Executive Summary

The 2015 – 2016 academic year was another very successful one for the School of Sciences and Mathematics (SSM). Our faculty continued their stellar record of publication and securing extramural funding, several important curriculum changes were completed, and we were able to significantly advance several capital projects. In addition, the number of majors in SSM remained very high, with ongoing significant growth in the number of computer science majors. SSM faculty and colleagues from other institutions and agencies continued to provide research experiences for a significant number of our students.

We welcomed seven new faculty members to our ranks. These individuals and their colleagues published 253 papers in peer-reviewed scientific journals, many with undergraduate co-authors. Faculty also secured $2.75M in new extramural grant awards to go with the $23M of continuing awards.

During the 2015-16 AY, faculty and students in SSM and other College of Charleston schools began to use the two 3,000 sq. ft. field stations at Dixie Plantation which were completed in June 2015. The footprint of the Computer Science Department at Harbor Walk was expanded by approximately 3100 sq. ft. Most importantly, however, the decades-old notion of renovating the Rita Hollings Science Center and replacement of Physicians Auditorium became a reality with work commencing during fall 2015. Until this work is complete Biology and Physics will continue their existence in various locations around Charleston.

We continue to see expanding interest in STEM programs and remained a major producer of STEM graduates in South Carolina. A prominent feature of SSM is the extent to which our students obtain real-world, hands-on experience in research laboratories, internships, and field experiences. These experiences are critical to preparing students for graduate and professional study, as well as for entering the work force. STEM fields continue to dominate lists of the most lucrative employment fields. A recent article in Forbes Magazine lists the Top Degrees for Getting Hired in 2015 based on a study by the National Association of Colleges and Employers (NACE). It revealed which majors college career placement offices are looking to place with employers. The article discusses three areas with specific degrees most in demand. Computer science was ranked the third top Bachelor’s degree in demand; computer science, accounting, and information sciences & systems were among the top 10 Master’s Degrees and; physics, computer science, math/statistics, and chemistry were among the top 10 Doctorate degrees. To note: all 10 top Doctorate Degrees in Demand were in STEM fields. SSM is committed to preparing our students for education and careers beyond our borders.
SCHOOL

Mission Statement and Goals

Our mission is to integrate discovery, innovation and education in order to serve our students, our state and our nation. The principal responsibility of the School of Sciences and Mathematics is to provide the science and mathematics courses for all students at the College, and, concomitantly, to equip students who major in sciences and/or mathematics with the knowledge and skills to pursue careers in a wide variety of fields, including, science, engineering, medicine and allied health, law, social services, and journalism. The school's graduate programs have been carefully selected both to complement the undergraduate programs in areas of significant national strength and to meet the intellectual, professional and economic needs of the region and the state.

Our vision and our mission are founded on our core values -- those principles that define and guide the way in which we achieve our mission. The School of Sciences and Mathematics reflects the values of a public liberal arts and sciences university. We value:

- Students as individuals
- Our colleagues and peers as teachers and scholars
- Commitment to responsible and ethical practices in research and pedagogy
- Inquiry and intellectual curiosity
- Meaningful engagement with the community, region and state
- Collaborative effort and lifelong learning
- Diversity and dialogue
- Assessment and accountability as key tools to drive continuous improvement

Our goals in science are to help assure that all graduates of the College of Charleston:

1. Can demonstrate understanding of some of the fundamental scientific concepts and theories about the natural world;
2. Acquire a knowledge of the evidence, ideas, and models that scientists use to make judgments about the natural world;
3. Acquire a knowledge about science and technology as they shape contemporary experience and values, and demonstrate an appreciation of the historical and contemporary impact of science on daily life;
4. Develop the skills of logical and critical thinking necessary to explore how the natural world works;
5. Can demonstrate an appreciation and understanding of the scientific method of inquiry;
6. Understand that scientific knowledge is based on the outcomes of testing of hypotheses and theories that are under constant scrutiny and subject to revision based on new observations, and such knowledge is not just a collection of facts; 
7. Can demonstrate an ability to distinguish between science and technology and appreciate the capabilities and limitations of both;

Our goals in mathematics are to help assure that all graduates:

1. Develop an appreciation for the practical value of mathematics in the modern world;
2. Can interpret mathematical models such as formulas, graphs, tables, and schemata, draw inferences and make decisions from them, and communicate these conclusions verbally;
3. Can organize information, recognize patterns and relationships, and represent them mathematically;
4. Can use mathematical, analytical, and statistical methods to solve problems and recognize limits of the methods;
5. Can estimate and check answers to mathematical problems in order to determine whether an answer is reasonable, and critically appraise numerical information;
6. Can apply mathematical methods in the context of other disciplines, and reason logically and recognize where conclusions can be drawn from a set of hypotheses.

For Sciences and Mathematics majors, the School has the responsibility to lead students toward acquiring a depth of knowledge and competence in their respective disciplines. In particular, science and mathematics graduates should have:

1. The ability to recount and explain the basic facts and postulates of the discipline and to use these in the solution of problems with which the discipline concerns itself;
2. Proficiency in the use of the techniques and tools of the discipline;
3. An awareness of the resources of the discipline and the ability to seek out and assimilate knowledge that has not been a part of the classroom experience;
4. The ability to relate knowledge in the discipline to other disciplines.

A key element of our mission is accountability, which includes regular assessments of the effectiveness of School of Sciences and Math programs. Departments must be alert to opportunities to measure their programs against objective indicators of programmatic quality, such as accreditation reviews and external program evaluations.

The School of Sciences and Mathematics recognizes that a college education is not merely an independent activity that follows high school but is part of a greater educational experience that begins in kindergarten. Academic departments are sensitive to their obligation to promote education at all levels. Consequently, faculty engagement in pre-college activities with students and teachers is regarded as an important part of the mission of the school.

