a message from the dean

In this issue of our magazine, Progression, we continue to update the friends of the College of Science at Coastal Carolina University with a series of articles and features that show the breadth of activities in our College.

After you read the articles, I would encourage you to engage with our faculty, staff and students. In many of the articles, information is provided so that you can contact us directly if you want additional information on a topic of interest. Of course, you are also welcome to contact me; my phone number and email are listed below.

Our College of more than 100 dedicated faculty and staff is fully committed to ensuring the success of our students as they pursue their academic careers at the undergraduate or graduate level. Our eight departments offer 20 major, minor and graduate programs ranging from biology to statistics. Our approach to education is current, engaged and hands-on, with learning taking place in the classroom, the laboratory and in the field.

Please take some time to read what is going on in each of our departments; by doing so you will gain an appreciation of the breadth of knowledge that is explored in our College by our faculty and students, as we seek to understand and explain the natural world.

Regards,

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The Department of Biology is home to more than 530 undergraduate biology majors, 20 graduate students, 15 full-time faculty and three adjunct faculty. Undergraduate students in our department earn a Bachelor of Science degree in biology. We also offer other programs of study preparing students for entry into various health professions. Our department participates in the Master of Science in Coastal Marine and Wetland Studies program and offers courses for graduate students in education.

Students in our department have access to professors with expertise ranging from molecules to ecosystems. Faculty in the Department of Biology take pride in providing excellent opportunities for learning inside the classroom and out. Our faculty have varied research interests, and we provide opportunities for undergraduates to participate in that research.

Please visit the Department of Biology website at www.coastal.edu/biology/. Karen Aguirre can be reached at kmaguirr@coastal.edu or at 843-349-4159.

The Department of Marine Science is home to the largest undergraduate marine science programs on the East Coast and is also one of the lead departments in Coastal Carolina University’s Coastal Marine and Wetland Studies graduate program. With our ideal location near the coast and collection of research-active faculty committed to undergraduate teaching, our strength is in providing individual attention and hands-on opportunities for students.

Marine science is an interdisciplinary field that uses biology, chemistry, geology and physical oceanography/atmospheric science in the study of the ocean. Lecture, laboratory and field experiences are integrated to provide an outstanding and well-rounded academic program. Within marine science, you may choose to concentrate your studies in one of the following areas: marine biology, coastal geology, marine chemistry, atmosphere/ocean dynamics or marine analytical technology.

As a marine science major, you are encouraged to get involved with research or internship experiences, which can help you get into graduate school, get a job or make contacts in the field. Each year, many of our students work individually with faculty to complete semester-long independent research projects or internships, for credit. More than half of these students present their findings at state, regional and national scientific conferences. Two major national reports, the Pew Oceans Commission and U.S. Commission on Ocean Policy, have documented the critical importance of marine science to our national health and well-being and called for increased efforts in marine science education, research and funding. This is truly an exciting and dynamic time.

Please visit the Department of Marine Science website at www.coastal.edu/marinescience/. Jane Guentzel can be reached at jguentze@coastal.edu or 843-349-2374.

The psychology program at CCU enrolls approximately 300 majors. Individual attention is available to all students, and faculty advisers work closely with students concerning courses and career choices. Students can choose either a Bachelor of Arts degree program or a Bachelor of Science degree program. Both undergraduate degrees provide students with a solid background in the traditional areas of psychology.

Students also have the opportunity to conduct individual research while enrolled in a senior research course. Some students have presented their research at local, regional and national professional conferences, and some have submitted their research for publication in undergraduate and professional research journals. Independent study opportunities allow students to work closely with a faculty member in an area of interest where a traditional course is not offered. Students also have the opportunity to earn elective credit or internship credit for volunteer work in various community organizations, including mental health centers, rape crisis and spouse abuse agencies, and agencies that serve special needs children.

The sociology program at CCU enrolls approximately 100 majors. The Bachelor of Arts degree program provides students with a solid background in traditional areas of sociology, including course work in social problems, sociological theory, social structures, the individual in society, and research methods in the social sciences.

Students also have the opportunity to participate in internships with various local agencies, including agencies for spouse abuse, child abuse, law enforcement, and care of the elderly; community recreation programs; and alcohol and drug programs. Some students have presented information and data from their internship experiences at local and regional meetings and conferences. Independent study opportunities allow students to work closely with a faculty member in an area.
of interest where a traditional course is not offered. Students also have the opportunity to earn elective credit for volunteer work in various community organizations, including mental health centers, rape crisis agencies and agencies that care for special needs children. Students may qualify for membership in Alpha Kappa Delta, the international sociology honor society.

Please visit the Department of Psychology and Sociology website at www.coastal.edu/psychology/. Susan Webb can be reached at sewebb@coastal.edu or 843-349-2933.

DEPARTMENT OF HEALTH PROMOTION
John Vannessa, Ph.D. Department Chair
CCU's health promotion major is one of only 21 programs in the nation and the first in South Carolina that has been awarded approval by the Society for Public Health Education and the American Association for Health Education. This prestigious designation is an indication of academic rigor, program quality and high academic standards in the field of health education.

Our health promotion program features four different areas of study that allow students to personalize their studies based on career or graduate school aspirations:
• Health promotion with general cognate (designed for students with general health interests or those seeking graduate work in allied health careers)
• Health promotion with a communication option
• Health promotion with an exercise science option
• Health promotion with a health services leadership option

Please visit the Department of Health Promotion website at www.coastal.edu/healthpromo. John Vannessa can be reached at yannessa@coastal.edu or 843-349-6460.

DEPARTMENT OF MATHEMATICS AND STATISTICS
James Solazzo, Ph.D. Department Chair
Welcome to the Department of Mathematics and Statistics at Coastal Carolina University. Our primary goal as educators is to improve students' mathematical understanding and competence. However, we also strive to illustrate the importance of mathematics both as an interesting and challenging subject on its own and as a tool that can be applied to other disciplines. Our degree program in applied mathematics is designed to develop a high degree of mathematical proficiency as well as extensive reasoning and problem-solving skills.

A degree in mathematics opens up many exciting job opportunities in business, industry, government, actuarial science, technology and education. Furthermore, the mathematics degree lays a solid foundation for continued study at the graduate level in any of the mathematical sciences.

At Coastal Carolina University, we are committed to providing quality undergraduate teaching. In addition, we recognize the interdisciplinary nature of the modern mathematical world. Therefore, students may choose to concentrate their studies in analysis, applied mathematics, discrete mathematics, mathematics for secondary education, or statistics while still obtaining a solid mathematical background. We also offer motivated students the opportunity to do research at the undergraduate level.

Please visit the Department of Mathematics and Statistics website at www.coastal.edu/math. James Solazzo can be reached at jsolazzo@coastal.edu or 843-349-2717.

DEPARTMENT OF KINESIOLOGY, RECREATION AND SPORT STUDIES
Gibson F. Darden, Ed.D. Department Chair
The Department of Kinesiology, Recreation and Sport Studies at Coastal Carolina University is a dynamic unit of high-quality faculty who study and promote human movement as applied to current and emerging physical activity, sport, therapeutic and recreation settings.

The department is currently home to 15 full-time faculty and 700 undergraduate students who study within the academic majors of exercise and sport science or recreation and sport management.

Our mission is to provide students with the knowledge, skills, abilities and attitudes for effective leadership in today's physical activity, recreation and sport. Our faculty members engage students in hands-on research, community service projects and field-based leadership opportunities.

Please explore our programs and services, and we hope you decide to join us. We think you will soon discover why our programs are fast growing, cutting edge and first choice.

Please visit the Department of Kinesiology, Recreation and Sport Studies website at www.coastal.edu/hkss. Gibson Darden can be reached at gfdarden@coastal.edu or 843-349-2944.
The Department of Computer Science and Information Systems at Coastal Carolina University provides high quality training that prepares students for careers in computer science and further study at the graduate level. At Coastal Carolina University you will find a dedicated faculty that cares about you as an individual. The computer science faculty is committed to excellence in teaching and to providing an outstanding educational experience for its students. While enjoying small-sized classes, you will find an up-to-date curriculum that offers a wide range of computer science courses.

The Department of Computer Science and Information Systems recognizes the importance of providing a high-quality education for its majors. Furthermore, we recognize that a part of our responsibility is to determine how successfully we have accomplished this. As a result, we have identified three major content areas and several specific objectives within that framework.

Please visit the Department of Computer Science and Information Systems website at www.coastal.edu/csis. Teresa Burns can be reached at tburns@coastal.edu or 843-349-2225.
Researching for

HEALTHY HEARTS

by Paul Richardson, Ph.D.
Associate Professor of Biochemistry
Heart disease is the leading cause of death for men and women in the United States. Every year about 785,000 Americans have their first heart attack or stroke, and another 470,000 have their second or third attack. In 2008, more than 25 percent of all deaths recorded were due to a coronary event. In 2010, it was estimated that the United States spent $108.9 billion on health care services related to coronary events. Millions of Americans get their blood tested every year to check their High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL). The HDL contains the "good" cholesterol that is about to be removed from the body, but the "bad" LDL contains cholesterol that can still remain in the blood and form plaques. High plasma levels of LDL-cholesterol and apolipoprotein B are risk factors for atherosclerosis.

