I hope you enjoy reading the first edition of Progression – the informational magazine of the College of Science at Coastal Carolina University. In the pages that follow, we provide an overview of what faculty and students do as they pursue their educational and scientific interests at our University.

The College, with more than 100 dedicated faculty and staff, is fully committed to ensuring student success at the undergraduate or graduate levels. The eight departments offer 20 major, minor and graduate programs ranging from Biology to Statistics. Our approach to education is current, engaged and hands-on. As you will see, learning takes place in the classroom, the laboratory and in the field.

Our students work one-on-one with faculty on research projects and internships. These experiences develop student's professional expertise and expand their understanding of science as a unique process for viewing and understanding the world.

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 studied (and understood) by our faculty and students.

Regards,

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Dean – College of Science
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DEPARTMENT OF BIOLOGY  
Karen M. Aguirre, Ph.D.  
Department Chair

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 B.S. 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.

We encourage you to browse the pages of the Department of Biology website at www.coastal.edu/biology/. Karen Aguirre can be reached at kaguirr@coastal.edu or at 843-349-4159.

DEPARTMENT OF CHEMISTRY AND PHYSICS  
Louis Keiner, Ph.D.  
Department Chair

Our department is home for several disciplines within the physical sciences, including the fields of astronomy, Physics, chemistry and biochemistry. We offer Bachelor of Science degrees in:

- chemistry
- bio chemistry
- applied physics

We also offer a dual-degree engineering program in partnership with Clemson University.

Whether you are here for a course in science as part of the core curriculum or you are interested in becoming a chemistry or applied physics major, please contact us with any questions you may have.

We encourage you to browse the pages of the Department of Chemistry and Physics website at www.coastal.edu/chemphys/. Louis Keiner can be reached at lkeiner@coastal.edu or 843-349-2226.

DEPARTMENT OF MARINE SCIENCE  
Eric Wright, Ph.D.  
Department Chair

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, national and international 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.

We encourage you to browse the pages of the Department of Marine Science website at www.coastal.edu/marinescience/. Eric Wright can be reached at ewright@coastal.edu or 843-349-2945.
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. In addition, we offer motivated students the opportunity to do research at the undergraduate level.

We encourage you to browse the pages of the Department of Mathematics and Statistics website at www.coastal.edu/math. Prashant Sansgiry can be reached at sansgiry@coastal.edu or 843-349-2078.

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.

We encourage you to browse the pages of the Department of Computer Science and Information Systems website at www.coastal.edu/csis. John Stamey can be reached at jwstamey@coastal.edu or 843-349-2552.

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.

We encourage you to browse the pages of 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.
Coastal Carolina University'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 allows 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

We encourage you to browse the pages of the Department of Health Promotion website at www.coastal.edu/healthpromo. John Yannessa can be reached at yannessa@coastal.edu or 843-349-6460.

The psychology program at Coastal Carolina University 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 Coastal Carolina University 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.

We encourage you to browse the pages of the Department of Psychology and Sociology website at www.coastal.edu/psychology/. William Hills can be reached at hillsw@coastal.edu or 843-349-2276.
Coastal Marine and Wetland Studies, M.S. Degree Program
James O. Luken, Ph.D.
Coordinator

Located near estuaries, marshes, swamps, a large unregulated river, barrier islands and the ocean, Coastal Carolina University offers an exceptional opportunity for graduate education. Students in the Coastal Marine and Wetland Studies graduate degree program pursue projects contributing to the characterization and preservation of the coastal ecosystem and the organisms that thrive in this ecosystem. Research conducted by graduate students and their faculty mentors is typically presented to the public via seminars, conferences or publications. Students completing this program pursue further graduate study, take jobs as teachers or informal educators, or go to work for state agencies and private consulting firms.

The coursework involves three core classes stressing coastal physical processes, ecology and environmental policy. Various electives provide students with skills in conservation biology, geographic information systems, statistics, wetland delineation and geophysical surveying as well as theoretical background in specific areas of organism biology and ecology.

We invite you to browse the pages of Coastal Marine and Wetland Studies at www.coastal.edu/coastalstudies. James Luken can be reached at joluken@coastal.edu or 843-349-2235.
In 2009 Kenneth E. Swain of Myrtle Beach gave Coastal Carolina University one of the largest donations ever made by an individual to the University. A retired pharmacist, Swain is a graduate of the University of South Carolina School of Pharmacy. The gift to the University is for a new science building, Kenneth E. Swain Hall, new laboratory equipment and student scholarships.

The scholarships are for students majoring in health promotion, exercise and sports science, biology and Chemistry who have a GPA of 3.5 or higher. To be considered for a Swain Scholarship, students must submit a resume, an academic transcript, faculty recommendation and a personal statement about their interest in community health. The requirements are a reflection of Swain's interest in community, health and wellness.

The members of the second (2010-2011) class of Swain Scholars are Alex Ham, a health promotion major from Arlington, N.J. (a veteran who served in Iraq and Afghanistan); Allyson League, an exercise sports science major from Baltimore, Md.; Miguel Mendoza, a biology major from Guanajuato, Mexico, and Loris, S.C.; and Thomas Niemela, an exercise sports science major from Richmond, Va.

The first class of Swain Scholars included Kaile Laurenzo, a senior in health promotion who continues to participate with the second class of Swain Scholars. She plans a career in nutrition and writes in this magazine about her experience. Others in the first scholar group were Christian Ells, biology; Sherri Tomlinson, chemistry; and Tyler Gebauer, exercise and sports science.

Class II members have made career plans. Alex Ham will go to medical school and enter the public health field; Allyson League wants to be a physical therapist; Miguel Mendoza plans graduate school with a concentration in nutrition and perhaps a career as a physician assistant; Thomas Niemela intends to become a chiropractor serving community needs and also has an interest in sports medicine.

Swain is an avid follower of the Scholars and maintains interest in their academic career plans. He is also keeping an eye on construction plans for Kenneth E. Swain Hall.