A central element of the mission of the School of Sciences and Mathematics is to sustain the involvement of its faculty in research and scholarship. Scholarly activities of the faculty not only are essential for maintaining the intellectual environment that characterizes an excellent institution of higher learning, but they support the mission of the College by providing students a community in which to engage in original inquiry and creative expression. Faculty members are urged to guide students in research activities whenever possible. All undergraduate programs in the School of Sciences and
Mathematics use independent study and student-faculty research as important methods for developing intellectual independence and creativity as well as for teaching appreciation and understanding of sciences and mathematics. Research is central to the goal of leading students to connect their coursework with the techniques and applications of their disciplines.

**Strategies and tactics in the College's strategic plan your department would place as highest priorities**

**Strategy 1: Enhance the Undergraduate Academic Core**

1.1 Provide each student a personalized experience that integrates classroom learning with at least two of the following: research and creative activities, civic engagement, study away, internships, and peer education.

The School of Sciences and Mathematics believes that undergraduate research is essential to learning. Undergraduate majors receive a highly personalized experience when mentored by our faculty in current, relevant, private, state and federally funded research. This work aids a student’s comprehension of their field and better prepares them for graduate programs and industry work. Research grant funds provide students with stipends necessary to forgo jobs in unrelated areas so they can stay focused on their field and often travel to conferences where they present their unrelated findings.

The Department of Mathematics furthered the personalization of education with the implementation of ALEKS. This intuitive math placement exam, now mandatory for all incoming undergraduates, insures that math skills are properly assessed so students can properly design their course of study and increase their chances of success in their major and at the College. The Department of Chemistry & Biochemistry uses LearnSmartPrep as an on-line, self-paced tool to help students assess their preparedness to take introductory chemistry and to remediate any deficiencies at the start of the semester.

The School of Sciences and Mathematics continued to play a strong role in the College’s study abroad programs. Faculty led students to the Bahamas, British Virgin Islands, India, Bali, Panama, South Africa, . Exchange programs with Xiamen University in China and the University of Tartu in Estonia continue to grow. The Department of Mathematics is in negotiations for an exchange program with the University of São Paulo in Brazil.

Faculty and students of the Department of Geology and Environmental Geosciences routinely travels for field research. This year 27 geology students completed their annual Maymester field studies trip which was comprised of three weeks of mapping geological sites in New Mexico, Arizona, Utah, and Colorado.

1.2 Enhance undergraduate academic programs that are strongly linked to the history, traditions, culture, and environment of Charleston and the Lowcountry, such as a new undergraduate majors in African-American Studies and sustainability.

Many of our programs take full advantage of our regional setting. The College of Charleston was listed among the Top 10 Marine Biology programs in the United States. The Grice Marine Laboratory on James Island offers the unique opportunity to collaborate and work with a large, diverse group of dedicated scientists at the Fort Johnson Marine Science Center. Our coastal South Carolina location provides an excellent setting in which to study and explore a variety of marine ecosystems. Students in graduate and undergraduate programs in Environmental Studies, Biology, and Geology also take advantage of our coastal location and partners at Fort Johnson.
Locations such as Dixie Plantation, Folly and Edisto Beach, and Frances Marion National Forest provide outdoor classrooms for natural science labs. Students can study marine and animal habitats, water systems, and botany in natural settings. Our climate allows for extended access to these areas. This year faculty began using the Field Stations, located at Dixie Plantation for lab sections of ornithology and plant physiology. Field stations were also used by the Lowcountry Hall of Science and Math as well as the School of Education, Health and Human Performance for outreach activities with students and teachers from the Charleston County School District.

1:3 Develop academic programs at the College of Charleston North Campus to offer lifelong learning courses and programs to serve the needs of returning adult learners or non-degree students. Classes required for the M.S. in Computer & Information Systems have been taught at the Lowcountry Graduate Center. The School continues to explore strategies to expand course offerings on this campus. Computer Science remains actively involved in the new Bachelor of Professional Studies by supporting a concentration in Information Systems. Seven elective courses in areas such as Communications Technology & the Internet, Website Design, Database Security, and Ethics in Information Systems are offered.

1:4 Strengthen the Honors College through dedicated faculty for innovative curriculum Faculty members in all six departments of the School contribute to Honors curriculum. The departments of Biology, Chemistry, Geology, Mathematics, and Physics have dedicated Honors Intro Sections. Elizabeth Meyer-Bernstein, Associate Professor of Biology, serves as Associate Dean of the Honors College.

1:9 Increase significantly the numbers of and enrollments in interdisciplinary courses and programs Our faculty continues to contribute heavily to the First-Year Learning Communities to foster interdisciplinary relationships between departments for unique learning experiences.

Chris Korey, Associate Professor of Biology, serves as Director of the First-Year Experience.

The School houses two interdisciplinary programs that bridge the School of Sciences and Mathematics with the School of Humanities and Social Sciences. Both the graduate and undergraduate programs in environmental studies as well as the neuroscience minor continue to see steady enrollments.

There are 57 declared minors in NSCI. The program has a strong relationship with the Neuroscience Department and Neuroscience Institute at MUSC which attracts students interested in pursuing research opportunities with MUSC faculty. It is unclear what the future holds for an Interdisciplinary Major in Neuroscience at the College. Popularity of the current minor suggests heavy enrollment in a major, but this would potentially further strain already taxed resources in both Biology and Psychology. The Neuroscience Steering Committee will continue discussions but are generally agreed that a major would not be instituted until the renovations of the Rita Hollings Science Center are complete. Sorinel Oprisan directed the NSCI minor while Jeff Triblehorn was on sabbatical.