Apolipoprotein B (ApoB) is an important protein responsible for transporting lipids and cholesterols in the blood. It is a large protein of 4,536 amino acids that can be expressed in its full length form called apoB-100 or in a truncated form, called apoB-48, both of which function to transport these lipid/cholesterol molecules. Apolipoprotein B surrounds the lipid droplet and keeps the particle together. The problem with these molecules is that they can connect and bind to one another in the blood capillaries, forming a plaque that can restrict blood flow. Because these plaques are insoluble in water, they cannot be dissolved by any means we know of. They can continue to grow over time, restricting blood flow, and they are difficult to detect until too late, when a heart attack or stroke takes place. If we can figure out how these particles form at the molecular level, we might find a means to stop these plaques from forming and prevent heart attacks or strokes.

As part of a collaboration I have set up the Dashti lab at the medical school of the University of Alabama, Birmingham, I have spent the last 10 years studying apolipoprotein B so we might better understand how it functions. First we started trying to make an all-atom molecule, so we could understand its functions at the molecular level. Because the size of the lipid droplet can change, so can the size and arrangement of the apoB molecule, which has made experimental determination of its structure impossible. A new technique called homology modeling had to be used to get at this problem. Homology modeling is a computer-based process where a molecule is determined based on experimentally determined molecules that are very similar to what is unknown.

For example, let us say that we've never seen a Chanticleer, but we know it is similar to a rooster and it is green. Based on facts and photos of known roosters, we could make a good approximation of what a Chanticleer is. That is the same technique we used to come up with the first all-atom model of apoB that was published right before I arrived here at CCU. From these models we have been able to predict properties of the protein and get a better understanding of how the protein functions and how lipids bind to the protein. For the last eight years we have been using this model to make predictions on how the lipids bind to apoB, so we can better understand how the particles form and how they function. From this model we have been able to publish numerous papers that experimentally prove the predictions that were generated using the computer models. The goal of these computer models is to greatly speed up the investigative process by directing the scientific research being conducted.

The ultimate goal is to explain, at the molecule level, how the plaques form and find new ways to stop that function. We have made a lot of discoveries over the last 10 years, and I hope to make many more as we continue with this research, as we just got an NIH grant to continue this work for another four years. I hope these models will help lead to a new class of drug that can significantly cut down on the formation of plaques and provide another alternative to the cholesterol-lowering drugs we currently use.

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Paving the Way for Better Antibiotics

by Riane Petersman & Ina Troutman

Biochemistry majors
acteriophages are absolute parasites, or viruses, that solely infect and destroy bacteria. They are one of the most abundant entities on Earth and carry all the information needed to direct their own reproduction once introduced into a host cell. In the past, phages had been used as prophylactic and therapeutic agents against bacterial infections before the discovery of antibiotics. Since the discovery of antibiotics and their widespread use in fighting bacterial infections, there has been an emergence of bacteria resistant to antibiotics. This has led to an inevitable augmentation in antibiotic production, which is both expensive and time consuming.

The purpose of our study is to search for naturally occurring phages and test their ability to infect and lyse bacteria of infectious diseases such as *Staphylococcus aureus*, the bacteria responsible for staph infections. We collect random samples by swabbing behind the ear and inside the nasal passage. Then we amplify the samples in the lab using LB broth and staph bacteria cultures. Next we plate the samples, and incubate them for 24 hours. Finally, we examine the plates for potential areas of lysis, which is portrayed by a translucent spot containing a lack of bacteria.

Phages provide an alternative therapeutic agent against evolving strains of bacteria due to the fact that they can simultaneously mutate with the bacteria. This concept is imperative due to the rapid evolution of bacteria and the unequal progression of antibiotics. This research could provide significant advancements in the prevention and treatment of infectious diseases through the bacteriolytic actions of phages. Not only will this research impact the innovation of medicine and benefit the health of the society, but it will also improve agricultural settings and the safety of food production.

Being part of the research team with Prof. Paul Richardson in Chemistry has multiple benefits, especially since we both have aspirations to attend medical school. We have been given the opportunity to enhance our education through this experience. Not only have we gained a better understanding of lab techniques, but we have also had hands-on experience with human subjects. Following protocols and safety precautions will prepare us for a career in medicine. By attending conferences and presenting our research and findings, we have been able to expand our communication skills. In the future, this will enhance our ability to work with others. Everything we learn in and out of the lab while doing medical research will help us pursue our long-term goal of becoming a significant asset to the medical field. We are both exceptionally proud to be a part of Coastal Carolina’s undergraduate research team.
“Every contact leaves a trace,” says Dr. Gil Grissom, one of the characters on the hugely popular television show CSI: Crime Scene Investigation. He’s talking about Locard’s exchange principle, postulated by early 20th century forensic scientist Edmond Locard, who was the director of the first crime laboratory. The Locard theory is based on the idea that when a criminal leaves a crime scene, he always leaves some kind of trace evidence behind and takes some away with him. While Locard and Grissom were referring to physical evidence, such as fibers, prints or DNA, Locard’s principle applies to digital evidence as well.

Consider, for instance, the act of sending an email. Traces of that email exist not only in your computer but all over cyberspace. When you start typing the email, it is stored in your computer’s temporary storage area, known as Random Access Memory (RAM). While you’re typing, it may also get saved periodically to a temporary file on the computer’s permanent storage area, the hard drive, even if you never click save. This is due to the autosave feature in many applications. If your computer is using up most of its physical RAM, then sections of that RAM will be copied to another special file on the hard drive to free up space for new data. This is called swapping out the data.

So, already there are potentially three copies of that email before you have even saved it.

Once you click send, the email is copied to the sent messages area of your email application, probably on some server somewhere in the world, as well as on your own computer or mobile device. The email server most likely has a backup routine where it backs up its data periodically, so the email is also on a backup storage device somewhere. As it is sent through the Internet to the destination email server, it is temporarily stored on each Internet routing device along the way. If unencrypted, as most email is, it could be viewed straight off the network by an administrator or curious person using network-sniffing software, and potentially stored in the sniffing software’s log files. When it finally reaches the destination email server, it is stored on the server’s hard drive, or some storage device attached to the server. The recipient may download a copy of the email to his own computer, where it’s stored on the computer’s hard drive and temporarily in RAM again. Whew—that’s a lot of copies of that one email! Now even if the email is somehow deleted from all of those storage devices, it may still be recovered using special forensics software to recover deleted files that have not yet been overwritten with new data.
So who are the experts who can gather and make sense of all this digital evidence? Coastal's own students are now getting a head start toward this exciting career. Information Systems professors Crysta I Edge and Mike Murphy have been working with the Wall College of Business to offer instruction in digital forensics for undergraduate and graduate computer science, information systems and business students. These students are learning about such topics as:

- Evidentiary procedures for preserving evidence
- Retrieving and preserving evidence from mobile devices
- Studying Windows operating system artifacts to gather information about connected network devices, previously installed software and general activity of the system
- Forensic imaging (reliable duplication of data)
- Gathering and analyzing volatile data from RAM

Last spring, forensics students wrote, produced and performed an educational (and hilarious) play called CSI: Coastal. In the performance more than 100 CCU students and faculty, demonstrated potential uses and methods of digital forensics in a legal investigation. Evidence was gathered from mobile phones found at the crime scene, from the suspect's email communication at work, from Facebook account activity and from data stored in a printer's memory, as the student investigators linked a murder to a spambot organized crime ring. The play ended with a big (cardboard) car chase and (plastic) handcuffs around the main suspect, who had inevitably left a small digital trace that led the investigators to the truth.

While this course was originally created as part of a Graduate Certificate in Fraud Examination, we anticipate more offerings in the forensics and security areas, as demand for professionals in these fields grows both globally and locally. Two recent graduates of the Department of Computer Science and Information Systems are currently working in the research and development division of WetStone Technologies, a company specializing in digital forensics software products, research and training. The annual TechnoSecurity and Mobile Forensics conference, held in Myrtle Beach each summer, brings several days of instruction and presentations from leaders in the digital forensics field. Several of our students have attended this conference thanks to generous sponsorship from The Training Co., the conference organizer.

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What is a Fellow to do?

by Craig Gilman, Ph.D.
Associate Professor,
Physical Oceanography
What are some of the challenges for students pursuing their Master of Science degree in CCU’s Coastal Marine and Wetland Studies (CMWS) program? Certainly coursework and thesis research come to mind, but what about middle school science standards and development of high school biology lessons? For a select group of CMWS students, the challenges of middle and high school environments are also a part of their daily lives, after being awarded a $30,000 GK-12 Fellowship from the National Science Foundation (NSF).