*Below: Architect's rendition of Kenneth E. Swain Hall*
My name is Kaile Laurenzo, and I am currently a senior health promotion major at Coastal Carolina University. I moved to South Carolina four years ago from Coventry, R.I., to pursue my college dream. I chose Coastal Carolina University not only for the warm weather but to try to take advantage of any new experiences I could by going away from home and starting somewhere new. I fell in love with the Coastal campus and knew this was where I wanted to spend my next four years. I've learned a lot being on my own and couldn't be happier with my decision. One of the things I love most about Coastal, and especially the health promotion major, is the small classes. Getting to know my professors and building relationships makes learning a whole new experience and has definitely made an impact on my time spent here. Coastal has, without doubt, been a great experience for me.
I am also a second year Swain Scholar, a very prestigious and honorable award for me to have received. The Swain Scholar program seeks Coastal Carolina University students in the majors of health promotion, biology, chemistry and exercise science who have passion for community outreach and health advocacy. Being a Swain Scholar enhanced my learning capabilities and was my biggest accomplishment at Coastal. I can’t thank Mr. Swain enough for this scholarship opportunity that helped make my learning experiences at Coastal even more valuable.

Last year I had the advantage of working alongside three students in the program fields of chemistry, biology and exercise science, to educate underserved diabetic patients at Little River Medical Center (LRMC). This project included a series of four monthly sessions to educate patients on a variety of diabetes self-management topics using both didactic and interactive teaching methods. (LRMC is a private, non-profit community health care center.) The scholars and I were charged with developing and presenting a series of educational outreach programs that highlighted guidelines for healthy lifestyles. These educational programs advocated the importance of glucose monitoring, diabetes-related complications, diet and nutrition, exercising, medications and preparation for doctor’s visits. A pre-test was conducted that included a quantitative measurement of the patients’ quality of life, and was followed on the fourth session with a focus group. The focus group was conducted to determine the patients’ perceptions of the diabetes self-management program, what they believed to be beneficial, what improvements could be made and what future alternative topics of interest should be touched. A few sample questions used for evaluation purposes included:

1. How long have the patients been dealing with health-related problems because of the diabetes disease? Answers varied from two to 15 years.

2. What new activities do the patients try to do to manage their disease as a result of the educational sessions? Simple daily exercise around the house, eating diet enriched with fruits and vegetables.

3. Was there any information provided to you that you found especially useful? A list was given of good carbohydrates versus bad carbohydrates delineated by Glycemic index and sample meal plans for a typical week with snacking during the day to prevent overeating at meals.

We were fortunate to seek out underserved diabetic patients and help educate them on the importance of their bodies’ health status. For some, this was their last opportunity to get on the right track and control the diabetes before it took over their lives. I feel as though the scholars and I presented educational material in a way that inspired the patients to begin taking small steps to regain control of their bodies and health status.

This year I am working with the S.C. Department of Health and Environmental Control (DHEC) with a registered dietitian in the Women, Infant and Children’s (WIC) program to facilitate nutrition classes. This experience has allowed me to educate DHEC staff about the importance of physical activity and provide them with fun, simple exercises to do at work. I also am working with the WIC program to educate specifically on the importance of key nutrients and maintaining a healthy, balanced diet. Both of these community outreach areas have enabled me to apply what I learned in the classroom to community outreach activities and research. I couldn’t be more thankful for this outstanding opportunity. I am proud to be a Swain Scholar and a Coastal Carolina University student.

As I approach the end of the semester, I have many aspirations for myself in the health field. I graduate with a Bachelor of Science degree in health promotion in May 2011. I plan to pursue my passion in the area of nutrition and continue on to graduate school to obtain my degree as a registered dietitian. I have interests in food research as well as in pediatric nutrition. My time at Coastal has been rewarding and fulfilling, and I could not imagine a more beneficial way to spend my college years. I cannot thank Mr. Swain and Coastal Carolina University enough for all the opportunities I have been given throughout my four years. I am very proud to be a part of this collegiate experience.
Juliana Harding, Ph.D. joined the Department of Marine Science as an assistant professor in January 2011. She received a B.S. and M.S. in biology from the University of Dayton and a Ph.D. in marine science from the College of William and Mary. Since receiving her Ph.D., she has served as a senior marine scientist with the Department of Fisheries Science at the Virginia Institute of Marine Science and as a visiting assistant professor at the College of William and Mary. Her research interests are in marine ecology, with an emphasis on the community ecology of coastal and estuarine ecosystems.

Recent projects include research on population dynamics of native and invasive species, molluscan ecology, and sclerochronology including its applications to environmental reconstruction and archaeology. She has experience developing research-based science education materials and enjoys working with students, educators and the general public.

Juliana Harding can be reached at 349-2262 or jharding@coastal.edu.
The Burroughs & Chapin Center for Marine and Wetland Studies research scientists Rich Viso and Rick Peterson boarded the research vessel R/V Atlantis II on Nov. 6 to embark on a 29-day cruise with researchers from the University of Georgia, University of North Carolina, Florida State University, University of Southern Denmark, Woods Hole Oceanographic Institute and Harvard University.

The primary objective of the cruise was to examine brine seeps in the Gulf of Mexico. When the Gulf was an evaporative basin earlier in geologic history (Jurassic period), large salt deposits were precipitated on the sea floor and subsequently overlain by sediments. As seawater circulates through fault networks in those sediments today, it slowly dissolves the salt bodies. Underlying hypersaline groundwaters ultimately discharge into the bottom waters of the Gulf of Mexico. These hypersaline waters are substantially denser than the bottom waters, so they form dense pools lying on the seafloor. As with most oceanic extreme environments, it is likely that some biological communities have adapted to living in these pools.

The goals of this cruise were to (1) characterize the diversity and activity of the microorganisms living in these environments, (2) understand the biogeochemical scenarios by which those communities can thrive, and (3) examine the interaction of these microbes with the brine pools. Viso and Peterson were primarily responsible for determining the discharge rates of groundwater into these brine seep pools and characterizing the seafloor shape at these sites.

To help with these efforts, the deep submergence vehicle Alvin performed 22 dives throughout this cruise. Alvin was key to collecting individual water samples in these brine pools and giving the human eye an opportunity to observe these environments as they appear naturally. These brine pools were located between 800 meters and 2,200 meters deep, so each Alvin dive lasted for about eight hours to achieve each dive's mission. Viso and Peterson each took a dive in Alvin, serving as scientific observers to assist in successfully meeting the missions' requirements.

