,” Santoro said. “Accompanied by her father, she came to learn not only about what she should expect within her biology degree, but also what she should expect from college in general.”

The experience was so positive, Edward quickly applied; it was two days before the final deadline.

“You could say that I was the happiest girl in the world,” said Edward, “when I was
accepted to KSU three weeks before classes began."

Santoro recalled Edward’s enthusiasm the day the two met.

“She left such an amazing first impression with me that I still clearly remember it. This began an advising relationship that would continue until today.”

Edward faced many challenges when she began at KSU at the age of 17.

“I remember panicking about that one class every semester that would make me doubt my journey through college,” said Edward. “I would run to my academic advisor, Hannah, mid-semester to vent, but she’d always reassure me that there is nothing too hard to accomplish and that all I need to do is believe in myself and try my best.”

Another challenge was scheduling her studies and extracurricular activities.

“I would have to say time management was one of the toughest challenges for me,” Edward said. “It certainly isn’t easy being a college student. From extracurricular activities to work to classes and research, it’s like you really can’t catch a break.”

She said she found solace in the saying that a “short pencil is better than a long memory,” meaning that it’s often better to write things down than commit them to memory.

“I found early on in my college journey that I have to list everything I need to complete: the deadlines, presentations, work and social events, so I use a combination of to-do lists and Google Calendar to keep myself and my time in check.”

According to Santoro, advising Edward was relatively easy because she was a model student.

“Whenever she had any questions, she sought my advice immediately,” said Santoro. “And, when advice was given, she listened and followed it without any reservation. She very well could be the poster child for ‘how to perfectly navigate the biology degree.’”

Asked what she would tell a new pre-med student, Edward replied, “It’s OK to fail, but you shouldn’t give up. If you put in that extra work and strive for what you want, you will get there. Also, don’t be afraid to talk to your professors and ask for advice. I feel like that is really key. You are here for only one person – yourself – so asking questions and asking for guidance is fine.”

As her graduation date approached, Edward shared some good news with her trusted advisor.

“Michelle said she had just received ‘the letter,’” said Santoro. “She had been accepted to one medical school and was hoping to hear good news from another.

“We both jumped up and down and she gave me a hug. I told her how proud I was of her. Having been an advisor at Kennesaw State for the past four and a half years, she is one of the first students – if not the first – I have advised.”

One long journey is over and the hard work has paid off. Edward graduated in May 2017 with a Bachelor of Science degree, summa cum laude. She began her next journey, to become a doctor, this fall.
Kennesaw State University senior Rebecca Webster’s research project on the parasitic Harper’s Dodder (Cuscuta harperi) plant’s ability to select certain plant hosts based on smell won the Top Poster Award at the Birla Carbon Symposium, at which the College of Science and Mathematics officially recognized 10 new Birla Carbon Scholars.

The scholarship program is designed to provide 10 Kennesaw State students with $4,000 stipends for summer research in science and mathematics. Each student scholar works side-by-side with a faculty researcher on a project, which deals with topics ranging from radiocesium soil contamination to the evolution of appendages.

“Many of our students are not able to explore summer research programs because they must work full time between the spring and fall semesters,” said Dean Mark Anderson. “This stipend allows them time and financial freedom to expand their research skills outside of the classroom and continue Kennesaw State’s tradition of academic excellence.”

Birla Carbon’s North American Region Chief Technology Officer Dale Clark and Terence Norman, director of human resources, along with several judges from Birla Carbon, reviewed posters summarizing the students’ research on display in the Carmichael Student Center’s University Rooms on the Kennesaw Campus.

“The most amazing thing about this plant is its ability to smell other plants,” she said. “I’m trying to identify the particular genes that are responsible for this behavior.”

This summer, she worked beside her faculty mentor, Assistant Professor of Biology Joel McNeal, in the Department of Ecology, Evolution and Organismal Biology.