A decade ago, the National Science Foundation (NSF) developed the Graduate STEM Fellows in K-12 Education (GK-12) Program recognizing that, in addition to being competent researchers, graduate students in science, technology, engineering and mathematics (STEM) must be able to communicate science and research to a variety of audiences. Coastal Carolina University was awarded a $2.3 million grant in 2008 to run a GK-12 Program for five years. Each year six to eight CMWS students conducting research in the coastal environmental are awarded GK-12 Fellowships and placed in local middle and high schools to aid science instruction. Each fellow is partnered with one local science teacher and aids that teacher throughout the year. During the academic year the researchers develop inquiry-based lesson plans based on their thesis research, enabling the students to learn about science being conducted in their local coastal environments. When not directing developing lessons based on their thesis research, the fellows are responsible for enhancing the middle or high school curriculum with hands-on, inquiry-based format. Each fellow spends 10-15 hours a week in the classroom, and often becomes a role model to the children, some of whom have never met a “real scientist” before.

Science can be the least favorite subject for middle and high school students; however, GK-12 Fellows try to help create a classroom atmosphere of excitement and exploration as students become active participants in learning science. “When I’m in the classroom, students know they are going to do something fun. It’s exciting to see,” says 2012 Fellow Kim Trinkle. According to two-time GK-12 Teacher Julie Helgerson of North Myrtle Beach High School, “I believe it is important to keep my classroom and my teaching exciting, real and relevant for my students. Participating in the GK-12 Program enables me to bring a ‘real scientist’ into my classroom to share his or her real life experiences of research in the marine environments. It opens the students’ eyes to opportunities/careers that they may have been unaware existed. I am excited to have the opportunity to bring more inquiry into my classroom.”

A highlight of the GK-12 Program at CCU is having each GK-12 Fellow act as a research team leader during the summer before the school year begins, so the GK-12 experience for some teachers begins the summer before the fellow steps into the classroom in August. Each fellow is also matched with an undergraduate STEM major who spends 200 hours assisting the Fellow with his or her thesis research. One half of the teams are joined by the fellows’ local teacher, who assists the research team for 120 hours. Catherine Pons of St. James Middle School joined GK-12 Fellow Moriah Moore in the summer of
2011 in her study of rays and sharks. “My field work this summer with Moriah Moore was so educational,” says Pons. “Exploring the local waters and studying the sharks and rays was something I have always been somewhat fearful of, but she made it so easy for me to apply the learning in my classroom. My students have experienced such exciting classroom adventures under her direction. The smiles on their faces during our recent shark and ray dissection was so enlightening to me as their science teacher. I wholeheartedly recommend the GK-12 Program for all teachers of science.”

During the first year of CCU’s GK-12 Program, teacher Jack Hord of Loris Middle School assisted Fellow Craig O’Connell in testing whether magnets work as a shark repellent due to the electromagnetic sensors located around the snout of most sharks. Hord says that his experience catching and tagging sharks helped him create lesson plans that have captured his middle school student’s attention. “It’s all about the wow factor. If I can make them say ‘wow’ then I know I’ve got them,” says Hord. He also reports that students in his classes are now exposed to science they never would have experienced without the GK-12 Program.

The goal of the GK-12 Program is not to change the career path of CMWS students away from research and toward education. Instead, it is to give the graduate researchers experience in a facet of science they likely would not encounter in their graduate work. Most GK-12 Fellows have continued with their research careers after graduation from the CMWS program. A few have changed their career plans and become science educators. Says GK-12 Fellow Kim Trinkle, “Being in the classroom and seeing students without much of a science background become interested in science has made me rethink my career path and I’m now wanting to become an environmental educator.”

The need to convey the importance and excitement of science to the next generation is vital in this time of significant scientific issues such as climate change and extinction of species. The GK-12 Fellows are able to achieve this by making science classes more dynamic and engaging to students, involving students in local coastal research, and showing them the importance of this science to their lives. 2012 GK-12 Teacher Jennifer Osborne of Forestbrook Middle School reports, “Our students are willing to work extra hard to prove themselves to our fellow, and they really look forward to the time that she spends in the classroom. Not only are the students truly engaged, but the test scores are showing remarkable gains.”

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Have you ever wanted to let our nation’s leaders know what you think? Well, four health promotion students along with their professor did just that! Jeremisha Coakley, Ryan McClain, Ashley Shelley, Shamirra Williams and Prof. Sherer Royce met with staff from U.S. Sen. Lindsey Graham’s office while attending the 15th Annual Health Education Advocacy Summit in Washington, D.C., in March. This occasion was an experiential component offered in their health promotion course: Health Policy and Law.

Three busy days (and nights with homework) were spent in the nation’s capital learning the finer points of advocacy, becoming educated about three current public health issues, and practicing new skills for creating messages that are heard and remembered. The crown jewel of the experience, however, was learning how to engage elected officials on topics that they may not support and then visiting Capitol Hill for meetings with members of Congress and their staff.

The CCU Health Promotion students educated Sen. Graham’s health care legislative assistant about the importance of retaining disease prevention funds in the Congressional budget and how prevention positively impacts our country’s overall health including the economy and our national security. “Our voices are being heard and WE are making a difference!” stated one of the students very excitedly after a 30-minute discussion in Sen. Graham’s office. Another quipped eagerly, “I want to move to Washington.” Attending the summit provided an opportunity for the students to connect their classroom curriculum with a real world experience. In other words, theory was put into practice.

“The experience was powerful and transformative for each of us,” said Sherer Royce. “To experience lawmaking firsthand and having an opportunity to shape policy was intoxicating. The time Sen. Graham’s office afforded us was significant but more importantly, the professionalism and respect with which my students and I were treated was exceptional.” Additionally, during the short trip to Washington, the students were able to network and spend time with leaders in public health and other students (mostly graduate) from around the country. “It is safe to say that more than health policy and advocacy was learned on this trip. I believe we each learned a little more about ourselves and developed confidence in our professional roles as public health educators,” said Royce.

The Advocacy Summit was sponsored by the Coalition of National Health Education Organizations (CNHEO) and the Society for Public Health Education (SOPHE). More than 200 public health professionals and students attended this professional development workshop. The four Health Promotion students from CCU represented the first delegation from a South Carolina university that has ever attended. These students hope to return next year with a few more CCU health promotion recruits in tow. Besides, the food choices in the Dirksen Senate Office Building mess hall “rocked!”

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Improving Design

by Paul Gayes, Ph.D., Director, Burroughs & Chapin Center for Marine and Wetland Studies

The Center for Marine and Wetland Studies Team on $700,000 Study to Improve Wind Turbine Design for Southeast U.S. Offshore
Coastal Carolina’s Burroughs & Chapin Center for Marine and Wetland Studies continues to advance the region’s marine renewable energy potential. The Center has teamed with the Savannah River National Laboratory (S.C.), National Renewable Energy Laboratory (Colo.) and MM I Engineering (Calif.) to characterize and model extreme wave forces to be expected during hurricanes offshore the Southeast U.S. to optimize design of future offshore wind turbine structures. The new $700,000 study will examine the spatial variability in hurricane wave conditions in the Southeast, field test the advanced models using the Center’s met/ocean instrumentation and new technologies and evaluate the suitability of various wave theories for design applications on the shallow Southeast continental shelf.

The effort builds upon the recently completed “Palmetto Wind Study” that gathered wind, wave and current observations for one year at six locations in the ocean off South Carolina’s Grand Strand to validate the wind resource potential for future energy production. Because the coastal ocean interacts in complex ways with the coastal atmosphere, Center researchers interactively coupled ocean and atmospheric models to better characterize the wind energy potential off the coast and oceanic effects. Through the wind studies to date, more than $1.5 million of advanced meteorological and oceanographic instrumentation and a state-of-art ocean-atmosphere modeling capability has been established in the Center with a growing list of research partners at universities, national laboratories and private industry across the country.

Closer to campus, Center staff have been actively participating in the “North Strand Coastal Wind Team” that installed two “small” wind turbines in the City of North Myrtle Beach in February 2012. The city recently changed its ordinances to allow for installation of wind turbines. This is part of an overall initiative to emerge as national leaders in the technical, educational and economic aspects of the developing U.S. offshore renewable energy industry.

The Center was an “Event Partner” for two large renewable energy conferences: the first was the Southeastern Wind Conference held in Charlotte, N.C., on May 8-9, 2012 (http://www.secoastalwind.org), and the second was the national American Wind Energy Association National Windpower 2012 in Atlanta, Ga., June 3-6, 2012 (http://www.windpowerexpo.org/).

The Center is also finishing a year in the National MesoUS program (and about to start the next), which is expanding the national atmospheric network of observations that feeds into the National Weather Service for forecasting and extreme weather reporting. We’ve partnered with N.C. State University as a SC/NC team. Our diverse systems (sensors at piers, buoys and with partners SODAR (Sonic Detection And Ranging)) and instruments that can profile wind speed and direction up into the atmosphere within the coastal zone are of increasing interest in the very complex coastal system that is influenced by land/sea and atmospheric processes.

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Reoccurring seasonal hypoxia has been observed during summer months in the coastal zone of Long Bay, S.C. Dissolved oxygen concentrations are episodically (periods of hours to days) reduced to levels creating stressful conditions for the local biota. Extreme cases of such water quality degradation, in some coastal settings, can result in fish kills and other negative impacts on delicate coastal ecosystems. Water quality is an increasingly important topic in coastal areas such as Myrtle Beach. Wide-reaching implications range from purity of drinking water to transport of pollutants through the coastal environment. In many coastal areas, tourism is the main economic driver, and healthy beaches with safe waters for recreation are paramount.