Viso and Peterson plan to board Atlantis again in the summer of 2012 for a follow-up cruise to the same brine seep sites. They will be busily measuring samples and processing data collected last November between now and the next cruise.
Sedimentary Geology

By: Kehui Xu, Ph.D., Assistant Professor, Department of Marine Science

Students Dig Sedimentary Geology (MSCT 316)

Sedimentology is the scientific study of classification, origin and interpretation of sediments and sedimentary rocks that cover about 3/4 of the earth's surface. Most of the world's ore bodies, petroleum and natural gas are found in sediments. Sedimentary rocks illuminate many of the details of the earth's history, such as sea-level change, global climate, tectonic processes and geochemical cycles. Sedimentary Geology (MSCI 316, Instructor Kehui Xu) is intended to introduce the concepts and practices in the field of sedimentary geology, including origin and transport of sedimentary materials, physical properties of sedimentary rocks, composition, classification and diagenesis of sedimentary rocks and depositional environments, as well as stratigraphy and basin analysis. In the sediment geology lab, each student is required to work on a sedimentary project, give an oral presentation and write a scientific report. The picture to the right shows a sediment-collection field trip to Garden City Beach, S.C. Samples vary from very muddy sediments on the marsh to sandy sediments on the beach.

Sediment Impact on Hypoxia

A well-known problem in the Northern Gulf of Mexico is hypoxia, defined as an episode in which the dissolved oxygen content in bottom water falls below 2 mg/L. Hypoxia is believed to be controlled by nutrient enrichment of Mississippi River water from land-based sources and the location of fresh water plumes that inhibit mixing. Hypoxia in the northern Gulf of Mexico is also possibly impacted by sediment-induced light attenuation as well as resuspension of oxygen-demanding muddy sediment from the seabed. Turbid Mississippi and Atchafalaya freshwater plumes are permanent features on the Texas–Louisiana Shelf, and thus play a key role in light attenuation which inhibits photosynthesis and controls primary production. Based on integrated measurements of sediment oxygen consumption on the sea bed and bottom water-column respiration rates during eight cruises from 2003 to 2007,
scientists have found that the sediment oxygen consumption contributed significantly to total below- pycnocline respiration. To fully investigate the mechanisms controlling hypoxia, a comprehensive, integrated and multidisciplinary study of the Texas- Louisiana Shelf is proposed that includes numerical modeling, moored observations, process cruises, shelf-wide surveys using a undulating towed sensor, and remote sensing observations. Participating institutions include Texas A&M University, Texas A&M University at Galveston, Coastal Carolina University, Louisiana State University, LUMCON, Virginia Institute for Marine Science, and Dalhousie University. Kehui Xu (right) is leading the box coring and sediment suspension measurements using a GUST chamber system to investigate the erodibility of sediment on the Texas-Louisiana Shelf.

Kehui Xu is a new faculty member in the Department of Marine Science at Coastal Carolina University. He received his B.S. in geology and computer applications as well as M.S. in marine geology from Ocean University of China. He joined the faculty after obtaining his Ph.D. in marine science at College of William and Mary. He is a marine geologist whose research centers on the flux and fate of fluvial sediment from the land to the ocean. He has been involved in a range of interdisciplinary projects studying sequence stratigraphy, sediment transport, surficial processes and numerical modeling. Kehui Xu can be reached at 843-349-6494 or kxu@coastal.edu.
Stephanie McLeod and other College of Science students have been volunteering at SC-C.A.R.E.S. (S.C. Coastal Animal Rescue and Educational Sanctuary). The mission of this not-for-profit organization is to rescue, rehabilitate and release injured wildlife. Wildlife that cannot be released become goodwill ambassadors for their species by participating in educational programs. The animals arrive, for the most part, in poor health and require veterinary services. Recently, Department of Biology students have begun registering for independent study at the facility, where they will be aiding in microscopic identification of parasites and microbes in stool samples from the animals, as well as performing other chores needed for the animals well-being. A positive parasite identification results in a referral to a local veterinarian. The sanctuary is home to more than 100 rescued mammals, birds and reptiles. At right, above, is Duchess, an alpha female timber wolf.

Robert Delviscio presented a poster entitled “Comparative analysis of uterine structural features in the Australian viviparous skinks Eulamprus tympanum and Eulamprus quoyii” at the 91st annual meeting of the American Ichthyologists and Herpetologists in Minneapolis in July 2011. Delviscio’s research is mentored by Scott Parker, Ph.D., a recent addition to the Department of Biology faculty.

Kristen Whiting-Hausmann (BS Biology, CCU, 2009) published an original case study with the National Science Foundation’s Case Study Teaching was in Science Collection. Hausmann wrote the case study as an independent study project during her last year at CCU. The study, entitled “Michael’s Story: A Case Study in Autism,” will appear in 2011. Kristen Whiting-Hausmann’s co-author was Karen Aguirre of the Coastal Carolina University Department of Biology.
Walk into John Goodwin’s general chemistry class, and you’ll likely see students sitting in groups discussing and working on activities dealing with some predictable things like rate laws, equilibrium constants and electrochemical cells, since he’s been using the POGIL (Process Oriented Guided Inquiry Learning) pedagogy since 1997. But on some days the discussion will be about the phase diagram and thermochemistry of methane ice (methane hydrate) that lies under large portions of the ocean floor. Or you might see a discussion of the time of death in a murder case using kinetics data in a forensic chemistry scenario.

These activities, using the POGIL pedagogy, were created by Goodwin for a workbook called “Solving Real Problems with Chemistry” under an NSF CCLI (Course, curriculum and laboratory improvement) grant awarded for $200,000 among three institutions a few years ago. Coastal’s project led the overall collaboration with Stony Brook University and Northeastern University. The workbook has been used by more than 3000 students across the country in its first edition. This “POGIL-in-Context” workbook, published by Pacific Crest, focuses on extending chemical problem-solving to other disciplines and contexts in an attempt to show the relevance of chemistry to everyday life and work. Goodwin was invited to speak on this project at a symposium at the 43rd IUPAC (International Union of Pure and Applied Chemistry) World Chemistry Congress in San Juan, Puerto Rico, in July 2011.