Assessment of the environmental studies minor showed that course offerings in the area of humanities and social sciences are currently inadequate, particularly in the area of political science. Like Neuroscience, faculty hope to develop BS/BA tracks in Environmental Studies. There are currently 161 declared ENVT minors. Leadership of the program was recently passed to Todd LeVasseur, Department of Religious Studies.
Computing in the Arts is an interdisciplinary major supported by SSM and the School of the Arts. This program is directed by Bill Manaris, Department of Computer Science. There are currently 63 declared CITA majors.

**Strategy 2: Develop nationally recognized graduate programs**

2:1 Emphasize the acquisition of research and teaching grants to develop interdisciplinary, international and innovative programs that capitalize on our unique location and capabilities.

Faculty in the marine biology program continued their success in securing extramural research and teaching grants. Faculty in this area secured $6.99M in funding for active research in 15-16.

Sponsors include the National Science Foundation, The Department of Energy, Gulf of Mexico Research Initiative, Florida Fish and Wildlife Conservation Commission, Medical University of South Carolina, University of South Floriday, Slocum-Lunz Foundation, and the South Carolina Sea Grant Consortium.

2:2 Enhance graduate programs in marine biology, environmental studies, historic preservation, and arts management to achieve national recognition.

Our Graduate Program in Marine Biology continues to be highly competitive and nationally ranked. The program attracts applicants from all over the country.

The ability of the MES program to provide students with a comprehensive background in both policy and science remains an attractive feature for prospective students. However, resources committed to this program are low. The program employs one full-time Program Coordinator who oversees administrative duties, logistics, and advising. Dr. Tim Callahan, a professor of Geology, serves as program director. Currently there are no roster faculty members designated fully to this discipline. Classes are taught by adjuncts and faculty borrowed from other departments.

The MES Program has a prominent position in the revised strategic and master plans for the College of Charleston. The MES program and its Peace Corps Master’s International option and Dual-Degree Public Administration/Environmental Studies program have a solid reputation and strong interest from prospective students, thus producing greater interest in University of Charleston graduate studies. However, the current structure of the program is not resilient. MES needs to increase the number of full-time equivalent faculty in order to meet specific areas of need in sociology, chemistry, and education.

**Strategy 4: Recruit, enroll, and retain an academically distinguished, well-prepared and diverse student body.**

4:4 Increase the amount of merit-based and need-based scholarship funding largely funded through private resources.

In the academic year 2015-2016, the School of Sciences and Mathematics awarded approximately $215,000 in scholarships. These funds came from both private donors and public sources.

Eight incoming freshman intending to major in computer science were awarded recurring scholarships in amounts varying from $2500 - $5000 per year. These funds were made possible by a special appropriation from the State of South Carolina. The appropriation was provided to support the College’s
dedication to helping grow the Charleston a recognized digital hub by attracting the brightest and best to the area.

Four students continue to be funded by a grant from the Clemson University Center for Workforce Development (CUCWD). Preference for this award was given to first generation college students from traditionally disadvantaged backgrounds and/or from underrepresented groups. All four recipients continue to maintain eligibility for renewal.

In an effort to retain minority students the chemistry department offered CHEM 103, a pre-CHEM 111 course for twelve students who participated in the SCAMP/SPECTRA Summer Bridge program. After two summer sessions, these students had an average GPA of 3.06. The average Fall CHEM 111 grade is 2.7 versus the average grade for underrepresented minority students of 1.89.

This fiscal year Boeing continued its support by providing four scholarships for students interested in pursuing careers in the aerospace industry. The W. Frank Kinard endowment continues to grow and will soon provide funding for scholarships in the areas of chemistry and biochemistry. The passing of Dr. J. Fred Watts, Professor Emeritus, Physics and Astronomy, resulted in gifts from alumni and friends to the scholarship that was endowed in his name upon his retirement. These gifts significantly grew the endowment and consequently the funds available to award in 16-17. Other endowed scholarship funds also continue to grow providing more funds to award each year.

Strategy 7: Provide up-to-date facilities and infrastructure to enhance academic, co-curricular, and extracurricular programs.

7:1 Build, renovate, and maintain classrooms, laboratories, and studios that allow for a variety of class sizes and teaching and learning styles.

The renovation of the Rita Hollings Science Center continued throughout the academic year. The Physicians Auditorium is being demolished in late summer 2015. Departments normally housed in RHSC are temporarily located at Harbor Walk, the School of Sciences and Mathematics Building, SCRA, MUSC, and JC Long.

The Department of Computer Science has become quite comfortable in its newly acquired offices at Harbor Walk. This location allows faculty and students access to the fast growing Charleston Digital Corridor.

This summer, two new field stations opened on Dixie Plantation. They will begin housing classes, labs and support research efforts in Fall 2015.

In future years, the School hopes to move forward on a new building for the Grice Marine Lab at Fort Johnson. Plans are complete and most funding has been secured for this project.
## FACULTY WORKLOAD

### Enrollments 2015-2016

<table>
<thead>
<tr>
<th>Department</th>
<th>Fall 2015</th>
<th></th>
<th>Fall 2016</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>G</td>
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<td>G</td>
<td>U</td>
</tr>
<tr>
<td>Biology</td>
<td>128</td>
<td>4549</td>
<td>133</td>
<td>4482</td>
</tr>
<tr>
<td>Chemistry and Biochemistry</td>
<td></td>
<td></td>
<td>1819</td>
<td>1724</td>
</tr>
<tr>
<td>Computer Science</td>
<td>1049</td>
<td>1034</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geology and Environmental Geosciences</td>
<td>2234</td>
<td>2097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>48</td>
<td>3612</td>
<td>43</td>
<td>2848</td>
</tr>
<tr>
<td>Physics and Astronomy</td>
<td>628</td>
<td>567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geology Total</td>
<td>1819</td>
<td>1724</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Average Undergraduate Class Size (2015-2016 data not available)