Development of hypoxia in Long Bay is unpredictable and results from complex chemical, physical and biological interaction. Ultimately, a source of nutrients is needed to stimulate increased biological activity, eventually diminishing the dissolved oxygen supply. In addition to overland inputs (tidal creeks, rivers, storm water inputs), submarine groundwater discharge (SGD) may be a significant source of nutrients and trace metals to surrounding waters. The often-overlooked SGD transport pathway may provide the stimuli to enhance biological activities to levels where oxygen consumption rates exceed those of production thus facilitating the formation of hypoxia in the nearshore.

Under the direction of Prof. Rick Peterson, a research scientist at the Burroughs & Chapin Center for Marine and Wetland Studies, CCU graduate student Leigha Peterson is investigating the temporal and spatial variability of SGD into local tidal creeks that ultimately discharge to the nearshore ocean. In pursuit of determining the impacts that surface water and groundwater flows have on nutrient transport, a fellow graduate student, Patrick Hutchins, has dedicated his thesis research to analyzing components of both of these inputs. Hutchins extends his research...
Extreme cases of water quality degradation, in some coastal settings, can result in fish kills and other negative impacts on delicate coastal ecosystems.

to evaluate SGD and overland inputs as they relate to stimulation of biological activity in the coastal ocean. The objective of Leigha Peterson’s and Hutchins’ projects is to try to isolate the impact of SGD inputs on the formation of hypoxia.

Hutchins’ research relies on carefully thought-out biological experiments in controlled environments. He feeds his experiments with a range of natural waters from the inputs described above. During each experiment, he measures how nutrients are consumed and what types of microscopic organism are the main consumers. He can determine which water source best stimulates biological activity in the ocean, a step that will lead to the relative influence of each input on the formation of hypoxia.

Leigha Peterson measures radon-222 as a proxy for the presence of SGD in coastal waters. Radon is naturally occurring and is derived from geological materials, concentrating in groundwater. Results to date show that elevated radon activities (increased groundwater inputs) correlate with decreased oxygen levels, suggesting SGD may be significant in the formation and duration of hypoxia.

Within the College of Science at CCU, several faculty and staff members contribute to the study of hypoxia in Long Bay. Presently, the study is funded by a grant from the National Oceanic and Atmospheric Administration to the University of South Carolina and Coastal Carolina University. The Environmental Quality Lab under the direction of CCU faculty scientists Susan Libes and Michael Trapp has also helped lead the overall research effort. As a result of this large, cooperative effort, many CCU students have gained experience in conducting scientific research and disseminating their results.

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High Fructose Corn Syrup:

Villain or CHEAP DATE?

by Sharon H. Thompson, Ed.D., CHES
Professor of Health Promotion,
Department of Health Promotion
**Q:** What do Heinz Ketchup, Wishbone Ranch Dressing, Oscar Meyer Pickle and Pimento Loaf, Clausen Relish, Vicks Formula 44 Cough Syrup and Stove Top Stuffing all have in common?

**A:** These products, along with many others on supermarket shelves, contain **High Fructose Corn Syrup**. This sweetener is processed from corn, is sweeter than sucrose (table sugar) and is inexpensive due to food subsidies.
Although nutrition research involving animals does not necessarily translate to the same health effects on humans, several studies have found negative metabolic effects when rodents consume high amounts of high fructose corn syrup. Food manufacturers often use high fructose corn syrup because they can sweeten foods at minimal cost. The United States Department of Agriculture reports that our daily consumption of high fructose corn syrup has increased from 2 to 165 calories per day over the past 40 years. During this same time period, our sugar consumption has dropped from 343 to 222 calories. With high fructose corn syrup found in so many foods and very widely consumed, many people wonder if it may affect health more negatively than sucrose (table sugar). Unfortunately, research findings are inconclusive and controversial.

To better understand the differences between sugar and fructose, we will begin with an examination of the characteristics of both. Sucrose provides 4 calories per gram and is a disaccharide composed of glucose and fructose. Most sucrose purchased in our country comes from processing sugar beets or sugar cane. Of all forms of sucrose available, molasses is the least refined form. Fructose also provides 4 calories per gram but is a monosaccharide. Fructose is found in fruits and fruit juices and can be absorbed directly into the bloodstream during digestion.

High fructose corn syrup is a processed food that is different from fructose and sucrose. To make high fructose corn syrup food, manufacturers process fructose from corn and then blend this with glucose. Generally, most high fructose corn syrup in our country is a blend of 42 percent to 55 percent fructose with glucose. Although sugar and high fructose corn syrup contain both glucose and fructose, they differ in chemical composition. Sucrose is a single molecule with fructose and glucose coupled. In high fructose corn syrup, the fructose and glucose are separate molecules. Because there are twice as many molecules in high fructose corn syrup as compared to the same percent solution of sucrose, there are more molecules triggering the sweet receptors on the tongue. As a result of the manufacturing process for high fructose corn syrup, the fructose molecules in the sweetener are free and unbound, ready for absorption and utilization. In contrast, every fructose molecule in sucrose (from cane or beet sugar) is bound to a corresponding glucose molecule and must go through an extra metabolic step before it can be utilized.

Because sugar and high fructose corn syrup differ in chemical composition, some experts believe there may be differences in the ways these foods affect calorie intake and weight gain. Some researchers have reported that high intake of fructose, particularly from sweetened liquids, may increase calorie intake and obesity through the blunting of hormones responsible for satiety. These blunted responses may not lead to feelings of fullness and then result in consuming increasing calories.

Although nutrition research involving animals does not necessarily translate to the same health effects on humans, several studies have found negative metabolic effects when rodents consume high amounts of high fructose corn syrup. For
example, a recent study in *Pharmacology, Biochemistry and Behavior* from Princeton University revealed high fructose corn syrup caused much more weight gain than sucrose in laboratory rats. The researchers performed two separate experiments using high fructose corn syrup and sucrose water. In the first experiment, the rats that were given water sweetened with high fructose corn syrup in addition to their rat chow gained significantly more weight than those that received sucrose water along with their chow. In their second experiment, researchers examined the long-term health consequences for rats with access to chow and high fructose corn syrup. These rodents had changes similar to those experienced by humans when they develop metabolic syndrome: abnormal weight gain, increases in triglycerides, and more belly fat. Those with access to high fructose corn syrup also gained 48 percent more weight than those rodents fed a normal diet.

Most human studies are small in number and examine the effect of fructose rather than directly comparing the health consequences of sucrose versus high fructose corn syrup consumption. For example, Fach and colleagues reported six days of high-fructose overfeeding in healthy, young male volunteers led to a substantial increase in plasma triglycerides. Furthermore, Hallfrisch and others conducted a crossover study where they fed 12 hyperinsulinemic men and 12 male controls diets with three varying levels of fructose for five weeks each. To keep caloric intake the same, starch calories were increased when fructose levels were lower. Among these men, total cholesterol and LDL cholesterol were significantly greater at the higher fructose levels.

Those researchers who believe there are no differences between sucrose and high fructose corn syrup in promoting weight gain insist that focusing on fructose as a major reason for our increases in weight just distracts us from further investigation of other causes of obesity. We know obesity is a complex problem that cannot be blamed on one nutrition behavior. There is, however, one item that most nutrition researchers do agree on and that is the need to examine the metabolic consequences of high fructose corn syrup as compared to sucrose at normal population levels in randomized prospective trials.

Daily, Americans consume 44 more calories per person from sweeteners (from both sucrose and high fructose corn syrup) than we did 40 years ago. This caloric increase could contribute to a 4- to 5-pound yearly weight gain. Epidemiological studies show growing evidence that consumption of any type of sweetened beverages is associated with a high-energy intake, increased body weight, and the occurrence of metabolic and cardiovascular disorders. Limiting use of caloric sweeteners or the consumption of processed foods that contain them is an important lifestyle change to maintain a healthy body weight and improve health.

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From a small town in **NEW HAMPSHIRE.**
to teaching at CCU

a Personal Narrative
by Jennifer Selman, Teaching Associate, Biology
So when "Rocky" asked me to write this article of how I ended up coming back to Coastal and what originally brought me to this point, I thought "no problem, that should be easy." Boy, was I wrong. Writing this was more difficult than I thought, so I figure I will just start at the beginning.

The idea of being a biologist began a long time ago for me. As far back as my memory can serve me, it began in the 4th grade. I remember telling my parents, "When I grow up, I want to be a biologist." I was fortunate to grow up in one of those "naturey" (yes, I know that isn't a real word!) families that loved the outdoors. My parents would take my sister and me hiking in the White Mountains of New Hampshire, and I would also spend time going mineral collecting during the summers with my dad. I think it helped that I grew up in a small town with a very big yard and lots of trees. I have always thought nature was fascinating. I remember once I had the opportunity to watch a yellow spotted salamander lay her eggs in the pond on our property and I thought that was the greatest thing ever. Pretty much ever since, then I've been hooked.