John Goodwin can be reached at 843-349-2295 or jgoodwin@coastal.edu.
New Outreach

Smith Exercise Science Lab Helping Keep CCU Student-Athletes Safe

Since sudden cardiac death (SCD) risk is almost three times higher in competitive athletes compared to non-athletes and is the leading cause of death in young athletes, athletic departments are increasingly pressed to consider ways to reduce SCD risk. Incorporating electrocardiographic (ECG) screenings as a part of pre-participation physicals in collegiate athletics has proved to be a useful tool in finding cardiac pathology not identified by histories and physicals alone. However, issues of access and cost are the primary barriers in mandating or increasing pre-participation ECG screenings.

Enter CCU’s Smith Exercise Science Lab and its outreach arm – the Community Fitness Testing Program. This resource, within the Department of Kinesiology, Recreation and Sport Studies, has partnered with the CCU Sport Performance Division in the Department of Athletics to provide low-cost ECG screenings of CCU student-athletes. Utilizing the two ECG devices already on site for the student labs and classroom learning experiences, every student-athlete has a 12-lead ECG done as part of his/her pre-participation physical. This test is included with the athlete’s medical history/physical and other reviewed by the team physician prior to being cleared to participate in any athletic-related activity.

To date, almost 600 student-athletes have been screened, and approximately 2 percent have been referred for more extensive cardiovascular diagnostic tests. The markedly reduced cost ECG screenings provided by the Smith Exercise Science Lab is an innovative approach that allows the athletic department to provide assessments at a level many other athletic departments can not. Revenue from ECG screenings enhances other outreach efforts in the Community Fitness Testing Program.

Recreation and Sport Management Partners with CCU Athletes to Learn Sport Operations

The Recreation and Sport Management (RSM) program has partnered with Coastal Carolina Athletics to create an experiential learning environment for students looking to work in the sport industry. The program, called the Sport Operations Education Program (SOEP), is giving these students the opportunity to get in-depth, hands-on experience in many operational aspects such as ticket sales, game promotion planning and execution, and game day operations.

This is the third year of the program in which senior-level students are selected to market and promote this year’s baseball and softball seasons. The competitive program requires students to complete high-level marketing plans for Coastal Athletics, achieve high marks in the classroom, participate in an interview and meet other key criteria. Eight students were chosen to participate this year in the program.

The students play a vital role in all areas of the game-day experience. This creates a living laboratory that enhances student learning. This lab creates a real-world opportunity to learn, as not everything works out exactly as planned. Students are given a great deal of autonomy in creating each game experience, but they are not completely on their own. At every game, a member of CCU Athletics and an RSM faculty member are present to lend a hand if necessary.

RSM faculty have worked with Athletics, students and the administration to make sure that students receive the best possible experience. According to RSM faculty member Colleen McGlone, Ph.D., “I think this program is exactly what education should be about. Education involves more than just sitting in a classroom. Students need to get hands-on experience in order to apply the classroom knowledge and theory and thus gain a true understanding of how concepts translate in real world environments. It is in this type of setting where students have a chance to put their knowledge to the test.”

The program thus far has 14 alumni. All of these former students are currently working in professional sport in organizations such as the Washington Nationals, the Carolina Panthers, the New York Jets and other professional sport organizations, or have gone on to continue their education through graduate studies.
New Research

RESEARCH UTILIZES EXERGAMING LAB TO COMPARE BENEFITS OF ACTIVE VIDEO GAMING TO TRADITIONAL PHYSICAL ACTIVITY PROGRAMS IN COLLEGE STUDENTS

Active video gaming has gained in popularity as a tool for increasing physical activity and reducing sedentary behaviors of young adults. As such, there is a need to determine the real physical and cognitive impact of active gaming compared to more traditional physical activity/exercise programs. Research is mixed on the energy expenditure, cardiovascular and cognitive benefit of active gaming as a form of exercise. Faculty members in Kinesiology, Recreation and Sport Studies (KRSS) have teamed up to compare the cardiovascular training effects of a seven-week exergaming activity program with two other seven-week “traditional” physical activity programs.

Additionally, the researchers are examining the effects of both forms of exercise on cognition and information processing speed. KRSS faculty members Lisa Barella, Stacey Beam and Tim Meyler are engaging exercise and sport science majors in the experimental research, which utilizes CCU students enrolled in physical activity courses as subjects. Subjects engage in a prescribed physical activity program (gaming or traditional) and are pre- and post-tested in the exercise science lab on both cardiovascular and cognitive fitness measures. The study spans two semesters of data collection, and results are expected soon.

FACULTY happenings

RECREATION AND SPORT MANAGEMENT PROFESSOR NAMED

Colleen McGlone, Ph.D., has been elected to serve as president of the Sport and Recreation Law Association (SRLA). The Sport and Recreation Law Association is a national, nonprofit corporation. The purpose of the organization is to further the study and dissemination of information regarding legal aspects of sport and recreation. The association addresses legal aspects of sport and recreation within both the public and private sectors. SRLA is one of four primary professional organizations in the field of sport management. Colleen McGlone will serve a three-year term.
Sarah Banks is an assistant professor of recreation management. She most recently served as a visiting assistant professor at CCU. She received her master’s and Ph.D. degrees in parks, recreation and tourism management from North Carolina State University. Her research interests include environmental issues in outdoor recreation such as interpretive trails and tourism impacts.

Lisa Barella is an assistant professor of exercise and sport science. She has an MBA from Villanova University, and Ph.D. in sport and exercise psychology from the University of North Carolina at Greensboro. Her research interests include investigating how exercise influences quality of life, cognitive function and psychological outcomes in older adults and chronic disease populations. She most recently served as the fitness and program director at Saint Mary’s Center for Health and Fitness in Reno, Nev.

Dustin Thorn is an assistant professor of sport management. He received his master’s and Ph.D. degrees in sport administration at the University of Louisville. He also directed sport administration internships and advised undergraduate majors. His research interests include areas of organizational behavior applied to the sport setting, as well as sport marketing and consumer behavior.