“Rebecca’s great, very bright and very industrious,” McNeal said. “Even before she began her research, she wanted to read every related paper on the subject.”

Webster, who resides in Kennesaw, took the top prize for her research into how the parasitic Harper’s Dodder plant selects its host based on its smell.

“Without students willing to do this kind of work, this partnership between Birla Carbon and Kennesaw State University would not be possible,” said Clark. “Like us, you share a passion to learn, to do research and to innovate.”

The event marked the fourth 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. Clark said four Kennesaw State graduates are currently working at the firm’s Marietta lab and technology center with a fifth graduate starting to work soon.

“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,” Anderson said.

Webster, who is originally from Colombia, plans to graduate in Spring 2018 and may work for a year in international conservation before pursuing graduate studies.

“Not a lot is known about this foraging behavior in the Dodders. So, I wanted to try to find out which genes are involved.”

This summer, she worked beside her faculty mentor, Assistant Professor of Biology Joel McNeal, in the Department of Ecology, Evolution and Organismal Biology.

“Rebecca’s great, very bright and very industrious,” McNeal said. “Even before she began her research, she wanted to read every related paper on the subject.”

The 2017 Birla Carbon Scholars

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<td>Rebecca Webster</td>
<td>Joel McNeal</td>
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The College welcomes talented new faculty; celebrates funding successes for our colleagues; and hosted a prestigious symposium this fall.

Dr. Gita Taasoobshirazi joins the Department of Statistics and Analytical Sciences. Gita received her Ph.D. from the University of Georgia. Her research uses structural equation and multilevel and growth modeling to study the interaction between cognitive, metacognitive, social, emotional, and motivational factors as predictors of problem solving success and conceptual change in science and mathematics.

After a postdoc at the University of Washington, Seattle, and a faculty stint at the University of Akron, Dr. Thomas C. Leeper joins the Department of Chemistry and Biochemistry. His research focuses on how chemical structure enables biomolecules to recognize, bind-to, and modify each other.

Dr. Ramya Rajagopalan joins the Department of Molecular and Cellular Biology. She received a Ph.D. in Microbiology from the University of Hawaii and joins KSU after starting her research career at Michigan State University. Her research centers on how bacterial communities sense and respond to environmental and cell-to-cell signals.

Dr. Kimberly Linenberger-Cortes (Department of Chemistry and Biochemistry), Dr. Adriane Randolph (Coles College of Business), and their University of Minnesota Rochester collaborators were awarded a National Science Foundation (NSF) grant ($258,129) to investigate how to better design 3D modeling activities in chemistry. This research will track what students pay attention to and how they cognitively process the 3D modeling activities using physiological biometric tools. In a second NSF award ($599,971), Dr. Linenberger-Cortes and faculty at the Milwaukee School of Biomolecular Engineering will collaborate to brings biochemistry students, researchers and practitioners together around a year-long protein modeling project.

Dr. Michael Van Dyke (Department of Chemistry and Biochemistry), recently received two NSF grants from the NSF. The first award ($253,790) allows his lab to identify orphan transcription factors and their potential biological roles. Transcription factors are the primary regulators of gene expression in most organisms, turning genes on or off in response to intrinsic factors or external cues. With the second award ($118,840), Van Dyke and his lab will investigate DNA cleaving enzymes known as type IIS restriction endonucleases. Also known as restriction enzymes, they are critical tools in biotechnology with applications in agribusiness and the pharmaceutical industry.

Dr. Sigurdur Greipsson and Dr. Thomas McElroy (both of the Department of Ecology, Evolution, and Organismal Biology) were awarded $160,453 by the NSF for their research on the restoration of contaminated soils through chemically enhanced phytoextraction by switchgrass. Through chemical manipulations, they aim to improve the use of these high-biomass producing plants to remediate lead polluted soils and to provide a new understanding of how plants avoid lead toxicity through their symbiotic relationships with soil microorganisms.