<table>
<thead>
<tr>
<th>Department</th>
<th>Subject</th>
<th>Average Class Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>BIOL</td>
<td>28.4</td>
</tr>
<tr>
<td>Chemistry and Biochemistry</td>
<td>CHEM</td>
<td>22.1</td>
</tr>
<tr>
<td>Computer Science</td>
<td>CSCI</td>
<td>23.2</td>
</tr>
<tr>
<td></td>
<td>CITA</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>DATA</td>
<td>13.0</td>
</tr>
<tr>
<td>Geology and Environmental Geosciences</td>
<td>GEOL</td>
<td>30.5</td>
</tr>
<tr>
<td>Mathematics</td>
<td>MATH</td>
<td>29.7</td>
</tr>
</tbody>
</table>
Since the renovation of RHSC began we have noticed a slight dip in enrollments in BIOL and PHYS Intro courses and suspect the recent move to Harbor Walk may be responsible. Majors from other Schools who are completing science credits may be avoiding the trip to Harbor Walk and are instead registering for Geology or Chemistry courses offered in SSMB at 202 Calhoun Street.

Research-active faculty members in the School of Sciences and Mathematics teach a 3:3 course load, unless altered by special exception. In addition to teaching regularly scheduled classes and advising declared majors, faculty pursue research grants, mentor undergraduate research assistants, participate in external STEM outreach events, contribute to graduate and special programs such as Honors and First Year Seminar as well as interdisciplinary majors and minors such as Neuroscience, Environmental Studies, Science and Math for Teachers, and serve on departmental and College-wide committees. Instructors teach a 4:4 course load as well as participate in many of the same additional duties listed above.

In order to prepare major students for upper division courses, departments prefer to place roster faculty in introductory level courses. Unfortunately, the ability to make roster faculty available for foundation courses is limited by the need for their expertise in upper level and graduate courses. Last year in introductory lecture sections only 58% of our students across
SSM see a roster faculty member as their instructor. In larger departments, such as Biology, one unintended side-effect of these efforts, particularly when combined with support for Honors and FYE, is that junior and senior majors increasingly report difficulty finding seats in upper level major courses. The implementation of the popular Public Health major increased enrollment in Anatomy and Physiology making it increasingly difficult for Biology majors to complete this course. Additional sections of Anatomy and Physiology are desperately needed.

**Major Curriculum Revisions**

<table>
<thead>
<tr>
<th>BIOL</th>
<th>Addition of an Internship Course</th>
<th>Allows students to intern with professional biologists for course credit. Formalize participation with local partners.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI</td>
<td>Addition of an Internship Course</td>
<td>Establish a formal mechanism for faculty to monitor and establish learning outcomes as well a increase participation with local partners.</td>
</tr>
<tr>
<td>ENVT</td>
<td>Name Change</td>
<td>Change name from Environmental Studies to Environmental and Sustainability Studies to suit the changing academic landscape of how human-nature interactions are studied and researched in ENVT.</td>
</tr>
<tr>
<td>MATH</td>
<td>Addition of Graduate Certificate</td>
<td>Program deals with experimental data and model building.</td>
</tr>
<tr>
<td>EVSS</td>
<td>New course on wildlife law</td>
<td>Provides training in wildlife law which benefits the many students who go on to work for local, state, and federal entities who deal with wildlife regulations. Also provide an intro to international environmental law.</td>
</tr>
<tr>
<td>PHYS</td>
<td>New Meteorology program</td>
<td>Creation of a B.A. in meteorology, a concentration in operational meteorology, and a concentration in atmospheric physics.</td>
</tr>
</tbody>
</table>

**Research and Professional Development**

To date Science and Math faculty members obtained $2.75M in newly awarded research grants and continued work on $23M in ongoing grants. Grants received were from federal, state and private sources such as: National Science Foundation; US Fish and Wildlife Service; Medical University of South Carolina; Slocum-Lunz Foundation; SC Department of Natural Resources; National Oceanic and Atmospheric Administration (NOAA); Smithsonian Astrophysical Observatory at Harvard; National Aeronautics and Space Administration (NASA); US Geological Society; Mathematical Association of America; Howard Hughes Medical Institute; National Center for Science and Civic Engagement; SC State University; Simons Foundation; Belle W. Baruch Foundation.
SSM faculty published 253 articles in peer reviewed journals with an additional 42 accepted for publication. They presented their research at both national and international conferences. Multiple undergraduate students were published as co-authors who traveled to regional and national conferences to present posters. Research interests include:

Grants obtained for professional research can be found in Appendix A. Publications are reported to the Faculty Activity System. Special publications, conference proceedings, and patents can be found in individual department reports.

Service
In addition to department programs and standing committees (such as curriculum, scholarship, assessment, long range planning, and safety) many SSM faculty members provide service to College-wide committees and external professional organizations. More tenured faculty also hold national and regional offices within their discipline. Examples can be found in departmental reports.

Outreach
School of Sciences and Mathematics faculty, staff, and students participate regularly in STEM outreach activities throughout the Lowcountry and Tri-County area. Faculty host school groups on campus, organize public events, and visit local elementary and high schools to give presentations that inspire interest in higher learning in the STEM fields. Thanks to their efforts thousands of students in the Charleston County School District and beyond are exposed to natural and physical sciences, mathematics, and computer science each year.