Alicia Day is a lecturer of recreation management. She received her master’s degree in recreation and sport management from Georgia Southern University and an undergraduate degree in adventure Education from Prescott College. She most recently served as an adventure educator and interim director of the Southern Adventures Outdoor Center at Georgia Southern University. At Coastal, she will be sharing her time as the Director for Chanticleer Outdoor Adventures in the Department of Campus Recreation.
Physical inactivity has been classified as a major public health problem and has been associated with a decrease in physical function and the increased risk of several diseases, including cardiovascular disease (CVD), obesity, diabetes, hypertension, dyslipidemia (high cholesterol) and several forms of cancer. Physical inactivity is also the fourth-leading risk factor for global mortality. South Carolina ranks among the highest in the nation in the risk of several of the diseases mentioned above. These include CVD (15th), diabetes (10th) and obesity (ninth). Horry County's statistics are close to the state average in CVD (4.7% vs. 4.3%, respectively), diabetes (8.3% vs. 9.6%, respectively), and obesity (60.3% vs. 65.4%, respectively). The World Health Organization states that, at least 60% of the world's population fails to engage in the recommended amount of physical activity needed to produce health benefits. The Centers for Disease Control and Prevention reports that greater than 50% of U.S. adults and 53% of S.C. adults don't get enough physical activity to receive health benefits, and that 25% of both U.S. and SC adults are not physically active at all. Evidence of this problem has been documented in several U.S. reports, namely the 2008 Physical Activity Guidelines Advisory Committee Report, a collaborative study by the Centers for Disease Control and Prevention and the American College of Sports Medicine, a Surgeon General's Report and a National Institutes of Health Consensus Conference. The most alarming reports concerning South Carolina are that obesity rates have increased by 19% in the past 10 years and that 12% of all CVD deaths are attributed to physical inactivity. Barriers to physical activity such as lack of time, lack of social support, bad weather, disruptions in routine, facility inaccessibility and dislike of vigorous exercise are commonly cited as reasons for not engaging in a program of regular physical activity.

Traditionally, exercise prescriptions use frequency, intensity and duration of sessions to specify the amount or volume of exercise. These prescriptions, which are very structured, include recommendations to exercise three to five days per week, for 20 to 60 minutes each session, and at an intensity of 60 to 85% of maximal heart rate (American College of Sports Medicine, 2005). The traditional exercise prescription stresses relatively intense activity and often seems very intimidating to those who are sedentary. The 2008 Physical Activity Guidelines, published by the U.S. Department of Health and Human Services, has restated the recommendations in a less structured format. These new recommendations state that individuals must satisfy one of the following to receive health benefits: 1) Achieve 150 minutes a week of moderate-intensity physical activity or 2) achieve 75 minutes a week of vigorous-intensity physical activity. However, these recommendations still state that one must do at least 10 minutes of physical activity per session for the total number of minutes described above to receive benefits. For many individuals, this method may also seem intimidating. Approaches such as these have led to the misconception that one must exercise at a relatively intense level and in a
structured exercise plan, in order to receive health benefits. This misconception is a key part of the public's perceived barrier to performing regular physical activity. Another approach to meeting the guidelines described above that may be less intimidating focuses on caloric expenditure. Using the above recommendations, it has been estimated that an individual must have a weekly energy expenditure of 9.5 kilocalories per kilogram of body weight per week (kcal/kg/wk) to obtain health benefits.

One mode of physical activity that has been understudied in relation to its amount of energy expenditure and potential for health benefits is golf. Golf is a recreational sport that is widely played in South Carolina, especially the Myrtle Beach area, due to its year-round temperate climate. This sport offers great potential for individuals of a wide variety of health levels and ages to increase their physical activity levels into the range necessary to result in increased health benefits. We received funding through a Coastal Carolina University Research Enhancement Grant for a pilot study to determine the amount of energy expenditure (physical activity level) required to play golf when walking versus riding in a cart. The ongoing study uses accelerometers to collect data regarding physical activity and collects other information, such as heart rate and blood pressure before and after each round. The information collected will be ultimately used to determine if golf is a viable alternative form of physical activity capable of producing health benefits.

The question of the differences in energy expenditure between walking and riding may seem obvious. However, no known study has quantified and/ or compared these modes of play. The information collected during this study will give us a better understanding of how much physical activity one is performing during a round of golf and will be used toward future grant proposals aimed exclusively at examining the health benefits potentially associated with golf in individuals of all ages.

Our study obtained data that was recently presented at the Southeastern Chapter of the American College of Sports Medicine (ACSM) and will be presented at the upcoming ACSM national meeting. These presentations included data on the energy expenditure and cardiovascular responses of playing nine holes of golf while either walking (carrying clubs or using a pull-cart) or riding. Our data suggest that walking nine holes of golf yielded a caloric expenditure of 710.46±44.11 kcal (7.66±0.29 kcal/kg), while riding yielded a caloric expenditure of 357.63±22.12 kcal (3.88±0.18 kcal/kg). Our data also suggest that individual heart rates (HR) increased to an equivalent of 52.3% and 42.5% of age-predicted HRmax in walking and riding, respectively. These levels put the activity into the light- to moderate-intensity level categories. These results suggest that playing golf has the potential to elicit health benefits; however, further research is warranted to determine the necessary duration and frequency of each mode of play (walking and carrying bags, walking using pull-cart or riding).

The benefits associated with this study are numerous. We will continue gaining valuable information regarding the potential health benefits of golf in individuals of all ages and abilities, but also give our CCU students an excellent learning experience in a rapidly emerging field of research. This study is exposing our students to community-based and field-based research, in addition to the already established lab-based research. The hands-on experience is greatly improving their knowledge and is giving them valuable skills needed in the areas of research, professional advancement and social interaction. Lastly, the CCU community will benefit by having a local research project aimed at increasing the health benefits, especially cardiovascular benefits, of individuals of all ages and abilities in a region that is among the top in the nation for risk of CVD, diabetes and obesity.

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Coastal Carolina University and Clemson University have teamed up for a second time to offer a grid classroom-enabled course devoted to exposing students to high-performance computing technologies and programming techniques central to high-end computational science and engineering.