My desire to study science only became stronger when I went to high school. I had the fortune of attending a private school that was very down to earth, environmentally friendly and very into the outdoors. And I had a really enthusiastic and very funny AP Biology teacher. Once I graduated I went to study general biology at the University of New Hampshire where I had the opportunity to take some amazing classes. Among some of my favorites were field limnology and then two off-campus courses, one located on St. John in the U.S. Virgin Islands and another called Field Marine Science located at the Isle of Shoals. It was a month-long course that involved intense learning and a field experiment. I had the great pleasure of learning what it feels like to have a seagull poop on your head! All of these experiences just made me love science more.

When I finally graduated in 2002 with a bachelor's degree in biology, I of course wanted to land my dream job, which much to my regret, never came. Graduating during an economic downfall isn't exactly the greatest timing. After having received what felt like hundreds of "Sorry, we aren't hiring right now," I decided to check the National Association of Independent Schools website, since I was a product of one of those schools. I was in luck. A private school in New York was looking for a middle school science teacher. Now you might ask, what type of school was it? Well, it wasn't your average school. It was a military school, and boy, did that turn out to be an adventure. I applied, had a two-hour interview, got the job and moved to New York. Then it began – the fun of teaching science to young, inquiring minds, is much more difficult than it sounds. There is something to be said for girls and boys in middle school. I think the best part was making them do push-ups when they got out of hand. Well, I guess that really wasn't the best part.
The best part was the email I received from one of my students a year after he had moved on to greener pastures, thanking me for teaching him all about science and having high expectations—so much so that he was placed in an honors science class. Letters like that change everything.

After three years of teaching there, I decided it was time to move on. I landed a job at the W. Alton Jones Environmental Education Center in Rhode Island where I spent a year doing nothing but having fun. I would actually say that if it had paid more and I didn’t have to share living space with five other people, I probably would have never left. There is nothing better than teaching in the field. Whether it was rain, snow or sun, I was teaching, and it was fantastic. Two thousand acres of land was like having your own personal outdoor playground. Alas, I left there when I decided to go to graduate school. I remember telling my family, “I just want to get my master’s degree to have a master’s degree.” I knew what I wanted my research to focus on; now I just needed to find a program on the East Coast that was a good fit. So the search began.

Coastal Carolina University wasn’t initially at the top of my list, but that all changed after I had a meeting with John Hutchens in the Department of Biology. I immediately knew that he would make a great fit as an adviser and some of his previous research fit what I wanted to do research on. I came to Coastal in 2006 as a graduate student in the Coastal Marine and Wetland Studies Program and was able to get a teaching assistantship. I balanced my research (investigating the impacts of localized development on the benthic invertebrates of the high salt marsh), teaching and coursework, and in the end, it all came out well. Throughout all of this, I learned some very important lessons: the salt marsh is incredibly stinky at low tide; Juncus is a salt marsh plant that can poke your eye out if you’re not careful; and having a research partner is invaluable. I also learned that Dr. Godwin isn’t quite as intimidating as he appears, (but don’t tell anyone, especially him, that I said that) and that I couldn’t have finished my degree without my adviser and my committee. But in the end, once the defense is over and you hear those fantastic words from Dr. Godwin as you finalize your thesis about how your defense “kicked butt,” you know it really is actually over, and that is a great feeling! In the end, I was still looking for the perfect field research job. Once I graduated in 2008 I set out for Maryland with my significant other, who is now my fantastic red-headed husband, to be closer to D.C., and other science jobs. In hindsight, that was probably one of the worst decisions I could have made (not the husband part, but the moving part!). 2008 was not a great year for the economy or my dream job. After being jobless for eight months, I landed a job stocking shelves at the Christmas Tree Shop, which of course, is not a biologist’s dream job. After seeming a little desperate to find something better suited to my degree, I decided to get in touch with Sharon Gilman at CCU, who was the department chair at the time. I couldn’t have had better timing. The faculty member teaching the Biology 101 lectures and coordinating the labs had decided that doing both was more then she wanted to do. So two weeks later, we had packed and moved to South Carolina. A little over a year after graduating I was back, and I have been at Coastal ever since.

I first started teaching a couple of the Biology 101 labs and coordinating all of the lab sections and what I discovered was that I really, really liked coordinating and teaching. It seems I did find a job that was fantastic, but I didn’t really realize it at the time.

I have so much fun teaching non-majors. I find them challenging, amusing, pretty entertaining and, all and all, a great bunch of students. I happen to be one of those over-the-top, loud teachers who has no problem making a complete fool of herself in front of her students. I like the challenge of getting them excited about some portion of biology. I think what is worse is that I absolutely love sarcastic students, and they can sometimes be some of my favorites. They help keep the class lively, me on my toes and they are great for bouncing goofy comments off of, which during the 3 p.m. lecture time can be an absolute necessity. If you have ever been a student or a teacher, you’ll know of the 3 p.m. “sleepies” that I am talking about. I let my students know about my love for things with sticky feet like tree frogs and geckos, and that I think most things they would think are ugly or gross, I find adorable. I really enjoy teaching them and usually find out in my evaluations whether or not they seemed to enjoy it too. I think one of my favorite comments was that one of my shortcomings was that I never brought a monkey to class, which might tell you a little something about the students I teach. Overall, I couldn’t be happier teaching and coordinating, but yes, I do sometimes get that research itch and maybe someday I will satisfy it and get my doctorate. But who knows, only the future and time will tell. For now, I am right where I want to be.

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Getting people to stop smoking is a major priority for health departments and agencies at the federal, state and local levels with smoking-related diseases estimated to cost the U.S. health care system more than $150 billion per year.
The 2009 South Carolina Youth Risk Behavior Survey indicates that 53 percent of the state's high school students have tried cigarette smoking, with 20 percent of students having smoked at least one cigarette in the past 30 days. Only 1-in-12 high school students report being daily smokers. We know that roughly half of those who begin smoking regularly as adolescents continue to smoke well into adulthood. Approximately 19 percent of people 18 and over in the U.S. smoke cigarettes. These data indicate that while many adult smokers begin at a young age, others do not begin smoking until their early 20s. People may take one of various pathways in beginning smoking. One finding from our study is that smokers also describe various pathways to quitting.

Institutional interventions mainly focus on campus smoking restrictions, smoke-free policies, anti-tobacco messages and cigarette pricing to help reduce smoking behaviors. Previous research indicates these kinds of policies do have a positive influence on reducing tobacco use among college students. With recent changes to the university smoking policy at Coastal Carolina, as well as new restrictions and advertising campaigns in Horry County, we wanted to understand how these new institutional policies affected smokers on campus. We interviewed 18 campus smokers in-depth to understand their past, present and planned future smoking behaviors. We have discovered the decision-making processes smokers go through in determining if and when they should stop smoking. Figure 1 (located on page 29) illustrates the smoking pathways smokers described during the interviews.

For those who begin smoking in adolescence, the beginning to smoke has little to do with the biological effects or personal enjoyment (taste) brought about by smoking itself. The first time an adolescent smokes is often brought about by the perceived image of cigarette smoking, either as something adults (parents, older siblings, older friends)
do or as something that indicates a rebellion against institutional (school, family) norms that appeals to the adolescent. For some, that is not enough positive reinforcement to continue smoking. For others, however, they begin to learn the process of smoking (e.g., inhaling properly; which kind of cigarette offers the best flavor to them) that makes smoking more enjoyable. Those regular smokers who enter college begin to experience additional positive effects, such as the act of smoking serving a calming effect before and after exams. This calming effect becomes a routine part of a smoker’s day, leading to the act of smoking becoming a natural aspect to one’s life, and cigarette smoking itself becomes more addictive.

Daily cigarette smokers often do weigh the costs and rewards of smoking. Most if not all smokers are at least somewhat aware of the negative health impact smoking can have on them, with many of those interviewed mentioning family members who have or had severe health issues brought about by smoking. Others are made aware of the negative impact through health information conveyed in school and through the media. Some students described smoking as “slow suicide” in which by smoking they are slowly killing themselves. Since the process appears slow, however, many do not have any immediate plans to quit smoking, but rather plan to quit after graduating (when they believe life becomes more calm) or sometime in the distant future. (“I don’t want to be an old lady smoking a pack of cigarettes a day.”) The majority of those interviewed indicated they had tried to stop smoking at least once for a variety of reasons. The withdrawal symptoms were too strong to enable them to stop long-term. One of the main withdrawal symptoms is the loss of the calming effect smoking has for them. Smoking as a social activity also reinforces the normality and enjoyment people get from the behavior, which leads smokers to become much less likely to want to stop smoking.