The Mace Brown Natural History Museum continues to be a favorite field trip for hundreds of local school children, senior groups, clubs and organizations, homeschoolers, local citizens and fossil aficionados, and tourists. The museum displays more than 3,000 fossil specimens that demonstrate how the Earth and life on Earth has changed over the past 3.45 billion years. The museum was recently expanded to accommodate an exhibit that displays examples of whale evolution. Since opening in 2010, over 5000 local school children have enjoyed the museum. In December of 2015, MBNHM began displaying Bucky the T-rex, on loan from the Children’s Museum of Indianapolis. This attraction has significantly increased the number of visitors to the museum.

On February 19, 2016, the School of Sciences and Mathematics once again teamed up again with Athletics to provide hands-on activities to over 2000 local school children who attended the 4th annual STEM Education Day at TD Arena. Faculty representatives from all six department as well as staff and students were in attendance with bones, biological specimens, marine touch tanks, rock samples, chemistry experiments, robotics, and math puzzles designed to engage students one on one and excite their curiosity in the sciences and mathematics. Afterwards, students cheered on the Women’s Basketball team as they played. This popularity of this event demonstrates the need for STEM education outreach. Planning has already begun for 2015.
Christine Moore continued to facilitate Girls Day Out. The event, held on July 25, 2014 attracted 55 young women ages 12-14 from the Tri-County area to campus. The overnight experience is a collaborative partnership with SPAWAR Systems Center (SSC) Atlantic, the National Defense Education Program, Trident Technical College and College of Charleston. The girls and their parents learned about various STEM career opportunities, degree programs, and admissions requirements. The mission of this program is to provide participants with the opportunity to meet women working in STEM fields and to provide hands on activities that promote and encourage programs of study and careers associated with STEM.

The 2016 Darwin Week was held February 8-13, 2015 with an emphasis on teaching the controversy. As always lectures were provided by those in both the religious and scientific professions. Members of the College and Charleston communities packed venues to hear guest speakers who included: Jeremy Rutledge, Senior Minister, Circular Congregational Church; Lee Dugatkin, Professor of Biology, University of Louisville; Jon Hakkila, Professor of Physics & Astronomy, College of Charleston; John Hildebrand, Regents Professor of Neuroscience and Professor of Chemistry & Biochemistry, Entomology, and Molecular & Cellular Biology, University of Arizona in Tuscon; Emily Willoughby, writer and scientific illustrator.

For the second year in a row, students from the Tricounty area participated in Piccolo Darwin Week. Lectures tailored to elementary age children were offered at venues both on and off campus and we offered tours of the Natural History Museum that documented whale evolution as well as a hands-on simulated lab of virtual organisms.

This year’s Annual Math Meet was held on February 27, 2016 and attracted students from schools located in South Carolina, North Carolina, and Georgia. The College’s Math Meet started in 1978 and predates almost all other college sponsored high school mathematics competitions. It is designed to encourage students of all levels in their math studies. The Departments of Chemistry, Computer Science, and Physics also participate by offering events and demonstrations making the competition an all-day event that advertises the College and exposes students to the broader impacts of mathematics on the sciences.

The Lowcountry Hall of Science and Math (LHSM), the School’s educational outreach center, held the 36th Annual Lowcountry Regional Science and Engineering Fair on March 2016 at TD Arena. The Fair is open to students in grades 5-12 in Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties. Details regarding this event can be found in the LHSM’s annual report.

Cynthia Hall, Director of LHSM, served on the planning committee for the 3rd Annual Charleston STEM Fest, hosted by Lowcountry STEM Collaborative. The 2016 STEM Fest took place on February 6, 2016. Faculty from all six academic departments as well as student organizations participated by manning hands-on activities and performing experiments for guests. Over 8,000 people attending the festival held at Brittlebank Park. STEM Collaborative partners include Bosch, The Citadel, Boeing, Google, InterTech Group, The South Carolina Coalition for Mathematics & Science, Charleston Southern University, and STEMPremier.
CORAL (Community Outreach Research and Learning) Program at Grice Marine Lab, led by Pete Meier, exposes students of all ages to the local marine environment through regular on and off campus programs. CORAL conducts approximately 50 events each year that. In addition, CORAL regularly participates in group STEM outreach events. CORAL touch tanks have become a highlight of STEM education events throughout the Lowcountry.

Students from Mitchell Elementary made their annual visit to the School in January 2015 to experience hands-on science lessons. This event, now in its seventh year, provided learning opportunities in biology, chemistry, physics, and geology for over 200 students, grades 3-6. The 2-day field trip gave underrepresented students an intimate connection with the scientific process by working in fully equipped, state-of-the-art laboratories, with real scientists.

Faculty members regularly participate in outreach activities hosted by local and regional schools, career days, and science nights. Select educational outreach activities can be found in departmental reports.

ADDITIONAL INSTRUCTIONAL CONTRIBUTIONS

Contributions to the Honors College

The School’s commitment to the Honors College continues to grow. In 2014-2015 SSM faculty offered a total of 56 credit hours to the HONS curriculum. Offerings included:

- HONS 115: Honors Calculus
- HONS 151/151L: Honors Biology I/Lab
- HONS 152/152L: Honors Biology II/Lab
- HONS 155/155L: Honors Geology I/Lab
- HONS 156/156L: Honors Geology II/Lab
- HONS 159/159L: Honors Astronomy I/Lab
- HONS 160/160L: Honors Astronomy II/Lab
- HONS 293/293L: Honors Organic Chem II/Lab
- HONS 216: Conceptual Tour of Contemporary Mathematics
- HONS 294/294L: Mathematical Treatment of Equilibrium and Kinetics, Intro to Nuclear Chem/Chemical Principles Laboratory
- HONS 381: Computer Music on a Laptop
- HONS 499: Natural Fractal Structure, Independent Study

Contributions to the First Year Experience

The School also continued its strong commitment to the First Year Experience. Faculty participated in interdisciplinary learning communities as well as offer individual seminars. Offerings included:

- Learning Communities
  - CHEM 111 & 111L/Biol 111: Chemistry and Biology for Pre-Med Students
  - HTMT 210/MATH 104: Measuring the Impacts of Tourism in Charleston
• BIOL 111/PYSC 103: Gateway to Neuroscience
• BIOL 111/ENGL 110: Viruses and the Coming Apocalypse
• FYSE 108/PHIL 101: Philosophical Issues and Molecular Biology

- First Year Seminars
  • FYSE 108: Genetics and Society: What Your Genome’s Got to Do With It, BIOL
  • FYSE 112: The Science of Secrecy, CSCI
  • FYSE 127: Mathematics in Fiction, MATH
  • FYSE 130: Apocalypse to Warp Drive: Physics in Film, PHYS
  • FYSE 112: Android App Development, CSCI
  • FYSE 112: Technology, Innovation, and Sustainability, CSCI
  • FYSE 126: Technology Ventures, CSCI

**Distance Education**
The popularity of online courses in computer science and mathematics continues to grow and the two departments are responding to this need. In 2015-2016, the following online course offerings were made:

The need to provide hands-on laboratory experiences limits the feasibility of on-line courses in natural science programs. However, Biology was able to provide some online lecture courses for a second time this summer session. They were:

**Interdisciplinary Course/Course in Other Schools**
The School’s two interdisciplinary minors, Environmental Studies and Neuroscience, are shared with the School of Humanities and Social Sciences. Both continue to be popular among students and discussions to move both minors to a major continue. Enrollment for the Computing in the Arts major continues to grow and maintain support from the School of the Arts. Classes offered by the Department of Geology and Environmental Geosciences support an interdisciplinary major and minor in archaeology offered by the Schools of the Arts; Humanities and Social Sciences; Languages, Cultures, and World Affairs; and Sciences and Mathematics.

Although not a shared program, the Department of Biology now finds itself servicing large numbers of students from the School of Education, Health, and Human Performance (EHHP) who are majoring in Public Health, Exercise Science, and Athletic Training.

**International/Global Initiatives**
Summer study abroad programs for the 2015-2016 academic year included:

- **BAHAMAS**, Faculty Director Erik Sotka, BIOL: This program will begin with two days of Maymester at Grice Marine Laboratory (James Island, SC) and then travel to Gerace Research Marine Station in San Salvador, Bahamas for 13 nights. This marine laboratory has all the appropriate research and teaching facilities for intensive field exploration, husbandry of some organisms, and dissecting microscopes. Each day, students will have a lecture in the morning for 1-2 hours, travel to the field for 3-4 hours, and then come back to dissect and examine animals. San Salvador is a small island with easily accessible
marine (seagrass, coral reef, high-salinity inland lakes) and semi-terrestrial habitats (mangroves).

- **BRITISH VIRGIN ISLANDS**, Faculty Director Rusty Day, BIOL: This program allows students to study the biology, ecology, and conservation of the Caribbean coral reef ecosystem. This program is offered in partnership with the [Marine Science and Nautical Training Academy](#) (MANTA).

- **INDIA**, Faculty Directors Vijay Vulava and Timothy Callahan, GEOL: This course will focus on issues related to water resources and pollution along the Ganges River basin from the headwaters of the river in the Himalayas to its mouth near the Bay of Bengal. It has two focus areas: 1) water resource and hydrology principles that delve into specific issues, including impacts of river management for economic development and associated land use change effects on water resource availability, and 2) water quality principles that focused on natural and anthropogenic changes to the chemical character of the river water, and linkages between human and environmental health.

- **INDONESIA**, Faculty Director Phil Dustan, BIOL: This study abroad program is located in the province of Bali. It is designed to introduce students to the natural and human ecology of the tropics, explore the complex and distinctive natural features of tropical communities and to become familiar with ecological processes as they apply to tropical ecosystems.

- **PANAMA**, Faculty Director Craig Plante, BIOL: This combined lecture and lab course in Ecology is a biology core course and is required for Marine Biology majors. Students will spend approximately ½ week in Charleston and 2 ½ weeks in Panama, which will offer a significant portion of the laboratory in a tropical setting.

- **SOUTH AFRICA**, Faculty Directors Adem Ali and Cyndi Hall, GEOL: The Geology and Environment Field Experience: South Africa is a 2 1/2 week course designed to broaden students' geology and environmental experience by providing an opportunity for them to see firsthand some of the best geology in the world and some current environmental issues facing South Africa. This field camp will allow students to gain international field experience and learn about geology in new settings. The course will focus on the geology of South Africa in the vicinity of Cape Town and northeastern Johannesburg. Students will specifically study sections of South Africa, looking at rock exposures ranging in age from Proterozoic to Paleozoic to Modern, and perhaps a few sites in Namibia. There will also be visits to various sites of natural, cultural, and historical significance, including Sterkfontein World Heritage site and Kruger National Park.

**Additional Programs and Centers**

**The BEEnthic Acoustic Mapping and Survey (BEAMS)** Program completed its 9th year at the College. Housed within the Department of Geology and Environmental Geosciences, the program trains geology and marine biology students in the use of state-of-the-art technology and software, to study in detail the ocean’s seafloor. The program is designed to address the omnipresent need for qualified ocean surveyors to support the expanding academic opportunities and job market in bathymetric mapping, seafloor habitat characterization, hydrography, marine spatial planning, water column process, marine geology and geophysics.
research, and remote observation of the ocean’s variability through time. The College’s BEAMS student alumni have become recognized internationally for their knowledge of and experience with mapping technologies.