The course, CSCI 473-Introduction to Parallel Systems, taught by William Jones, Ph.D. is concurrently offered by CCU’s Department of Computer Science and Information Systems and Clemson’s Department of Electrical and Computer Engineering.

The course was initially introduced during the Spring 2010 semester and offers students at both universities the opportunity to receive instruction from professors at both the local and remote institution via a real-time grid classroom environment. Students at both institutions are able to use Clemson’s Palmetto Supercomputer, currently ranked as the 90th fastest supercomputer in the world.

Using these resources, students can explore the fundamentals of parallel program design and performance evaluation that will give them an edge in a world where high-performance computing systems are becoming increasingly common.

This collaboration was showcased at the 2010 International Conference for High Performance Computing, Networking, Storage and Analysis as part of Clemson University’s showroom booth and drew the attention of many attendees from both academia and industry. This partnership has provided CCU students an opportunity to access a level of technology not previously available to them.

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This article is a brief overview of the mathematical research conducted by professors David Duncan, Thomas Hoffman and me. I always find it very interesting when someone asks what my profession is. When I respond that I am a math professor, their responses are usually: "I hated math," "Math hated me" or "I am terrible at math." Sometimes the interested party will ask me, "What exactly does a math professor do?" I will respond that we teach and do research. My audience will gasp, "RESEARCH! Isn't all math known? What could you possibly do that has not been done?" This is a very difficult question to answer for the following reason: even your typical college professor (even in the sciences) has had, at most, calculus 1, and calculus is more than 300 years old. After Newton and Leibniz wrote their treatises on calculus, the mathematical community did not say "Great, we are all done with this math stuff. Now let's have some real fun." In fact, it is just the opposite. Over the last 300 years, mathematical knowledge has exploded. Areas of mathematics such as linear algebra, differential geometry, measure theory and probability theory have been well developed and are now standard courses in a typical mathematics graduate school curriculum.

So let's take a few steps back and discuss what it is that mathematicians do other than make people miserable. The best answer that I can come up with is that mathematicians love to do the following three things, in no particular order: we love to generalize; we love to classify; and even if we do not admit it we love to compute, compute, compute! It is that simple. Let me give you an example. Suppose we are walking down the street and we notice that every time we square an even number this new number is also even. For example, 2 squared is 4, 6 squared is 36 and so on. One might ask, "When I square an even number, is the outcome always even?" or "If the square of a number is even, is the original number even?" It turns out that both of these statements are true. The following theorem states this fact in general.

**THEOREM:** A real number N is even if and only if N squared is even.

Oh, I forgot a fourth thing that mathematicians love to do: we love to prove or disprove statements. Can you prove the above statement? So what does all of this have to do with our research?

Here it goes! We have been studying a particular class of "frames" called uniform equiangular frames. Loosely speaking, a frame is a finite collection of objects that have the characteristic that one can describe an infinite number of objects with this finite collection. Think about Legos. With just a few different shapes and colors of building blocks, you can construct many different objects. (Mathematicians also enjoy thinking about infinity, but that is a topic for another time.) The elements of our frame are the different types of Legos we have available to us. Different frames are like different Lego sets; some have more types of blocks than others. The uniform means that each object in this finite set has the same "length," and the equiangular means that the angle made by a distinct pair of objects is constant. We have been working on classifying all such frames as well as developing new methods for constructing new uniform equiangular frames. Frame theory is a relatively new area of mathematics with numerous applications to areas in the sciences such as bioimage informatics, image processing and data compression.

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Bachelor of Science

in Nursing Completion Program

Patricia Bohannan, Ph.D, RN,
Director of Nursing
Our new Nursing Program at CCU is based on a strong liberal education foundation, and it provides baccalaureate-level education for professional nurses. It also prepares the graduate to excel in advanced professional nursing education programs.

Through engaged educational experiences in the classroom, and with research, mentoring and collaborative service learning opportunities, students provide primary, secondary and tertiary prevention in diverse communities in collaboration with other health care providers. In addition, students learn leadership and management skills and knowledge that can be applied to professional nursing roles in regional, state, national and global health care. Students learn to analyze policy issues and use political knowledge to influence change in their community, state and nation.

The CCU Nursing Program recognizes its important role in the community to facilitate basic and applied research in nursing and to advance the practice of nursing by supporting evidenced-based nursing practice.

The primary mission of the Bachelor of Science in Nursing completion program at CCU is to offer registered nurses the intellectual skills, knowledge, values and critical judgment needed to provide health care leadership for diverse populations in diverse health care environments. The Nursing completion program was proposed in response to a regional need for nurses that are both liberally educated and have a broader knowledge of the roles in nursing. This program is an example of CCU's commitment to lifelong learning and greater transfer-ability because it provides registered nurses an opportunity to continue their education with minimal loss of credit or duplication of knowledge and skills. Working collaboratively with Horry Georgetown Technical College, this program offers an innovative, seamless transfer to a baccalaureate completion program. Having the Bachelor's of Science degree offers the nurse more opportunities for employment, increased responsibility and career progression. It opens the door for professional certification in specialty areas of nursing practice, leads to an expanded role as a provider, designer, manager and coordinator of patient care, as well as provides the foundation for graduate study in nursing.

The curriculum of the Bachelor of Science in Nursing completion program is derived from this mission and the American Association of Colleges of Nursing (AACN) Essentials of Baccalaureate Nursing for Professional Nursing Practice (2008), the American Nurses Association (ANA) Scope and Standards of Practice and the National League for Nursing Accrediting Commission (NLNAC) Standards for Baccalaureate Nursing Education (2008).

Building on acute care clinical knowledge and experience received in the associate's degree and diploma nursing programs, this program will:
1. Prepare graduates who consistently apply professional standards, ethics and values in their nursing practice.
2. Prepare graduates to assess, design and implement health promotion and disease prevention nursing programs for diverse individuals, groups and communities.
3. Prepare graduates to evaluate nursing research and apply the results to evidenced-based nursing practice.
4. Prepare graduates with the intellectual skills and competencies to provide leadership on health care management teams that promote patient safety and quality care in health care institutions and community settings.
5. Prepare graduates to take leadership roles in the profession of nursing and in health care issues in the state and nation.
6. Prepare graduates for advanced nursing education programs.