Finally, the College hosted the 37th Annual Southeastern-Atlantic Regional Conference on Differential Equations (SEARCDE 2017) on October 7-8. SEARCDE brought together researchers and students, promoting intellectual exchange and discussion of recent developments in differential equations and related topics. The conference featured plenary talks from eminent mathematicians alongside parallel sessions.
The College of Science and Mathematics launched the Advanced Majors Program (AMP) in August 2017 with a Backstage Pass event, giving 130 AMP students the opportunity to network with student groups, student researchers, and CSM faculty/staff. The program was created to provide the individual attention and community students would receive at a small school while having all the benefits of a large university.

A major component of the Advanced Majors Program includes student-centered, integrative courses that foster critical thinking skills. AMP sections were created so high-achieving first-year students can get to know other students within the program taking similar classes throughout their time at KSU. More AMP courses will be added as these students progress, and new first-year students will be added each year.

The Advanced Majors Program will continuously expose students to enrichment activities designed to benefit their future educational or career aspirations. Students have the opportunity to perform undergraduate research with top faculty and present their work at local, national, and international meetings. Additional scholarship opportunities will be available to the students as well.

Major Distribution in the Advanced Majors Program

- **69%** Biology & Environmental Science
- **23%** Chemistry & Biochemistry
- **5%** Physics
- **3%** Mathematics
Like millions of Americans, KSU turned their gaze toward the heavens on Monday, Aug. 21 to witness the first solar eclipse to be viewed in the contiguous United States in 38 years. From the University’s two campuses, viewers were able to see a nearly 98 percent full solar eclipse during the mid-afternoon.

In the weeks leading up to the Solar Eclipse, Associate Professor of Physics David Joffe was interviewed by several news outlets. Check out the stories below!

CobbTV 23 Science Update | WSB-TV Interview | Marietta Daily Journal
The College of Science and Mathematics took 30 students and exposed them for 10 minutes of one-on-one, speed networking with alumni, industry professionals and faculty in Spring 2017.

The result was lots of good career advice to help students compete for internships and jobs.

Gayle Jones, senior director of Development in the College of Science and Mathematics, said the pilot program was based on one at Georgia Tech that has proved successful. “We partnered with Career Planning and Development,” Jones said, “and our students scored rave reviews from our mentors.”

Thirty students were teamed up with 30 industry pros who acted as mentors, offering insights that could prove valuable as they move forward in their higher education and future careers. The students got a chance to hone their job-hunt elevator speeches.

“Most of our students will do something else besides going to medical school or graduate school,” said Dean Mark Anderson. “So, that’s why this is a good experience for them, which also allows them to make excellent career connections through networking.”

One of those volunteering to mentor students during the speed networking event was Don McGarey, the interim VP for Research and professor of biology, who dispensed practical advice to his mentees.

“When you’re a sophomore or a junior you should look into summer internship/research opportunities. A great program to start with is the NSF’s (National Science Foundation) REU (Research Experiences for Undergraduates) program,” McGarey said.

“Many universities throughout the U.S., including KSU’s Chemistry Department, have NSF-REU programs in every STEM discipline. The participating universities and disciplines are listed on the NSF-REU website,” said McGarey. “These are competitive, paid internships, so that’s where having good grades and lab skills, and a genuine interest in discovery will be a big help to you.

“That’s also something you should bring up when you’re applying for summer research internships.”

Salina Garcia, a KSU alum working with the Jim Huber Corporation, one of the largest privately held companies in the United States, said she hoped students would gain a better understanding of the work world from the pilot event.

“Working for an organization requires lots of collaboration inside and outside the organization,” she said. “Never forget problem-solving is a team effort.”
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.

CSM will host another Speed Networking event in Spring 2018. If you are interested in speaking with students about the science and mathematics industry, please click here and we will contact you when more information about industry/alumni registration becomes available. More information on our Speed Networking event can be found online.