Ultimately the issue is how health care practitioners and health promotion experts can increase the success rate of smoking cessation, helping to reduce the overall costs smoking has on our health care system. Further restricting smoking may help reduce smoking behaviors, but there likely is a point where restrictions lose their intended impact. For example, local institutional restrictions that designate very specific areas for smoking (gazebos) actually produce the positive aspect of socialization among smokers, with many students meeting to share a smoke while discussing classes, plans for the weekend and other topics of common interest. Gathering smokers into gazebos may well serve to increase smoking behavior compared to locations that impose no restrictions on where people can smoke outdoors. While smokers rarely view smoking as an important aspect to their self-identity, they do find smoking to be their preferred activity to fill time when they are bored and as the activity to do when they are agitated or anxious. For these smokers, finding alternatives to smoking that serve to fill time and help reduce anxiety could lead to more successful attempts to quit smoking. The connection that needs to be made for some college students to stop smoking is a specific plan to quit, using perhaps a traditional method (e.g., using a nicotine patch or gum to slowly decrease nicotine dependence) in conjunction with a behavioral change (finding alternative behaviors that are calming and enjoyable). Without the behavioral change in place, most students who try to stop smoking end up starting again within a matter of days or weeks.

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The Department of Mathematics and Statistics has initiated a new event, the MA+H: applied Lecture Series. The goal of this ongoing series is to expose undergraduates to the myriad ways mathematics (and statistics) are used as a tool to conduct research in other disciplines. As a department, we are always working to increase the number of students who major in mathematics, but an equally important focus is encouraging students to take just one more math class regardless of their major. The members of the Department of Mathematics and Statistics endeavor to teach the foundations of mathematics in such a way that students of all majors are able to apply this knowledge to their chosen field of study. Math courses typically build upon one another, and each new course adds another set of mathematical (statistical) tools to the student’s "tool box." The clear and obvious fields of study where such tools are employed are computer science, physics and marine science. However, mathematics extends to disciplines outside the College of Science such as economics and finance, political science and music. This is precisely why the Department of Mathematics and Statistics decided to launch a lecture series exploring the numerous applications of mathematics throughout the disciplines.

We were very fortunate to have five wonderful speakers for the inaugural year of the series. Of the five speakers, four were CCU faculty members: Brian Bunton from physics spoke on "The Strange Lives of Elementary Particles," Kehui Xu from marine science spoke on "Linking Mathematics to Marine Science: Numerical Modeling of Ocean Circulation and Coastal Processes in the Northern Gulf of Mexico," John Hutchens Jr. from biology spoke on "Estimating Ecological Success in Natural Populations: An Example from a South Carolina Salt Marsh" and Megan McIlreavy from psychology spoke on "High-Density EEG in Infancy: Heart Rate Defined Sustained Attention and Inattention." Each of these individuals gave wonderful presentations explaining how mathematics is used in their own research.

The closing speaker of the lecture series was David Kung, associate professor of mathematics from St. Mary's College in Maryland. Kung is an award-winning teacher and is famous for his talk "How Math Made Modern Music Irrational." Speaking to an audience of more than 100 students and faculty in Edwards Recital Hall, he played passages from classical and modern composers to illustrate some of the mathematical principles of musical sound—the final conclusion being that no piano is ever in tune.

We're looking forward to the next MA+H series.
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Investigating De-escalation of Athletics Spending

On behalf of the Knight Commission on Intercollegiate Athletics, Michael Hutchinson, Ph.D., assistant professor of recreation and sport management has earned a $5,000 grant to investigate de-escalation of Division I athletics spending. The Knight Commission announced the results in late October of the competitive grants program entitled "Shaping policy and practice in intercollegiate athletics for the benefit of students and institutions." The initial goal of the Knight Commission, formed by the John S. and James L. Knight Foundation in 1989, was to recommend reform agendas emphasizing academic values in an arena where commercialization of college sports often overshadowed the underlying goals of higher education. Since 1989, the Knight Commission has worked to ensure intercollegiate athletics programs operate within the educational mission of their colleges and universities. The Commission received 38 applications from researchers and organizations throughout the country and selected six for funding.

In his second year at CCU, Hutchinson submitted a proposal to examine de-escalation of spending in university athletic departments. With Division I athletic department budgets rising at an alarming rate, recent data shows only a small percentage of institutions earn a profit. As such, when athletic department revenues cannot cover expenses, institutional funds fill the gap. In such instances, a university can find itself in a cycle of escalation of commitment situations. According to Hutchinson, "There are two important reasons for studying this phenomenon. First, it will be meaningful to compile data on what university and athletic department personnel assert regarding the subject of de-escalating the ‘arms race’ in Division I intercollegiate athletics. Second, identifying de-escalation strategies will be beneficial for institutions seeking to break the cycle of escalation regarding athletic spending."

The goal of the program is not merely to produce new knowledge and insights, but to provide real-world information and advice to leaders in college athletics to address the ethical, commercial and academic challenges they face in college sports. Researchers will present their findings at the Commission's summit event next October. "I am very encouraged by the quality and variety of proposals we received," said Carol A. Cartwright, president emerita of Kent State University and chair of the Commission’s review committee. "The work to be done with these grants will be of great value to presidents and others with a stake in college sports."

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Nursing Students in the Community

by Patricia Bohannan, Ph.D., RN

Director of Nursing

Nurses at Coastal Carolina University complete a primary prevention program with a community group as part of their Community Health Practicum. During the 2011-2012 academic year, six groups of students participated in different prevention programs with a variety of community groups. Each program was based on a community assessment and was planned and implemented by three or four registered nurse students. In all, 23 registered nurse students participated.

The programs included hand washing for preschoolers, preventing medication errors for retirees, preventing obesity for a junior high girls' basketball team and preventing sexually transmitted diseases for residents of a homeless shelter.

The 2012-2013 academic year promises to be exciting. This year the students will be working with at-risk adult groups in the Grand Strand area. A generous gift from the Ocean View Memorial Foundation Inc. will provide special health assessment equipment and education materials to screen and teach adults how to monitor their health. Adult groups that wish to have a group of registered nurses present a program should contact Frances Long at 843-349-4152 or Patricia Bohannan at 843-349-4112.

Nursing students (left to right) Lois Rathbun, Edith Bostic and Merinda Bellamy teaching prekindergarten students how to wash their hands.
New College of Science Online Program

Bachelor of Science in Health Administration Completion Program

The Bachelor of Science in Health Administration (BSHA) Completion Program is designed to build on the knowledge acquired in entry-level health professional programs. The purpose of the BSHA is to provide advanced knowledge, values and critical judgment skills needed to assume leadership and management roles in health care settings.

Graduates of the BSHA program will be prepared for advance employment roles and for admission to advanced degree programs such as Master of Business Administration (MBA) or Master of Health Administration (MHA).

The BSHA program at Coastal Carolina University builds on the foundation courses in associate degree programs and the liberal arts core curriculum.

Admission to the program requires:

- An earned associate degree or baccalaureate degree from a regionally accredited college/university with a minimum 2.0 cumulative grade point average and 2.0 grade point average in all professional and science courses.
- Completion of Core Curriculum (see CCU course catalog) for students who do not possess the A.A., A.S., B.A. or B.S. degree. (Statistics required.)
- Current certification and/or licensure in a health care discipline.

Students must submit an application and official transcripts to the Office of Admissions along with a $45 application fee. Applicants may be awarded a maximum of 76-90 credit hours for academic work completed prior to admission to the program. The 48 credit hours required for the major must be completed via distance learning through Coastal Carolina University. For more information regarding the BSHA Completion program, please contact Joanne Myers at 843-349-6568 or email jmyers@coastal.edu.

This program is most appropriate for health care providers who have completed an associate degree certification in an allied health field such as:

- Dental Hygienists and Assistants
- Emergency Medical Personnel
- Histotechnologists
- Medical Laboratory Technicians
- Health Information Management
- Nurses (Associates Degree or Diploma)
- Radiographers
- Respiratory Care Practitioners
- Physical Therapy and Occupational Therapy Assistants

RSM PROGRAM DONATES MORE THAN $5,000 TO FOSTERING HOPE

The Recreation and Sport Management (RSM) program at CCU conducted a sports equipment drive and fundraiser for the nonprofit organization Fostering Hope. The mission of Fostering Hope is to assist foster families in providing a better lifestyle for foster children along the Grand Strand. The sports equipment drive was created by recreation and sport management students in the RSM program’s Sport in Contemporary Society class. The main goal was to get involved in the community and to introduce the benefits of infusing the positive elements of sports into these children’s lives. This was achieved by soliciting and collecting new and slightly used sports equipment and obtaining monetary donations to purchase equipment for foster care children. The efforts provided these foster families with an alternate source of recreation. By encouraging youth to actively participate in sports, the RSM students believe that lives will be impacted. Adding the element of sports into children’s lives can provide them with an outlet and also equip them with the tools needed to adapt to their changing life situations. Students who are actively involved in and who study the impacts of recreation and sports understand the enormous positive impact it has on one’s life. With the help of the CCU campus, our community and local businesses, more than $5,000 was donated to Fostering Hope. We would like to thank everyone for their help and support in making this possible.
Exercise and Sport Science Community Connections

Lisa Barella, Ph.D., assistant professor of exercise and sport science, has made presentations to local schools and organizations relating the importance of physical activity and wellness.