The Bachelor of Science in Nursing completion program requires 30 credits and can be completed in three semesters. All courses are offered every fall and spring semester, and classes are held on Saturdays to accommodate working students.

Interested nurses should contact Patricia Bohannan at 843-349-4112 or pbohanna@coastal.edu.
Childhood Environment

ADULT BEHAVIOR

By Kelli Melick, Senior Psychology Major, Coastal Carolina University
As a condition for graduation, I was required to perform a research study over the course of one semester. I chose to do a study on the relationship between childhood trauma and adult criminal behavior in the hopes that it would prepare me to better understand the heartbreaking situations that I would have to deal with as a guidance counselor. The recent shootings at Socastee High School and the tragic shooting at Carolina Forest further influenced me to explore this topic in more depth. Childhood trauma has been linked to substance abuse and criminal behavior, both later in life as well as during adolescence. Researchers have reported that traumatic experiences during a person's childhood have the power to alter the development of the adolescent brain (Perry, 2000; Andersen, 2009).

Sarchiapone, Carli, Cuomo, Marchetti and Roy conducted a study in 2009 and reported a strong positive correlation between childhood trauma and later aggression. Because aggression is a major factor in criminal behavior, it would appear that childhood trauma ultimately results in criminal behavior. In addition, Widom reported in 1989 that traumatized children were significantly more likely to exhibit later criminal behavior.

Adult criminals may be predisposed to violence and crime in the first three years of their lives because of the effects of trauma on the adolescent brain. Perry (2000) reported that trauma can have a significant effect on the developing childhood brain. The brain is already 90% of its adult size by the age of 3. Therefore, trauma that occurs during childhood can have a significant impact on the adult brain. When children are threatened, their brains respond to that threat neurologically. Multiple traumatic experiences, or a long history of traumatic experiences, cause the adolescent brain to use certain parts of the brain more often than the average adolescent brain. Because these specific parts are working more often than they should be, they are eventually weakened. A study conducted by Andersen et al. (2009) reported that the hippocampus, corpus callosum and frontal cortex in MRI scans were weakened in the adult brains of victims of childhood abuse when compared with adults who did not report abuse.

By functioning continuously to deal with trauma, specific parts of the brain, such as the hippocampus, which controls memory and cognition, get worn out and overused (Perry 2000). The experiences of childhood can “shape” the brain and ultimately the adult life of the child. In addition, Lisak and Beszterczey (2007) reported that nearly half of the 43 men in their study experienced neurological impairment and all of them reported experiencing some kind of abuse.

Childhood trauma not only increases the likelihood of criminal behavior but also the likelihood of mental illness. If more treatment programs and early intervention programs were developed, possibly some of the effects of childhood trauma could be mitigated. The need for proper mental health counseling in the prison system is further supported by the findings of Brooker and Gokovic (2009). The researchers found that mental illness is much more prevalent in the prison system than in the general population, but there are more treatment options for those in the general population than for those in the prison population.

During my research, I found no articles relating to increased mental health care for incarcerated men in prisons. Because of the fact that most of the men are not evaluated or treated, it is likely that mental conditions are going unrecognized, which may be leading to the increasing rate of repeat offenders. J. Reuben Long Detention Center is a great example to other prisons throughout the country. The center has a rehabilitation program for prisoners who have mental illness and/or a traumatic past.

I chose this topic of study because I plan on pursuing my master's degree in educational counseling after I graduate. The topic of childhood trauma and adult criminal behavior has helped me to better understand the severe, and sometimes overlooked, impact that trauma can have on the developing psyche of adolescents and young adults. I was fortunate in the fact that Chaplain Hill welcomed me into J. Reuben Long Detention Center with open arms and guided me throughout my research. The prisoners were surprisingly open and willing to help with my study in any way possible. I hypothesized that the number of traumatic events would positively correlate with the severity of the crime committed. Although the results of my study were not statistically significant, it should be noted that all participants reported experiencing at least one traumatic event during their childhood. I plan to further pursue my research by exploring the relationship between childhood trauma and adult criminal behavior in prisoners in comparison to the outside population. I also plan on looking more closely at the possible connection between certain events, such as sexual abuse during childhood, and corresponding criminal events later in life, such as rape or sexual assault.
Sherer Royce has been awarded a $280,000 grant to help assess tobacco use in Horry County and evaluate the success of local prevention programs. The grant is part of a $2.3 million grant from the U.S. Department of Health and Human Services to the Horry County BREATHE Coalition. Royce, an associate professor in the Department of Health Promotion, will also assist with countywide environmental and behavioral change activities regarding tobacco use prevention and dependence for Horry County residents.

Horry and Florence counties were two of 44 communities across the country awarded federal stimulus money as part of the Communities Putting Prevention to Work initiative. "Tobacco is the leading cause of preventable death and disability in the United States, and we are in grave need of tobacco use prevention programs in this part of the country," says Royce, whose academic expertise is in the area of tobacco use and behavioral habits. "This grant will help us determine if we're making a difference in our preventive efforts." Royce is charged with:

- Collecting baseline and impact data concerning youth and adult smoking.
- Checking the air quality in restaurants and other public places that allow or have allowed smoking.
- Determining whether medical education curriculum and clinical practice promote tobacco prevention practices.
- Assisting school, hospitals and municipalities in modeling smoke-free policies.

The grants were part of the American Recovery and Reinvestment Act of 2009, according to South Carolina Department of Health and Environmental Control officials. Currently, 20 percent of South Carolina adults smoke. However, in Horry County, 29 percent of adults smoke, which is well above the state and national averages.
NEW?

PUBLIC HEALTH ISSUE: TEEN PREGNANCY
Health Promotion graduate Forrest Alton, chief executive officer of the South Carolina Campaign to Prevent Teen Pregnancy (S.C. Campaign), has unveiled a new federally funded initiative aimed at reducing the teen birth rate in Horry County. His organization acquired a significant grant recently for Horry and Spartanburg counties, providing $1.5 million each year for five years divided between the two counties to reduce teen pregnancy.