**Santee Cooper Geographic Information Systems Laboratory** is a center for excellence in geographic information systems (GIS) and remote sensing. It supports undergraduate, graduate, and faculty teaching and research, facilitates education and outreach, and trains students in GIS software. The lab also provides data and support for community and regional groups:

- SCGIS maintains a base station on the roof of the science building that serves as part of the state’s emergency management plan allowing first responders to use differential GPS during emergencies and disasters.
- The lab is a source of information about the Charleston Seismic Zone providing educational information for K-higher education users as well as the general public.
- A partner of the United States Geologic Survey, the Center is a data site for the National Map program.
- The lab supports FEMA’s HAZUS-MH program by holding certification workshops at the College.
- The lab supports the South Carolina Arc Users Group and South Carolina Mapping Advisory Committee.
- The lab supports South Carolina Earthquake Education and Preparedness.

**South Carolina Space Grant Consortium (SCSGC)** is part of a nationwide network that promotes aerospace research, K-12 and college education, and public awareness of NASA mission directorate initiatives. Within the larger context of national STEM initiatives, SCSGC promotes activities in research, education, and public engagement related to NASA’s mission. The College of Charleston serves as the lead institution for the SCSGC and SC NASA EPSCoR and the College acts as the Consortium’s legal and fiscal agent for both programs. SCSGC’s goals and objectives are: to increase access and understanding of space, Earth systems science, biological sciences, and aeronautics; encourage cooperative programs among colleges and universities, state organizations, business and industry, and pre-college interests; enhance interdisciplinary research, education and public service activities; recruit and train students, educators, and professionals, especially women and underrepresented groups; promote a strong STEM base in SC education; facilitate statewide communication of NASA opportunities and programs. Students who work closely with this program have gone on to internships and jobs with NASA’s Goddard Space Center and Johns Hopkins Applied Physics Laboratory.

**Lowcountry Hall of Science and Math** is the education/public engagement arm of the College of Charleston’s Schools of Sciences and Mathematics (SSM), serving as a critical bridge between science and math faculty and educators. The LHSM provides a mechanism for communication and collaboration between SSM, the School of Education, Health and Human Performance (EHHP), regional educators, and the general public. The philosophy of the LHSM is providing the classroom teacher with a strong science and math education, the
first step in achieving a solid knowledge base and hands-on understanding of the natural world.

Since its inception in 1997, the LHSM has reached tens of thousands of students through the Lowcountry Regional Science and Engineering Fair (hosted by LHSM), SSM open houses at the College of Charleston, Community-wide STEM Festivals and Education Days, Science and Math nights, etc. The LHSM has reached thousands of teachers through STEM professional development opportunities and as a resource library of STEM curricula for pre- and in-service teachers.

The Lowcountry Regional Science and Engineering Fair was held on April 5, 2016 and showcased 79 projects from 120 students, grades 5-12, from 13 schools in Charleston, Colleton, Dorchester, and Georgetown counties. Faculty from SSM participated as judges.

**South Carolina Earthquake Education & Preparedness Program (SCEED)** is composed of Geology faculty members whose broad research interests encompass everything from the cause of earthquakes to their likely effects and then share that information with the public and the appropriate emergency management groups. The group is funded by the SC Emergency Management Division and is responsible for promoting earthquake safety and examining hazards on a statewide basis.

**DIVERSITY**

**Faculty Recruitment Efforts**
The School’s roster of 137 faculty members consists of 31% female, the largest underrepresented group in STEM fields, and approximately 10% of ethnicities other than Caucasian or of foreign descent. A comparison of recent percentage of women and minorities receiving terminal degrees in various STEM fields, and our employment percentages in those fields is shown below. The comparison shows that SSM is a leader in providing fair employment opportunities to both demographic groups.

<table>
<thead>
<tr>
<th>CIP</th>
<th>Discipline</th>
<th>Minorities</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IPEDS</td>
<td>CofC</td>
</tr>
<tr>
<td>11</td>
<td>Computer and Information Science and Support Services</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>26</td>
<td>Biological and Biomedical Sciences</td>
<td>18%</td>
<td>3%</td>
</tr>
<tr>
<td>27</td>
<td>Mathematics and Statistics</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>40</td>
<td>Physical Sciences</td>
<td>10%</td>
<td>14%</td>
</tr>
</tbody>
</table>

When advertising for faculty positions, search chairs allocate additional funds to advertise in media available to minority audiences such as the Association for Women in Science and the Society for the Advancement of Native Americans and Chicanos in Science and the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers. Advertisements are also sent to institutions known to have large numbers of minority PhD
students such as Howard University, Alabama A&M, Florida International University, and University of Puerto Rico. Academic requirements remain a priority in regards to potential hires.

During the 2015-2016 academic year four, new roster faculty members began teaching in four of the six academic departments.

- CHEM: Assistant Professor, Michael Giuliani, Caucasian Male, Ph.D. University of Wisconsin, Postdoctoral Associate, Yale University
- CSCI: Assistant Professor, Brent Munsell, Caucasian Male, Ph.D. University of South Carolina
- CSCI: Assistant Professor, Aspen Olmsted, Caucasian Male, Ph.D. University of South Carolina
- GEOL: Associate Professor, Philip Manning, Caucasian Male, Ph.D. University of Sheffield, UK
- GEOL: Senior Instructor, Robin Humphreys, Caucasian Female, M.S. University of Charleston

**Student Diversity Efforts**

The South Carolina Alliance for Minority Participation (SCAMP) is an initiative of the National Science Foundation and is aimed at encouraging minorities to pursue degrees in STEM areas. A major goal of the program is to increase the number of underrepresented minorities receiving baccalaureate degrees in these areas. The long-term goal is to increase the number of students matriculating in graduate studies in STEM fields. It is a subset of the Louis Stokes-AMP national program. In South Carolina, the consortium is made up of the College of Charleston and nine other institutions of higher learning, with South Carolina State University serving as the lead institution.