On Feb. 7, 2012, Barella conducted three 20-minute presentations at Ocean Bay Elementary for Family Science Night. The presentations focused on increasing attention to children's health through physical activity.

On Feb. 11, 2012, Barella presented “How to Jump Start Your Wellness Initiative” to the Chicora Rotary Club meeting at the Dunes Club in Myrtle Beach.

On March 14, 2012, two Carolina Forest High School classes learned about careers in sport and exercise psychology.

Barella can be reached at lbarella@coastal.edu or 843-349-4184.

The RSM program works with the Waccamaw Sports Classic
The RSM program assisted in hosting and developing the senior games. The RSM 389 class (Rec & Sport Leadership) helped coordinate the Waccamaw Sports Classic, held in spring 2012. More than 300 senior athletes (50 years and older) participated in the games.

Outdoor recreation adventures
The Outdoor Leadership class created a series of outdoor recreation adventures held in the spring semester 2012.

RSM Program hosts inaugural Golf Scramble
The Recreation and Sport Management program held its Inaugural RSM Golf Scramble in April, 2012. The Scramble was open to anyone who wanted to participate. The event was developed and implemented by the program event management class and helped raise funds for student scholarships.

CSRI case study team
Four recreation and sport management students competed in a national case study completion. Students Jacqueline Leake, Blair Jannelle, Chase McFaddin and John Kasarjian competed against 13 other programs in Chapel Hill, N.C., during the annual College Sport Research Institute conference. This was the third time CCU has participated in the competition. The event was held in April, 2012.

TPG Sports career conference
Ten students traveled to Charlotte, N.C., to attend the TPG Sports career conference during the spring semester. The students had the opportunity to interview with several organizations, including The Carolina Panthers, ESPN networks, The Charlotte Bobcats, The Minnesota Timberwolves, Joe Gibbs Racing and NBA Operations.

Fundraiser for Relay for Life
The Recreation and Sport Management Alliance (student club) held a dodgeball tournament with proceeds donated to Relay for Life. In addition, an Alliance team participated in Relay for life in March, 2012.

Sport marketing class teams up with Horry County Parks and Recreation
The RSM 369 sport marketing class partnered with Horry County Parks and Recreation to design new marketing initiatives. The class developed and presented ideas for a new website, developed informational marketing strategies for the two most underutilized parks and developed a new calendar containing all information for events hosted by Horry County Parks and Recreation.

RSM students work with the Southeastern Regional Games
The RSM program’s sport tourism class helped put on the Southeastern Regional Games in April, 2012. The games included swimming, powerlifting, track and field, and archery. The track events were a qualifier for the 2012 Paralympic Games in London. The students also spearheaded the Paralympic Experience in April, 2012, which was designed to bring in potential new athletes and show them various sports and activities they can be involved in. The students reached out especially to area Wounded Warriors.
For 33 years, Coastal Carolina University has hosted a math contest for high school students, an event intended to stimulate interest in mathematics. The 2012 competition took place at CCU in March with 175 students representing 18 South Carolina schools.

Prof. Subhash Saxena has been involved with conducting this competition and recently retired after 30 years. Saxena, a mathematics faculty member and chair of the Department of Mathematics and Statistics, has created a fund to endow the annual contest.

Throughout the competition, emphasis is placed on the importance of mathematics for all disciplines. In addition to the competition, Menassie Ephrem, Ph.D., associate professor of mathematics at CCU, gave a presentation, "Cryptography, Secret Sharing." Ephrem earned his master's degree at Addis Ababa University in Ethiopia and a Ph.D. from Arizona State. Andrew Incognito, Ph.D., associate professor of mathematics, presented "Contest Solutions." Incognito earned a bachelor's, master's and Ph.D. degree from Temple University.

There were written examinations for the competition. Level I questions were taken from Algebra I, Algebra II and Geometry; Level II questions were taken from algebra, geometry, advanced algebra and trigonometry. Winners received $100 for first place, $75 for second place and $50 for third place in each category.

High schools competing in the contest were: A.C. Flora; Academic Magnet; Academy of Arts, Science and Technology; Aynor; Bishop England; Carvers Bay; Creek Bridge; Conway; Goose Creek; Green Sea Floyds; Hammond; Scholars Academy; South Aiken; Spring Valley; West Florence; Williston-Elko; and Wilson.

School competition winners by category were:

**Competition 1-Level I**: Academy for Arts, Science and Technology

**Competition 1-Level II**: Academic Magnet High School

**Competition 2-Level I**: Goose Creek High School

**Competition 2-Level II**: A.C. Flora High School

**Overall Winner**: A.C. Flora High School
Science programs benefit from a generous gift to the University by Kenneth E. Swain.

A 40,000-square-foot building will consist of labs, equipment, classrooms and office space including 20-22 labs, supply spaces and 30-35 offices. This addition will enable the current science building to convert back to classrooms. A new state-of-the-art science building is also planned to integrate all science instruction, including marine science and computer science.

Mr. Swain has deep interest in “helping students who study health science and for those students to help our communities.” The Swain Scholar Program, a major part of Mr. Swain’s gift, started in 2009 and will soon be receiving applicants for the 4th class of Scholars. Students from classes 2 and 3 share what the scholarships have meant to them.
meet the
Swain scholars

**Allyson League**

Exercise Sports Science, Swain Class 2

Being a Swain Scholar has been a wonderful and exciting journey. Not many college students are given the opportunity to better themselves while giving back to the community. This unique program has given me the opportunity to watch myself mature and grow over the last two years of my undergraduate career. Taking part in the Swain Scholar Program has confirmed my belief in the importance of the health and science fields, while reassuring my personal decision to attend physical therapy school. At first, I was unsure about the direction of my future career, but I have decided that physical therapy and aiding the rehabilitation of others is a way I can make my mark. The Swain Scholar Program values the importance of making a difference in the community while giving back to the students. This program instills a level of motivational drive into each of its members, making them hunger for success and compassionate for others. I am very grateful for this experience and credit much of my outreach experiences to the opportunities presented throughout this program. I hope this program continues to thrive while expanding its wonderful opportunities to the students of Coastal Carolina University.

**Alex Ham**

Health Promotion, Swain Class 2

The Swain Scholarship has been an amazing experience for me over the past year and a half. As a health promotion major, I have had the opportunity to actually implement a health education program from beginning to end and be involved in every aspect of its planning, which is something that many health promotion majors will not get before they graduate. It has provided me with real world experience that is invaluable to my future, both personally and professionally. In addition, it has given me an opportunity to work with an orthopedic surgeon, both in his office and during surgical procedures. As my future goals include attending medical school, this was a very interesting learning experience for me, as I was able to see the day-to-day work of a very specialized doctor in a field that I have not yet been exposed to. These internships will no doubt help me in the future as I apply to medical school to further my education and career.

The Swain Scholarship is something that I would advise students to apply to. Its goal of community outreach, especially to underserved communities, is a noble goal that brings plenty of personal rewards to those who are involved. It gives you the chance to reach out and help people who need it the most while gaining personal experiences in settings that you may have never pictured yourself. I will always look back on the Swain Scholarship as a highlight of my college career, and I am very thankful to Mr. Swain and to everyone else involved who allowed me the opportunity to be a part of its history.
The Swain Scholar Program focuses on community health outreach, and that focus has helped me to realize that I really do want a career where I help and educate people about their health. I have chosen to go into a career in chiropractic, because I want to be able to help all different types of people. Being a chiropractor will allow me to help individuals of all ages by giving them treatment for a specific complaint or giving them preventive/wellness care.

The biggest accomplishment that I can take away from my year and a half of being a Swain Scholar is that I now have the confidence and knowledge to be able to talk to my family, friends, and anybody about their personal health and educate them on what they can do to help themselves.

Iesha Wade
Exercise Sports Science, Swain Class 3
My name is Iesha Wade and I am a junior exercise sports science major at Coastal Carolina University. I recently received the Swain Scholar Scholarship and it has truly had a positive impact on me. It has given me the opportunity to spread the word about healthier nutrition and lifestyles to elementary school children. I think this outreach portion of our program is great because many children are not aware of the healthy decisions they can make that can change their life and possibly their family's view on living a healthier lifestyle. Being a part of the Swain Scholar Program has also given me more experience with communicating and working with other people to achieve a specific goal. It has allowed me to come out of my comfort zone and experience new things. I feel as if my leadership and communication skills play an important role in the physical therapy setting, and you must know how to work with other people. The Swain Scholar Program has given me great experience with these skills and has shown me how to build relationships with others. I am honored to be a part of this program and it has truly made positive changes for my life now and for the future.
Christine Po
Health Promotion, Swain Class 3

My career aspiration is to be physician's assistant and being a Swain Scholar has provided so many benefits to building skills toward my future. I look forward to working in a clinical setting such as a hospital or an office clinic. There is such a vast field of specialty medicine in the health industry, but right now I am in the process of discovering which one I would like to pursue. Being a part of the Swain Scholar Program has opened my eyes to who could possibly be the patients I can be treating in the future. With the other Swain Scholars, we have the opportunity to hold healthy educational classroom sessions with students from Palmetto Bays Elementary School. In addition to teaching children how to live healthier lives, we are able to interact with them by mentoring and participating in physical activity games with them. Having this chance has opened my eyes to possibly working with children, a career path I have never considered before.