According to the S.C. Campaign, a teen becomes pregnant in South Carolina every 49 minutes. Teen birth rates in the state are consistently higher than nationwide. In 2006, South Carolina had the 13th highest teen birth rate in the country among 15-to 19-year-olds. Horry and Spartanburg counties have teen birth rates higher than the state and national average. S.C. Campaign staff in each county will focus on four objectives:

- Ensuring that teens throughout each county have the opportunity to participate in programs shown to prevent teen pregnancy
- Improving access to teen-friendly reproductive health service
- Increasing public awareness and support of teen pregnancy prevention and youth development
- Promoting informed policy decisions on adolescent reproductive health

"Teen pregnancy is too complex an issue to be addressed by a single strategy or intervention," Alton said. "Fortunately, the funding Horry County is receiving allows for the exploration of a more comprehensive approach to teen pregnancy prevention emphasizing research and science."

Alton is hoping to engage both the Department of Health Promotion faculty and Swain Scholars in this effort. Swain Scholars are a select group of students from the University's College of Science committed to the promotion of community health. According to Michael Roberts, dean of the College of Science, "By working collaboratively across several disciplines, Swain Scholars seek to understand the underlying causes of various community health problems, as well as identifying community-based solutions."

Each year, up to eight students are provided a scholarship and program funds to support their education, supported by a generous gift from Kenneth Swain, a retired Myrtle Beach pharmacist.

The South Carolina Campaign to Prevent Teen Pregnancy is a 501(c)(3) nonprofit organization committed to the prevention of adolescent pregnancy in South Carolina through education, technical assistance, public awareness, advocacy and research.

PUBLIC HEALTH ISSUE-MATERNAL MORTALITY: MOTHERS DYING DURING CHILDBIRTH
The Bele Uman Project was conceptualized in response to the high maternal mortality rate in Sierra Leone, West Africa. The project stems from the experiences and previous research conducted in Freetown, Sierra Leone, by Fredanna M'Cormack. The project was developed by CCU health promotion professor Fredanna M'Cormack and CCU professor John F. Yannessa as well as Fredline M'Cormack-Hale, a faculty member at Seton Hall and Freida M'Cormack at the Institute for Development Studies at the University of Sussex, United Kingdom. The multifaceted project facilitates understanding of the socio-ecological contributing factors leading to main causes of maternal deaths and, in response, develops and implements innovative strategies to reduce maternal mortality, particularly in Sierra Leone.
RESEARCH REPORT:
DETERRENCE, RATIONAL CHOICE
AND GUNS ON CAMPUS

By Robert Jenkot, Ph.D.
Assistant Professor of Sociology
In July 2009, the South Carolina legislature passed a law stating that people with concealed carry permits can carry their weapons onto school campuses, but are forbidden from carrying them into school property and must keep them in their vehicle (SC Bill: A32, R74, S593). This law contributed to an interesting discussion in my juvenile delinquency course related to bullying and school shootings. Based on that discussion, CCU student Douglas Holder (a major in interdisciplinary studies with an emphasis in law and society), William Lovekamp (assistant professor of sociology at Eastern Illinois University) and I decided to pursue research on carrying of concealed handguns on college campuses.

The current research centers on the application of deterrence theory as related to carrying concealed handguns, and how that could lead to a reduction in school shootings. Deterrence theory proposes that if potential shooters were aware that members of the campus community are armed, they would avoid taking part in shooting behavior on campus, as they might themselves be harmed. Taken a step further, deterrence theory assumes that the potential shooter is a rational actor. A rational actor performs a "mental calculus," where the potential/anticipated outcomes of a behavior are considered and evaluated, leading to an informed action/behavior. Such a "mental calculus" is virtually instantaneous. The actor is not creating pro/con lists regarding a behavior; instead, he/she unconsciously considers a course of action, makes a decision, and acts.

However, we question how rational the actors are who contemplate school shootings. Importantly, we must not forget that school shootings are a form of mass murder, and few would consider mass murderers rational. In addition, many active shooters have suffered from some form of mental illness (see the events at Virginia Tech in 2007 and Northern Illinois University in 2008). Additionally, some evidence points to even "hard targets" not being immune to the threat of an active shooter with a mental illness. Consider the events at Fort Hood in 2009, where an active shooter attacked a group of people who were all trained in hand-to-hand combat as well as the use of firearms. Also, consider the shooting at a Detroit police station in 2011, where four officers were wounded by a single shooter, even though all officers were armed with firearms, tazers, pepper-spray and batons, and were trained in techniques of hand-to-hand combat. These few cases lead us to question whether an armed campus community could prevent an active shooter on campus.

Holder, a state constable appointed by the governor of South Carolina who has completed a variety of advanced firearm courses and has competed in firearm competitions, finds the deterrence argument fascinating. If, when an active shooter begins his action, people respond immediately and predictably by taking cover (hiding), the effect, then, of any firearm possession by community members is minimized because they are hiding. For example, when shots are fired, untrained college students, faculty and staff will not quick draw their weapons to take down the offender. Instead, the predicted behavior is to seek cover and work to extract oneself from the situation. Further, of those people who might have concealed carry permits and who are carrying weapons (which would be illegal since they cannot be taken outside their vehicles on any campus), only a portion of these people could be expected to use protected cover and return fire, and this would likely occur only after some delay. We anticipate that the fear of being shot will often override the generalized desire to attempt to stop the shooting—at least for some people. Most likely in the presence of an active shooter, the best that can be done is to minimize the time the active shooter has to complete his/her action. In other words, school shootings cannot be stopped; only the duration of the event can be limited.

Therefore, proponents of the concealed carry on campus movement ignore several key issues. One issue is that simply carrying a weapon does not mean that the weapon will be used, used effectively, or in the correct circumstances. A second issue is that persons must be at least 21 years old to have a concealed carry permit for a handgun in South Carolina. This component of the law eliminates several thousand members of our campus community from legally carrying handguns onto campus in any capacity. Third, the concealed carry of a firearm may not make any difference in the outcomes of active shooter events, beyond allowing those people who are carrying weapons to feel safer.

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