The Summer Bridge Program for SCAMP is held in conjunction with SPECTRA during Summer II Session. SCAMP students register for the college level Pre-calculus and accompanying Lab and work with tutors to help them succeed. The department of chemistry and biochemistry began offering a pre-CHEM 111 course for twelve students who participated in the SCAMP/SPECTRA Summer Bridge program, CHEM 103. The participating students in this course for the past three summers had an average CHEM 111 grade of 3.06. The average Fall CHEM 111 grade is 2.6-2.7. The average Fall CHEM 111 grade for underrepresented minorities students is 1.89. Some recent graduate accomplishments include:

- Casey Wadsworth ’14: Accepted to MUSC College of Medicine
- Lidoshka Marc ’14: Employed at Mead Westvaco as Associate Applications Chemist
- Tomika Caldwell ’14: Attending MS Immunology program at MUSC
- Briosha Sanders ’14: program Assistant of Expecting Health, at Genetic Alliance in Washington, DC
- Jan Enabore ’14: Accepted to USC Greenwood Medical School
- Tiffani Smalls ’14: Studying Nursing at MUSC
- Joye Nettles ’15: Software Developer at ThoughtWorks
**Women in Computing** is an initiative of the Department of Computer Science. Despite the high female population at the College as a whole, the majority of majors in computer science disciplines are males. The goal of this new organization is to increase the number of female majors by focusing on female mentoring by female faculty. Under the direction of RoxAnn Stalvey, number of female majors in the department has risen to 24% of its student body. The national average is 18%.

Two external grant programs, the Howard Hughes Medical Institute (HHMI) and the South Carolina National Institutes of Health IDeA Networks of Biomedical Research Excellence (SC INBRE), help support undergraduate research and in particular emphasize the inclusion of underrepresented minorities.

The School's complete diversity report can be found in Appendix B.

**ASSESSMENT ACTIVITIES**

Assessment takes place at both the school-wide and departmental/programmatic levels. School-wide assessment studied outcomes involving instruction in our introductory general education courses, students participated in undergraduate research, laboratory safety, admission to professional schools, outreach, and faculty research productivity. The results show that we need additional lines to provide roster faculty to teach in introductory lectures and thus lessen our dependency on adjuncts (44% of intro students are taught by adjuncts), that we continue to provide research opportunities to over 200 students each year and that we require more resources to provide similar opportunities to more students (234 for credit in FY14, 217 for credit in FY15, 422 in FY16), that our safety efforts continue to improve (departmental safety committees are becoming more active), that we reached over 26,400 people through our outreach activities, and that faculty secured over 6.4 million dollars in external grant funds, publishing 264 peer-reviewed articles. Departments assessed aspects of their program that were important to them. The School's complete assessment report can be found in Appendix C.

**STUDENT ACCOMPLISHMENTS**

**Undergraduate/Graduate Research**

Undergraduate research remains a priority and a high impact experience for Science and Math majors. This experience often results in students presenting their research findings at regional and national conferences and/or being published alongside their faculty mentors in peer reviewed journals. This credit is invaluable for graduate and professional health school applications and further prepares students for their graduate studies. Each year approximately 250 students work in a research lab with approximately 50 experiences resulting in student author credit on an article published in a refereed scientific journal.

In November 2015, the School held its now annual research match-making session which introduced faculty mentors to undergraduates eager for a high impact research experience. Approximately 150 students stopped by to meet with researchers from our six academic
departments and the Medical University of South Carolina. Dozens of students were matched to a faculty mentor and began working in labs in Spring 2016.

SSM students were awarded a total of 45 research grants from the Office of Undergraduate Research and Creative Activities. These grants provide funds for materials, stipends for summer research, and cover travel fees to conferences and meetings. A complete list of awards and abstracts can be found at [http://urca.cofc.edu/glance-at-research/index.php](http://urca.cofc.edu/glance-at-research/index.php).

The 28th Annual Undergraduate Research Poster Session featured 126 posters representing the work of over 200 authors. A complete list of abstracts can be found at [http://ssm.cofc.edu/additional-programs/poster-session/abstracts/index.php](http://ssm.cofc.edu/additional-programs/poster-session/abstracts/index.php). SSM students also presented at campus events such as the Graduate School Poster Session, Neuropalooza, and Celebration of Scholars.

Students presented research at regional and national conferences often winning scholarships and awards. Conferences and meetings include: SYNAPSE annual meeting; Society for Integrative Comparative Biology; American Chemical Society; US HYDRO Conference; American Fisheries Society Southeastern Division; Southeastern Society of Parasitologists; Southeastern Developmental Biology Conference; Southeast Environment Meeting; Lunar and Planetary Sciences Conference; Geological Society of America; USA CARIS 2016 Conference.

**Medical School Acceptances**

The 2015-2016 academic year saw an increase in student activity drawn from a pool of prospective students, currently enrolled students, transfer students, and alumni. An average of 25 students per week visited the Health Professions Advising Office. Of these, 124 students were accepted to professional schools including clinical programs in the following areas: medicine, dental, veterinary, pharmacy, allied health, and nursing. 45 students were accepted to medical schools (both MD and DO). Trends in medical school applications are changing and approximately 50% of students are applying the year they graduate rather than starting medical school immediately after graduation; taking a gap year. This trend has been well received by medical schools, but it presents new challenges in accurate student tracking.

Since the launch of Banner, the College’s software system, the pre-health category helps to identify and track incoming pre-health students. As of June 2015, more than 700 students were designated as pre-health students with an assigned pre-health advisor. Pre-Health Peer Mentors have recently been made available to make pre-health information more accessible to all interested pre-health students at the College. Student to student interaction has proven to be very successful.