Being a Swain Scholar is so relevant to my future career because not only do I want to work in a clinical setting, I also want to be a public health resource. I want to be able to provide health education and resources to my patients, co-workers, and to the community. We have the chance to carefully plan every aspect of what our program entails and now we are in the process of implementing this program to the children. Our health education sessions also require us to conduct research on how effective our lessons may be to the children. The project has changed my perspective on how to go about designing and implementing research projects specifically for elementary school children. The process of health education research has recently caught my attention and has only added to the possibilities of conducting my own public health research in the future.

I look forward to the progression of how our Swain Scholar's program will lead us. I know we all are excited to see how effective our project at Palmetto Bays Elementary School will turn out. This fall, each of us has the opportunity to choose a location to conduct our own health education outreach and research project. I would like to choose a location that mirrors the environment I would like to work in, such as a hospital. Having the chance to pursue places and research topics of our own choosing is a giant step to furthering our experiences to be prepared for what graduate school and our careers may bring.

Janel Reeves
Exercise Sports Science, Swain Class 3

It seems fairly common for students to just "go with the flow" and accept things that come their way instead of choosing to follow their ambitions. I think if that's the way someone lives each day, then the fulfillment and happiness that should be present with what you choose to do will be nonexistent. I believe it is important to have a career or goal in mind to continuously work toward. With that said, being a Swain Scholar has further defined the person I aspire to be.

Prior to being a Swain Scholar, I was pretty sure I wanted to be a sports nutritionist. My dedication to exercise and a lifestyle of healthy diet led me into that career idea. Now that I have had the opportunity to work with all different types of children, parents, teachers and students within the community my focus has changed. My exposure to all the diverse situations and different levels of knowledge surrounding healthy nutritional habits has compelled me to want to work with more than just athletes. My passion now lies within a more general realm of dietetics. I would like to help a wider variety of people who especially need the help—maybe those who are overweight, underweight, or who have a disease or disorder that affects their dietary habits.

I have learned that the main reason people don't practice healthy nutritional habits is ignorance. It seems that many people lack the necessary knowledge to make choices that optimally benefit their health. Being a sports nutritionist would not allow me to help the people who probably need it the most. I would like to reach out and help those who are making themselves susceptible to heart disease, obesity or other disorders that can be affected by dietary choices.

Being a Swain Scholar has taught me the importance of helping those who are sometimes forgotten, or brushed aside. I'm so thankful for this opportunity that I have been given to open my eyes to a different career and way of thinking. I look forward to more new ideas and opportunities that may unfold during my future as a Swain Scholar.
As Coastal Carolina University has grown over the past few years, the College of Science has mirrored this growth, as shown on the accompanying charts, and the growth will most likely continue. Since 2006, CCU has grown 27.9 percent in total students at approximately 5 percent per year. The College of Science has grown 55 percent since 2006 at approximately 9 percent per year, and in 2011, 40.7 percent of all students were science majors.

This relationship of the College of Science and Coastal Carolina University is expected to continue as the objective of reaching 12,500 students is achieved. And the growth of the College of Science during this period and beyond results from science being part of all disciplines and life.

The economy, commerce, technology, environment and demographics all influence education and careers. For example, healthcare from various vantage points, from laboratory and research for knowledge and cures, to technology for the same, to exercise for older and younger generations, to cleaner environments for life, all reach the aforementioned influences on education and careers.

Grants are an important and significant asset in promoting and supporting faculty and student research, an essential part of the COS quality education mission. In the most recent report from the Office of Research Services for the 2010-2011 year the College of Science accounted for 92 percent of the "Total Grants Awarded," amounting to $2.3 million. For "Pending Proposals," the College of Science has 69 percent of the total, amounting to $2.5 million.
Figure 1: Enrollment Growth Relationship of CCU and the College of Science

- CCU's enrollment growth percentage since 2006: 27.9%
- COS enrollment growth percentage since 2006: 55%
- CCU enrollment percentage of COS students in 2011: 40.7%

2006 CCU Enrollment: 6,660 Students
2011 CCU Enrollment: 8,517 Students

Figure 2: Percentage of COS Enrollment at CCU

Figure 3: COS Departmental Student Growth

2006 COS Enrollment: 2,237 Students
2011 COS Enrollment: 3,467 Students
BIOCHEMISTRY
Kevin T. Crowley
Kevin T. Dyer

Robert K. Louder
Ina R. Troutman

BIOLOGY
Romie S. Barnes
Christian R. Barrett
Samuel A. Buzuleciu II
Justin B. Creel
Adam J. Crysel
Paige M. Cummings
Jon M. DiMaina
Patrick M. Dupuy
Robert C. Dutlinger
Lee A. Grainger
Valerie M. Hamrick
Taylor L. Harris
Kelsey K. Herring
Brittany A. Hoffman
Will T. Hoy
Daniel E. Knight
Todd M. Larson

Lauryn N. Luderman
Emily J. Marchini
Michael J. McCann
Lorraine E. Millard
Thaiduong N. Nguyen
Skylar D. Norton
Megumi C. Oshima
Samantha M. Palka
Brent R. Parsons
Derek A. Pride
Maeve K. Snyder
Jordynne M. Spinell
Lauren E. Thomas
Chelsea N. Thomas
Alexis Webb
Ciara R. Williams

HEALTH PROMOTION
Allison M. Curry
Mary C. Hierholzer
Rhacacia M. Pierre
Taylor M. Snook

Haley N. Spain
Samantha A. Spivey
Jill W. Teixeira
Amanda M. Trabilsy

INFORMATION SYSTEMS
Kevin M. Engelman
DJ Girone
Dalton L. Heiland

Daria A. Horinbein
Michael L. O’Neill

EXERCISE AND SPORTS SCIENCE
Brittany A. Bailey
Julia L. Baldwin
Jessica R. Benchley
Emily R. Benton
Stephanie L. Bunch
William K. Coleman
Brittany R. Connor
Constance P. Darlington
Kathleen A. Dowling
Keri A. Dunnington
Camille Ferrandino
Kelli L. Golding
Mikaela S. Kristofersson
Bradley F. Lawrence
Shanika P. Maddox

Sarah A. Manzi
Tyler J. McCarthy
Raymond C. Moye
Brian C. Novak
Jon D. Pack
Cassie E. Parrott
Rhacacia M. Pierre
Rhacacia M. Pierre
Taylor V. Prosser
Lisa C. Richardson
Cassandra M. Scott
Shelby M. Thomas
Brett R. Todd
Roderick T. White
Shanique T. Willis

COMPUTER SCIENCE
Brian W. Atkinson
Daria A. Horinbein
Robert C. Schatz
Austin J. Sherman
Aaron J. Smith

Tyler W. Spahr
Ruben G. Villao
Hubert E. Walton Jr.
Benjamin A. Whetstone

APPLIED PHYSICS
Keith W. Farrington
Richard D. Floyd Jr.
Harrison T. Frawley

Robert K. Louder
Ashley R. Petersman
College of Science

**Applied Mathematics**
Gina A. Austin
Chelsey M. Beese
Dorian D. Nagro
Aaron J. Smith

**Psychology**
Felicia N. Burchfield
Brittney A. Denninger
Brittany K. Gaillard
Stevie C. Goggans
Thomas J. Hale II
Abigail H. Holland
Kayla K. Holmes
Lauren N. Irwin
Alysha M. McGrath
Angela N. Mezzanatto
Paige D. Naylor
Lindsey H. Oliver
Jenna L. Otten
Marilyn E. Sussmann
Tierra J. Thomas
Virginia G. Tyner-Hornbeck
Kaitlyn A. Zuilkowski

**Recreation and Sport Management**
Alexander N. Beck
Laurel A. Bolesky
Matthew S. Decker
Brian P. Farrell Jr.
Brian C. Frisch
Keith A. Hessler
James F. Kalinowski
Kelsey L. Keena
Terry L. Thomas II

**Sociology**
Hannah M. Cooper
Jolene M. Hiller
James L. Jacko
Shayla E. Jefferson
Robin D. Knox
Emily E. O'Kelly
Sarah A. Ruby
Michelle L. White

**Marine Science**
Chelsey M. Beese
Hannah C. Briggs
Joseph F. Cannon
Emily P. Deborde
Aleksandar Dimkovikj
Matthew R. Doster
Courtney E. Elliton
Rohen T. Gresalfi
Nathaniel G. Grimes
Valerie J. Hartigan
Sean A. Jowers
Lyndsey R. King
Dylan M. Kletter
Justine A. Lundsted
Josh T. Nagel
Brian H. Nguyen
Megumi C. Oshima
Thomas S. Parker
Michael H. Romine
Kelsey L. Spencer
Lauren E. Thomas
Olga V. Tweedy
Erin K. White
Kelsey L. Wilenta

**Chemistry**
Mercedes H. Biron
Justin S. Kaiser
Ashley R. Petersman
Kelsey L. Wilenta